University of Illinois at Urbana-Champaign
Facilities & Services
Division of Safety and Compliance

Confined Space Entry Policy

Reviewed April 2014
# UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
## CONFINED SPACE ENTRY POLICY

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Appendix A  Permit-Required Confined Spaces – 29 CFR 1910.146

Appendix B  Example Unit-Specific Confined Space Entry Program
I. PURPOSE

The University of Illinois at Urbana-Champaign (U of I), through the Division of Safety and Compliance (S&C), has established this Confined Space Entry Policy to protect the health of University employees and to assure compliance with State and Federal occupational safety and health standards, particularly the Confined Space Entry Standard of the Occupational Safety and Health Administration (OSHA) located in 29CFR 1910.146 and enforced at the U of I by the Illinois Department of Labor.

This Confined Space Entry Policy provides the minimum requirements for Unit-Specific Confined Space Entry Programs including the U of I policy on administration, hazard evaluation and selection, training, inspection and record keeping. In addition, responsibilities are outlined for S&C, Deans and Directors, Unit Heads, Supervisors and Employees, Confined Space Competent Person, and the designated rescue employee. It is expected that Campus Units utilizing the Confined Space Entry standard will develop Unit-Specific Confined Space Entry Programs and site-specific written standard operation procedures (SOP) to complement this general policy. S&C can assist Campus Units in developing their Programs and SOPs.

II. POLICY

It is the policy of the U of I to provide its employees with a safe and healthful working environment. This is accomplished as far as feasible with acceptable work practices and administrative controls.

III. SCOPE

The provisions of the Confined Space Entry Policy shall apply to all employees who have to enter a Confined Space. Examples of Confined Spaces include, but are not limited to the following: Storage tanks, furnaces, boilers, pits, ducts, sewers, manure pits, hoppers, silos, large pipelines, vaults, dikes and open surface tanks.

IV. RESPONSIBILITIES

The Division of Safety and Compliance shall:
A. Develop a written Confined Space Entry Policy and review it on an annual basis.
B. Conduct a hazard evaluation of confined spaces upon request and as needed to ensure adequate protection of employees.
C. Provide Campus Units assistance with creation of Unit-Specific Confined Space Entry Programs and site-specific standard operating procedures.
D. Assist Campus Units in the selection of appropriate equipment for Confined Space Entry.
E. Provide or assist in the arrangement of training on Confined Space Entry procedures for supervisors and employees.
F. Assist Campus Units in establishing proper training record retention procedures as outlined in Section VIII. Training Requirements.
Deans, Directors of Academic and Administrative Units and Department Heads of facilities with confined spaces shall:

A. Ensure that the Unit-Specific Confined Space Entry Program meets the requirements of the general guidelines of this Confined Space Entry Policy and applicable OSHA regulations.
B. Provide fiscal and administrative resources for the implementation of their Unit-Specific Confined Space Entry Program.
C. Ensure that all personnel affected by confined spaces receive the proper training.
D. Designate a Confined Space Competent Person that will be responsible for implementing the Unit-Specific Confined Space Entry Program and ensuring compliance with applicable OSHA regulations.

Confined Space Competent Person shall:

A. Understand the requirements of this Confined Space Entry Policy and applicable OSHA regulations.
B. Have the knowledge and/or experience to create, maintain, revise, implement, and enforce the Unit-specific Confined Space Entry Program.
C. Attend training, as needed, to enforce the requirements of the Unit-Specific Confined Space Entry Program.
D. Identify personnel who require confined space entry training.
E. Train or arrange training for all affected personnel on the requirements of the Unit-Specific Confined Space Entry Program.
F. Coordinate training for supervisors, attendants, and entrants in accordance with the requirements outlined in Section VIII Training Requirements.
G. Ensure that the requirements of the Unit-Specific Confined Space Entry Program are followed.
H. Maintain a training record for all employees that have been trained in the components of the Unit-Specific Confined Space Entry Program.

Supervisors of employees who may be required to comply with the Unit-Specific Confined Space Entry Program shall:

A. Attend training on the requirements of the Unit-Specific Confined Space Entry Program and requirements outlined in Section VIII Training Requirements.
B. Identify personnel who require confined space entry training and ensure that they have received the proper training before allowing entry into a confined space.
C. Understand and follow the protocols of this Confined Space Entry Policy, Unit-Specific Confined Space Entry Program, and site-specific standard operating procedures.
D. Ensure that the requirements of the Unit-Specific Confined Space Entry Program are followed.

Affected employees shall:

A. Attend training on the requirements of the Unit-Specific Confined Space Entry Program and requirements outlined in Section VIII Training Requirements.
B. Know and understand the associated hazards of a confined space.
C. Understand and follow the protocols of this Confined Space Entry Policy, Unit-specific Confined Space Entry Program, and site-specific standard operating procedures.

V. DEFINITIONS

Acceptable entry conditions: The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

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.

Blanking or blinding: The absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstand ing the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined space: A space that is:
A. Large enough and so configured that an employee can bodily enter and perform assigned work;
B. Has limited or restricted means for entry or exit; and
C. Is not designed for continuous employee occupancy.

Double block and bleed: The closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

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 that can exert enough force on the body to cause death by suffocation, strangulation, constriction, or crushing.

Entry: The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry Permit: The written or printed document that is provided by the employer to allow and control entry into a permit space.
Entry Supervisor: The person (such as the employer, foreman, or crew chief) 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.

Hazardous Atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self rescue, injury, or acute illness from:
   A. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);
   B. Airborne combustible dust at a concentration that meets or exceeds its LFL;
   C. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
   D. Toxic atmosphere; or
   E. Any other atmospheric condition that is immediately dangerous to life or health.

Hot Work Permit: The employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

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

Inerting: The displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

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

Line Breaking: The intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

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 serious physical harm.

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

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

Permit Required Confined Space: A confined space that has one or more of the following characteristics:
   A. Contains or has a potential to contain a hazardous atmosphere;
B. Contains a material that has the potential for engulfing an entrant;
C. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a small cross section; or
D. Contains any other recognized serious safety or health hazard.

**Permit-Required Confined Space Program:** The employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

**Permit System:** The employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

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

**Rescue Service:** The personnel designated 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 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.

**Toxic Atmosphere:** An atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in 29 CFR 1910 Subpart G, Occupational Health and Environmental Control, or in 29 CFR 1910 Subpart Z, Toxic and Hazardous Substances, which could result in employee exposure in excess of its dose or permissible exposure limit.

**VI. GENERAL REQUIREMENTS**

**Identification and Evaluation of Confined Spaces**
Each Campus Unit shall conduct a survey of their premises and/or operations to identify confined spaces in the workplace. The survey shall be conducted by a qualified person and all spaces identified shall be classified as “Permit-Required Confined Spaces” or “Non-Permit Required Confined Spaces” as defined by this Policy. Each classification must be approved by the Campus Unit's Confined Space Competent Person in writing. If there are any questions regarding whether or not any space is a confined space, contact Safety and Compliance prior to entry at 265-9828.

**Non-Permit Required Confined Spaces**
If only non-permit required confined spaces are to be entered, the Campus Unit need not develop a Unit-Specific Confined Space Entry Program, an Entry Permitting System, Rescue and Emergency Services, Training Requirements, or Responsibilities for Authorized Entrants, Attendants and Entry
Supervisors. However, all affected employees should be trained on hazard identification. Prior to each entry into a non-permit required confined space, the space must be evaluated for changes to the space that may be hazardous to the entrants. When there are changes in the use or configuration of a non-permit space that could increase the hazards to entrants, the employer must reevaluate the space and reclassify it as permit-required if necessary.

**Permit Required Confined Spaces**
If any Permit-Required Confined Spaces are identified, all exposed employees shall be notified of such findings by posting warning signs reading “PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER”, or similar language in the vicinity of the space or by some other effective means. If the Unit decides Unit personnel will not enter the permit spaces then the Campus Unit must take effective measures to prevent such entry.

**Reclassification**
A permit-required confined space can be reclassified to a non-permit space under the following conditions:

A. Demonstrate and document that the permit space poses no actual or potential atmospheric hazards and all other hazards can be eliminated without entry into the space; or

B. Demonstrate and document that previous testing and inspection of the permit-space demonstrates that all hazards within have been eliminated.

*(Note: control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards.)*

The Campus Unit must document in writing the reclassification process and the reclassification must be approved, via signature, by the designated Confined Space Competent Person.

### VII. Confined Space Entry Program

If Unit personnel will enter permit-required spaces, then a Unit-Specific Confined Space Entry Program must be developed and implemented.

**Program Elements**
The required program shall be developed and implemented by the Campus Unit’s Confined Space Competent Person. The program shall include all of the following elements:

A. Implement the steps necessary to prevent unauthorized entry into such spaces;

B. Identify and evaluate the hazards of permit spaces before employees enter;

C. Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including but not limited to the following:

1. Specifying acceptable entry conditions;
2. Isolation (Lockout/Tagout) of the permit space;
3. Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;
4. Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and
5. Verifying that conditions in the permit space are acceptable for entry throughout the duration of the authorized entry.

D. Each Campus Unit shall review their Confined Space Entry Program annually and make all necessary changes to ensure that employees are protected. The review should include at a minimum, review the Program document, canceled permits, SOPs, and other associated permits (e.g., hot work permits used in conjunction with a confined space entry permit).

Responsibilities of Employees Involved in Confined Space Entry Operations

Entry Supervisor: the Campus Unit shall ensure that each Entry Supervisor understands the requirements of the Unit-Specific Confined Space Entry Program and is capable of the following:

A. Knowing the hazards that may be present or exist during entry, including information on the routes of potential exposure (i.e. inhalation, skin contact, etc); signs or symptoms, and consequences of the exposure.

B. Verifying that the appropriate entries have been made on the permit, that all tests specified on the permit have been completed, and that all equipment required on the permit have been provided and are being used.

C. Terminating the permit and canceling the permit as required by the Entry Permit System subsection.

D. Verifying that the rescue services are available and that the means of summoning them are operable.

E. Removing unauthorized individuals who enter or who attempt to enter the permit space during entry operations.

F. Determining that entry operations remain consistent with the terms of the permit and that acceptable entry conditions are maintained.

G. Providing all canceled permits to the employer for filing purposes.

Authorized Entrants: employees who are required to enter a Permit-Required Confined Space shall complete the following:

A. Request a Confined Space Entry Permit from the Supervisor for entry and/or work to be performed in permit required confined spaces.

B. Implement the precautions identified on the Confined Space Entry Permit prior to entry.

C. Obtain the approval of the Supervisor prior to entry.

D. Know the hazards that may be present or exist during entry, including: Information on the routes of potential exposure (e.g., inhalation, skin contact, etc), signs or symptoms, and the consequences of the exposure.

E. Properly use all the required equipment.

F. Properly wear chest or full-body harnesses, and in certain circumstances, wristlets, as retrieval equipment.

G. Alert the Attendant whenever you recognize any warning sign or symptom of exposure to a dangerous situation or detect a condition that is not allowed by the permit.

H. Evacuate the permit space as quickly as possible if:
   1. An order to evacuate is given by the Attendant or the Supervisor;
   2. The Entrant recognizes any warning sign or symptom of exposure to a dangerous situation;
3. The Entrant detects a condition that is not allowed by the permit; or
4. An evacuation alarm is activated.

I. Return the confined space entry permit to the Supervisor when the work is completed.

Attendants: employees required to act in the role of an Attendant as defined by this Policy shall complete the following:
A. Know the hazards that may be present or exist during entry, including information on the routes of exposure (i.e. inhalation, skin contact, etc.), signs or symptoms, and consequences of the exposure.
B. Be aware of the possible behavioral effects of hazard exposure in authorized entrants.
C. Monitor and maintain the safety of the Authorized entrants inside the confined space at all times.
D. Continuously maintain an accurate count of the Authorized Entrants in the permit space.
E. Remain outside the permit space during operations until relieved by another Attendant.
F. Post the permit on or near the confined space and assure that the conditions stipulated on the permit are being met. Unauthorized persons shall be warned to stay away from the space.
G. Know how and where to activate the rescue service requirements.
H. Communicate with Authorized Entrants as necessary to monitor the entrant status and to alert entrants of the need to evacuate the space.
I. Order the evacuation of the confined space if:
   1. A condition which is not allowed on the permit is observed.
   2. If the Authorized Entrant exhibits behavior effects indicative of hazard exposure.
   3. A situation outside the space is detected which could endanger those who are working inside the space.
   4. An uncontrolled hazard is detected inside the space.
   5. The Attendant can not effectively and safely perform all of the required duties.
J. Render any medical aid that can be done safely.
K. An attendant should never enter a confined space in an emergency unless they are equipped and trained with suitable emergency equipment and back up personnel.
L. Perform no duties that might interfere with the primary duty to monitor and protect the Authorized Entrants.
   (Note: Passing tools to Authorized Entrants and monitoring the atmosphere of the permit space are permitted provided the Attendant does not break the plane of an opening into a confined space.)

Entry Permit System
Each Campus Unit shall develop a permitting system which, at a minimum, meets the requirements of this section.

Before entry is allowed into a Permit-Required Confined Space, the Entry Supervisor shall obtain and complete a Confined Space Entry Permit. Upon completion of this permit the Entry Supervisor shall sign it to allow entry. The completed permit shall be made available to all authorized entrants or their representative by posting it at the entrance of the confined space or via some other effective means.
The entry permit used shall include at a minimum the following elements:

A. The permit space to be entered;
B. The purpose of the entry;
C. The date and the authorized duration of the permit. Duration shall be limited to the time required to complete the assigned work;
D. The identification of the authorized entrants allowed into the confined space by name or other effective means which allow the attendant to quickly determine who is in the space;
E. The personnel, by name, who is currently acting as the attendant(s);
F. The individual by name who is currently acting as the entry supervisor with a space for his/her signature;
G. The hazards associated with the permit space;
H. The steps used to isolate and eliminate the hazards associated with the permit space;
I. The acceptable entry conditions;
J. The results of the initial and periodic atmospheric tests required by this Policy along with a space for the initials of the employee(s) who performed the testing;
K. The rescue and emergency services which can be summoned and the means to summon them;
L. The communication procedures used by authorized entrants and attendants used to remain in constant contact with one another;
M. Any additional necessary information:
N. Any additional permits (e.g., hot work permits) that have been issued to authorize work within the space.

The Entry Supervisor shall terminate the entry and cancel the permit when either of the following conditions occurs:

A. The entry operations covered by the entry permit have been completed; or
B. A condition that is not allowed by the permit arises in or near the permit space.

The Confined Space Competent Person shall retain a copy of each canceled permit for one year after its termination. Canceled copies will be used in the annual evaluation of the Unit-Specific Confined Space Entry Program and any special conditions or hazards noted during the entry will be noted on the permit.

**Entry Procedures**

Each Campus Unit shall develop procedures for entry into a permit-required confined space. At a minimum the procedures shall include steps to:

A. Evaluate the permit space prior to allowing employees to enter and periodically throughout the time an employee occupies the permit space to ensure that acceptable entry conditions are maintained.
B. Continuously monitor the permit space for acceptable entry conditions when the permit space cannot be isolated (e.g., a sewer system).
C. Test the atmosphere by testing for oxygen first, then for combustible gases and vapors, and then for toxic gases and vapors.
D. Provide at least one attendant outside of the permit space.
E. Designate the responsibilities of the employees involved in the permit space entry. These responsibilities are outlined in the subsection on Responsibilities of Employees Involved in Confined Space Entry Operations.
F. Develop and implement procedures for summoning rescue and emergency services to the permit space in the event of an emergency and shall instruct unauthorized personnel not to attempt rescue which requires entry into the permit space.
G. Review the procedures involved in the permit space entry if it is believed the measures taken do not protect employees and revise the program as necessary.

Entry Equipment
Campus Units must provide equipment necessary to safely enter a permit space as well as training necessary to ensure the equipment is used properly to affected employees at no cost. Campus Units are also responsible for ensuring proper maintenance of the equipment. The following equipment shall be provided:

A. Atmospheric testing and monitoring equipment;
B. Forced air ventilation equipment;
C. Communications equipment;
D. Lighting equipment needed to enable employees to work safely within the permit space and exit said space quickly in the event of an emergency;
E. Barriers and shields necessary to prevent pedestrian and vehicular access;
F. Ladders;
G. Rescue equipment such as fall arrest systems and retrieval devices as required in Section IX. Rescue and Emergency Services; and
H. Miscellaneous personal protective equipment such as eye protection, foot protection, head protection, etc. as necessary to work safely within the confined space.

Alternate Entry Procedures
Alternate Procedures may be used for entering a confined space if it can be demonstrated that:
A. The only hazard faced by employees entering the space is an actual or potential atmospheric hazard;
B. Continuous forced air ventilation alone is sufficient to maintain the permit space safe for entry; and
C. Monitoring and inspection data have been developed to support items A and B of this subsection. This information must be documented in writing by the Confined Space Competent Person and made available to all employees required to enter the permit space.

If only alternate procedures are to be used, the Campus Unit need not develop a Confined Space Entry Program, an Entry Permitting System, Rescue and Emergency Services, or Responsibilities for Authorized Entrants, Attendants and Entry Supervisors.

An employer who uses alternate procedures must train his/her employees in accordance with Section VIII. Training Requirements.
Entry into a confined space using Alternate Procedures shall comply with the following:

A. If an initial entry into the confined space is required to verify that alternate procedures can be safely used, such entry shall be accomplished in accordance with the subsection on Identification and Evaluation of Confined Spaces and Section VII. Confined Space Entry Program. Any conditions making it unsafe to remove or open an entrance cover shall be eliminated before the cover is removed.

B. When an entrance cover is removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary means which prevent people and tools from accidentally falling into the confined space.

C. Before employees are allowed to enter the confined space, the atmosphere within shall be tested to be certain that it is acceptable as defined within this Policy (see DEFINITIONS). The testing instrument shall be a calibrated direct-reading instrument which samples for the following elements in the order given:
   1. Oxygen content,
   2. Flammable/combustible gases and vapors, and
   3. Potential toxic air contaminants.

D. There may be no atmospheric hazards within the confined space at any time the employee is within.

E. Continuous forced air ventilation shall be provided using a clean source of air for the entire time the employee is within the confined space. Such ventilation shall be so directed as to ventilate the immediate areas where the employee is and cannot increase or create the hazards within the space.

F. The atmosphere within the confined space shall be periodically tested to ensure that an acceptable atmosphere is being maintained. Continuous monitoring is recommended.

G. If at any time an unacceptable atmospheric condition is detected the following shall occur:
   1. Each employee within the space shall leave the space immediately;
   2. The space shall be evaluated to determine the source(s) of the air contaminant; and
   3. The employer shall take all steps necessary to eliminate and prevent the unacceptable atmospheric conditions from recurring.

When Alternate Procedures have been approved for a confined space, the assessment and approval process shall be documented in a written certification that contains, at a minimum, the date, the locations of the space, and the signature of the Confined Space Competent Person certifying that the space meets the criteria to be an Alternate Procedures confined space. The written certification shall be made before employees are allowed to enter the confined space and shall be made available to each employee who enters.

Coordination with Contractors
Whenever there are outside personnel (contractors) hired to work within a permit space, the host Campus Unit must:

A. Advise the contractor of the existence of the permit space(s) and that entry into the space must meet the requirements of 29 CFR 1910.146;

B. Advise the contractor of all known hazards associated with the permit space(s);
C. Advise the contractor of any precautions the host employer uses to protect employees when they are working near the permit space;
D. Coordinate work activities with the contractor, when both the Unit personnel and the contractor personnel are working near the permit space;
E. Debrief the contractor at the conclusion of the entry operations regarding the Unit-Specific Confined Space Entry Program followed and regarding any hazards confronted or created in permit spaces during entry operations; and
F. Develop and implement procedures to coordinate the entry operations when the employees of more than one employer are working in the same permit space.

Non-Entry Rescue

To facilitate non-entry rescue, also referred to as retrieval, each authorized entrant and attendant shall be provided and use a retrieval system which meets the following requirements:

A. 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 entrants head. Wristlets may be substituted for the chest or full body harness if the Confined Space Competent Person can demonstrate that the use of said devices is infeasible or creates a greater hazard to the entrant.
B. The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the attendant becomes aware that rescue is needed. A mechanical device shall be available to retrieve personnel from all vertical type permit space which are more than 5 feet deep.
C. Non-entry rescue shall not be attempted if:
   1. The entrant would be dragged around a corner or between obstacles; or
   2. If you suspect that the entrant has sustained a head or neck injury.

*Exception:* If the employer can demonstrate that the required retrieval equipment would increase the overall risk of the entry or would not contribute to the rescue of the entrant a retrieval device need not be provided.

VIII. Training Requirements

Training will be provided to all employees affected by this Policy so that they may acquire the understanding, knowledge and skills necessary for the safe performance of their assigned duties.

Training will be provided to all affected employees as follows:

A. Before employees are first assigned permit space duties.
B. Before there is a change in assigned duties.
C. Whenever there is a change in permit space operations that presents a hazard for which an employee has not previously been trained.
D. Whenever the department has reason to believe either that there are deviations from the permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.
E. Whenever there is a reclassification of a permit-required confined space, alternative procedure confined space, or a non-permit confined space.
F. The training will establish employee proficiencies in their required duties and shall introduce new or revised procedures, as necessary. The training content for each employee affected by this Policy is listed below.

Authorized Entrants shall be trained on:

A. The hazards that may be faced during entry;
B. The routes of exposure (e.g., inhalation, dermal, etc), signs or symptoms, and consequences of the exposure (refer to the Material Safety Data Sheets);
C. The use of the following equipment:
   1. Testing and monitoring equipment;
   2. Ventilating equipment;
   3. Communications equipment;
   4. Personal protective equipment;
   5. Lighting equipment;
   6. Barriers and shields;
   7. Equipment needed for safe access and egress (e.g., ladders);
   8. Rescue and emergency equipment; and
   9. Any other equipment necessary for safe entry into and rescue from permit spaces;
D. The duties required of an Authorized Entrant; and
E. The requirements of the Unit-Specific Confined Space Entry Program.

Attendants shall be trained on:

A. The hazards that may be faced during entry;
B. The routes of exposure (e.g., inhalation, dermal, etc), signs or symptoms, and consequences of the exposure (refer to the Material Safety Data Sheets);
C. The use of the following equipment:
   1. Testing and monitoring equipment;
   2. Ventilating equipment;
   3. Communications equipment;
   4. Personal protective equipment;
   5. Lighting equipment;
   6. Barriers and shields;
   7. Equipment needed for safe access and egress (i.e. ladders);
   8. Rescue and emergency equipment; and
   9. Any other equipment necessary for safe entry into and rescue from permit spaces;
D. The behavioral effects of hazard exposure in Authorized Entrants;
E. Procedures for continuously maintaining an accurate count of Authorized Entrants in the permit space;
F. Procedures for being relieved Attendant duties;
G. Communication procedures with Authorized Entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space;
H. Procedures to monitor activities inside and outside the confined space to determine if it is safe for entrants to remain in the space and to evacuate the Authorized Entrants from the permit space immediately under the following conditions:
1. The detection of a prohibited condition;
2. The detection of behavior effects of hazard exposure in an Authorized Entrant; and
3. The detection of a situation outside the space that could endanger the Authorized Entrants;
I. Procedures for summoning rescue and other emergency services; and
J. Procedures for dealing with unauthorized persons that approach or enter a permit space while entry is underway;
K. The duties required of an Attendant; and
L. The requirements of the Unit-Specific Confined Space Entry Program.

Entry Supervisors shall be trained on:
A. The hazards that may be faced during entry;
B. The routes of exposure (e.g., inhalation, dermal, etc), signs or symptoms, and consequences of the exposure (refer to the Material Safety Data Sheets);
C. The use of the following equipment:
   1. Testing and monitoring equipment;
   2. Ventilating equipment;
   3. Communications equipment;
   4. Personal protective equipment;
   5. Lighting equipment;
   6. Barriers and shields;
   7. Equipment needed for safe access and egress (e.g., ladders);
   8. Rescue and emergency equipment; and
   9. Any other equipment necessary for safe entry into and rescue from permit spaces;
D. Entry permit procedures,
E. The use and limitations of the testing equipment,
F. The interpretation of the testing results,
G. The selection of the proper equipment,
H. Entry permit termination procedures,
I. Procedures to verify rescue services are available and the means of summoning them are operable;
J. The duties required of an Entry Supervisor; and
K. The requirements of the Unit-Specific Confined Space Entry Program.

Rescue Service Employees required to perform entry and non-entry rescue shall be trained on:
A. Proper use of all required rescue equipment;
B. Proper use of all required personal protective equipment;
C. Hazards that may be present during entry, including information on the routes of exposure, signs or symptoms and the consequences of the exposure;
D. Procedures to inform the Entry Supervisor of any hazards confronted or created in a permit space;
E. Receiving the training required of Authorized Entrants;
F. Communication procedures (how and when to communicate with the attendant);
G. Basic first aid;
H. Cardiopulmonary resuscitation (CPR);
I. Making practice permit space rescues at least once every 12 months. Practice rescues should include:
   1. Training aids that may be used for simulated rescues including dummies, manikins or actual persons from the actual permit spaces or from representative permit spaces.
   2. Representative permit spaces shall, with respect to opening size, configuration and accessibility, simulate the types of permit spaces from which emergency rescue may be performed.

IX. Rescue and Emergency Services

Rescue Services must be provided and they must be able to respond to an incident on any shift within 4 minutes. The Rescue Services for the U of I are the Champaign and Urbana Fire Departments depending upon your location on campus. The appropriate fire department must be contacted prior to entry into a permit space. The Urbana Fire Department non-emergency phone is 384-3420 and the Champaign Fire Department non-emergency phone is 403-7200. Rescue procedures must be documented and evaluated for each confined space. The rescue procedures should include at a minimum:
   A. Communication protocols between the personnel performing the entry and the rescue service.
   B. The use of full body and chest harnesses.
   C. The use of wristlets.
   D. The use of retrieval lines, fixed attachments, and mechanical devices, as well as procedures for the use of SCBAs or air line respirators with escape provisions and stand-by person(s) in the event that rescue personnel must enter the confined space to perform a rescue where a hazardous atmosphere exists.
   E. The specification and use of PPE.
   F. Removal of the entrants from the confined space.
   G. Transport of the entrants to a medical facility.
1910.146(a)
Scope and application. This section contains requirements for practices and procedures to protect employees in general industry from the hazards of entry into permit-required confined spaces. This section does not apply to agriculture, to construction, or to shipyard employment (Parts 1928, 1926, and 1915 of this chapter, respectively).

1910.146(b)
Definitions.

"Acceptable entry conditions" means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

"Attendant" means 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" means an employee who is authorized by the employer to enter a permit space.

"Blanking or blinding" means the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

"Confined space" means a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and

(3) Is not designed for continuous employee occupancy.

"Double block and bleed" means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

"Emergency" means 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" means 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 that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

"Entry" means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

"Entry permit (permit)" means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in paragraph (f) of this section.

"Entry supervisor" means the person (such as the employer, foreman, or crew chief) 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 by this section.

NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.
"Hazardous atmosphere" means 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:

(1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

(2) Airborne combustible dust at a concentration that meets or exceeds its LFL;

NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this Part and which could result in employee exposure in excess of its dose or permissible exposure limit;

NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

(5) Any other atmospheric condition that is immediately dangerous to life or health.

NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, section 1910.1200 of this Part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

"Hot work permit" means the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

"Immediately dangerous to life or health (IDLH)" means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

NOTE: Some materials -- hydrogen fluoride gas and cadmium vapor, for example -- may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

"Inerting" means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

NOTE: This procedure produces an IDLH oxygen-deficient atmosphere.

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

"Line breaking" means the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

"Non-permit confined space" means 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 serious physical harm.
"Oxygen deficient atmosphere" means an atmosphere containing less than 19.5 percent oxygen by volume.

"Oxygen enriched atmosphere" means an atmosphere containing more than 23.5 percent oxygen by volume.

"Permit-required confined space (permit space)" means a confined space that has one or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant;
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
4. Contains any other recognized serious safety or health hazard.

"Permit-required confined space program (permit space program)" means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

"Permit system" means the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

"Prohibited condition" means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

"Rescue service" means the personnel designated to rescue employees from permit spaces.

"Retrieval system" means 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" means the process by which the 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.

NOTE: Testing enables employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

1910.146(c)
General requirements.

1910.146(c)(1)
The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces.

NOTE: Proper application of the decision flow chart in Appendix A to section 1910.146 would facilitate compliance with this requirement.

1910.146(c)(2)
If the workplace contains permit spaces, the employer shall inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces.

NOTE: A sign reading DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER or using other similar language would satisfy the requirement for a sign.
1910.146(c)(3)
If the employer decides that its employees will not enter permit spaces, the employer shall take effective measures to prevent its employees from entering the permit spaces and shall comply with paragraphs (c)(1), (c)(2), (c)(6), and (c)(8) of this section.

1910.146(c)(4)
If the employer decides that its employees will enter permit spaces, the employer shall develop and implement a written permit space program that complies with this section. The written program shall be available for inspection by employees and their authorized representatives.

1910.146(c)(5)
An employer may use the alternate procedures specified in paragraph (c)(5)(ii) of this section for entering a permit space under the conditions set forth in paragraph (c)(5)(i) of this section.

1910.146(c)(5)(i)
An employer whose employees enter a permit space need not comply with paragraphs (d) through (f) and (h) through (k) of this section, provided that:

1910.146(c)(5)(i)(A)
The employer can demonstrate that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;

1910.146(c)(5)(i)(B)
The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry;

1910.146(c)(5)(i)(C)
The employer develops monitoring and inspection data that supports the demonstrations required by paragraphs (c)(5)(i)(A) and (c)(5)(i)(B) of this section;

1910.146(c)(5)(i)(D)
If an initial entry of the permit space is necessary to obtain the data required by paragraph (c)(5)(i)(C) of this section, the entry is performed in compliance with paragraphs (d) through (k) of this section;

1910.146(c)(5)(i)(E)
The determinations and supporting data required by paragraphs (c)(5)(i)(A), (c)(5)(i)(B), and (c)(5)(i)(C) of this section are documented by the employer and are made available to each employee who enters the permit space under the terms of paragraph (c)(5) of this section or to that employee’s authorized representative; and

1910.146(c)(5)(i)(F)
Entry into the permit space under the terms of paragraph (c)(5)(i) of this section is performed in accordance with the requirements of paragraph (c)(5)(ii) of this section.

NOTE: See paragraph (c)(7) of this section for reclassification of a permit space after all hazards within the space have been eliminated.

1910.146(c)(5)(ii)
The following requirements apply to entry into permit spaces that meet the conditions set forth in paragraph (c)(5)(i) of this section.

1910.146(c)(5)(ii)(A)
Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
1910.146(c)(5)(ii)(B)
When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other
temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in
the space from foreign objects entering the space.

1910.146(c)(5)(ii)(C)
Before an employee enters the space, the internal atmosphere shall be tested, with a calibrated direct-reading instrument,
for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Any
employee who enters the space, or that employee's authorized representative, shall be provided an opportunity to
observe the pre-entry testing required by this paragraph.

1910.146(c)(5)(ii)(C)(1)
Oxygen content,

1910.146(c)(5)(ii)(C)(2)
Flammable gases and vapors, and

1910.146(c)(5)(ii)(C)(3)
Potential toxic air contaminants.

1910.146(c)(5)(ii)(D)
There may be no hazardous atmosphere within the space whenever any employee is inside the space.

1910.146(c)(5)(ii)(E)
Continuous forced air ventilation shall be used, as follows:

1910.146(c)(5)(ii)(E)(1)
An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;

1910.146(c)(5)(ii)(E)(2)
The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present
within the space and shall continue until all employees have left the space;

1910.146(c)(5)(ii)(E)(3)
The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.

1910.146(c)(5)(ii)(F)
The atmosphere within the space shall be periodically tested as necessary to ensure that the continuous forced air
ventilation is preventing the accumulation of a hazardous atmosphere. Any employee who enters the space, or that
employee's authorized representative, shall be provided with an opportunity to observe the periodic testing required by
this paragraph.

1910.146(c)(5)(ii)(G)
If a hazardous atmosphere is detected during entry:

1910.146(c)(5)(ii)(G)(1)
Each employee shall leave the space immediately;

1910.146(c)(5)(ii)(G)(2)
The space shall be evaluated to determine how the hazardous atmosphere developed; and
1910.146(c)(5)(ii)(G)(3)
Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

1910.146(c)(5)(ii)(H)
The employer shall verify that the space is safe for entry and that the pre-entry measures required by paragraph (c)(5)(ii) of this section have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification shall be made before entry and shall be made available to each employee entering the space or to that employee's authorized representative.

1910.146(c)(6)
When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the employer shall reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

1910.146(c)(7)
A space classified by the employer as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

1910.146(c)(7)(i)
If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

1910.146(c)(7)(ii)
If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed under paragraphs (d) through (k) of this section. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.

NOTE: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards. Paragraph (c)(5) covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.

1910.146(c)(7)(iii)
The employer shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space or to that employee's authorized representative.

1910.146(c)(7)(iv)
If hazards arise within a permit space that has been declassified to a non-permit space under paragraph (c)(7) of this section, each employee in the space shall exit the space. The employer shall then reevaluate the space and determine whether it must be reclassified as a permit space, in accordance with other applicable provisions of this section.

1910.146(c)(8)
When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall:

1910.146(c)(8)(i)
Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of this section;
1910.146(c)(8)(ii)
Apprise the contractor of the elements, including the hazards identified and the host employer's experience with the space, that make the space in question a permit space;

1910.146(c)(8)(iii)
Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;

1910.146(c)(8)(iv)
Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and

1910.146(c)(8)(v)
Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

1910.146(c)(9)
In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall:

1910.146(c)(9)(i)
Obtain any available information regarding permit space hazards and entry operations from the host employer;

1910.146(c)(9)(ii)
Coordinate entry operations with the host employer, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and

1910.146(c)(9)(iii)
Inform the host employer of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either through a debriefing or during the entry operation.

1910.146(d)
Permit-required confined space program (permit space program). Under the permit space program required by paragraph (c)(4) of this section, the employer shall:

1910.146(d)(1)
Implement the measures necessary to prevent unauthorized entry;

1910.146(d)(2)
Identify and evaluate the hazards of permit spaces before employees enter them;

1910.146(d)(3)
Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following:

1910.146(d)(3)(i)
Specifying acceptable entry conditions;

1910.146(d)(3)(ii)
Providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces;

1910.146(d)(3)(iii)
Isolating the permit space;
1910.146(d)(3)(iv)
Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;

1910.146(d)(3)(v)
Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and

1910.146(d)(3)(vi)
Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry.

1910.146(d)(4)
Provide the following equipment (specified in paragraphs (d)(4)(i) through (d)(4)(ix) of this section) at no cost to employees, maintain that equipment properly, and ensure that employees use that equipment properly:

1910.146(d)(4)(i)
Testing and monitoring equipment needed to comply with paragraph (d)(5) of this section;

1910.146(d)(4)(ii)
Ventilating equipment needed to obtain acceptable entry conditions;

1910.146(d)(4)(iii)
Communications equipment necessary for compliance with paragraphs (h)(3) and (i)(5) of this section;

1910.146(d)(4)(iv)
Personal protective equipment insofar as feasible engineering and work practice controls do not adequately protect employees;

1910.146(d)(4)(v)
Lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency;

1910.146(d)(4)(vi)
Barriers and shields as required by paragraph (d)(3)(iv) of this section;

1910.146(d)(4)(vii)
Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;

1910.146(d)(4)(viii)
Rescue and emergency equipment needed to comply with paragraph (d)(9) of this section, except to the extent that the equipment is provided by rescue services; and

1910.146(d)(4)(ix)
Any other equipment necessary for safe entry into and rescue from permit spaces.

1910.146(d)(5)
Evaluate permit space conditions as follows when entry operations are conducted:

1910.146(d)(5)(i)
Test conditions in the permit space to determine if acceptable entry conditions exist before entry is authorized to begin, except that, if isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), pre-entry testing shall be performed to the extent feasible before entry is authorized and, if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized entrants are working;
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1910.146(d)(5)(ii)
Test or monitor the permit space as necessary to determine if acceptable entry conditions are being maintained during the course of entry operations; and

1910.146(d)(5)(iii)
When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors.

1910.146(d)(5)(iv)
Provide each authorized entrant or that employee's authorized representative an opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces;

1910.146(d)(5)(v)
Reevaluate the permit space in the presence of any authorized entrant or that employee's authorized representative who requests that the employer conduct such reevaluation because the entrant or representative has reason to believe that the evaluation of that space may not have been adequate;

1910.146(d)(5)(vi)
Immediately provide each authorized entrant or that employee's authorized representative with the results of any testing conducted in accord with paragraph (d) of this section.

NOTE: Atmospheric testing conducted in accordance with Appendix B to section 1910.146 would be considered as satisfying the requirements of this paragraph. For permit space operations in sewers, atmospheric testing conducted in accordance with Appendix B, as supplemented by Appendix E to section 1910.146, would be considered as satisfying the requirements of this paragraph.

1910.146(d)(6)
Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations;

NOTE: Attendants may be assigned to monitor more than one permit space provided the duties described in paragraph (i) of this section can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in paragraph (i) of this section can be effectively performed for each permit space that is monitored.

1910.146(d)(7)
If multiple spaces are to be monitored by a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces being monitored without distraction from the attendant's responsibilities under paragraph (i) of this section;

1910.146(d)(8)
Designate the persons who are to have active roles (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each such employee, and provide each such employee with the training required by paragraph (g) of this section;

1910.146(d)(9)
Develop and implement procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue;

1910.146(d)(10)
Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this section;
1910.146(d)(11) Develop and implement procedures to coordinate entry operations when employees of more than one employer are working simultaneously as authorized entrants in a permit space, so that employees of one employer do not endanger the employees of any other employer;

1910.146(d)(12) Develop and implement procedures (such as closing off a permit space and canceling the permit) necessary for concluding the entry after entry operations have been completed;

1910.146(d)(13) Review entry operations when the employer has reason to believe that the measures taken under the permit space program may not protect employees and revise the program to correct deficiencies found to exist before subsequent entries are authorized; and

NOTE: Examples of circumstances requiring the review of the permit space program are: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.

1910.146(d)(14) Review the permit space program, using the canceled permits retained under paragraph (e)(6) of this section within 1 year after each entry and revise the program as necessary, to ensure that employees participating in entry operations are protected from permit space hazards.

NOTE: Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.

Appendix C to section 1910.146 presents examples of permit space programs that are considered to comply with the requirements of paragraph (d) of this section.

1910.146(e) Permit system.

1910.146(e)(1) Before entry is authorized, the employer shall document the completion of measures required by paragraph (d)(3) of this section by preparing an entry permit.

NOTE: Appendix D to section 1910.146 presents examples of permits whose elements are considered to comply with the requirements of this section.

1910.146(e)(2) Before entry begins, the entry supervisor identified on the permit shall sign the entry permit to authorize entry.

1910.146(e)(3) The completed permit shall be made available at the time of entry to all authorized entrants or their authorized representatives, by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed.

1910.146(e)(4) The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit in accordance with paragraph (f)(2) of this section.

1910.146(e)(5) The entry supervisor shall terminate entry and cancel the entry permit when:
1910.146(e)(5)(i)
The entry operations covered by the entry permit have been completed; or

1910.146(e)(5)(ii)
A condition that is not allowed under the entry permit arises in or near the permit space.

1910.146(e)(6)
The employer shall retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program required by paragraph (d)(14) of this section. Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

1910.146(f)
Entry permit. The entry permit that documents compliance with this section and authorizes entry to a permit space shall identify:

1910.146(f)(1)
The permit space to be entered;

1910.146(f)(2)
The purpose of the entry;

1910.146(f)(3)
The date and the authorized duration of the entry permit;

1910.146(f)(4)
The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space;

NOTE: This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.

1910.146(f)(5)
The personnel, by name, currently serving as attendants;

1910.146(f)(6)
The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;

1910.146(f)(7)
The hazards of the permit space to be entered;

1910.146(f)(8)
The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

NOTE: Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

1910.146(f)(9)
The acceptable entry conditions;
1910.146(f)(10) The results of initial and periodic tests performed under paragraph (d)(5) of this section, accompanied by the names or initials of the testers and by an indication of when the tests were performed;

1910.146(f)(11) The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;

1910.146(f)(12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;

1910.146(f)(13) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;

1910.146(f)(14) Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and (15) Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

1910.146(g) Training.

1910.146(g)(1) The employer shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this section.

1910.146(g)(2) Training shall be provided to each affected employee:

1910.146(g)(2)(i) Before the employee is first assigned duties under this section;

1910.146(g)(2)(ii) Before there is a change in assigned duties;

1910.146(g)(2)(iii) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;

1910.146(g)(2)(iv) Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by paragraph (d)(3) of this section or that there are inadequacies in the employee's knowledge or use of these procedures.

1910.146(g)(3) The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary, for compliance with this section.

1910.146(g)(4) The employer shall certify that the training required by paragraphs (g)(1) through (g)(3) of this section has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.
1910.146(h)
Duties of authorized entrants. The employer shall ensure that all authorized entrants:

1910.146(h)(1)
Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

1910.146(h)(2)
Properly use equipment as required by paragraph (d)(4) of this section;

1910.146(h)(3)
Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by paragraph (i)(6) of this section;

1910.146(h)(4)
Alert the attendant whenever:

1910.146(h)(4)(i)
The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or

1910.146(h)(4)(ii)
The entrant detects a prohibited condition; and

1910.146(h)(5)
Exit from the permit space as quickly as possible whenever:

1910.146(h)(5)(i)
An order to evacuate is given by the attendant or the entry supervisor,

1910.146(h)(5)(ii)
The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,

1910.146(h)(5)(iii)
The entrant detects a prohibited condition, or

1910.146(h)(5)(iv)
An evacuation alarm is activated.

1910.146(i)
Duties of attendants. The employer shall ensure that each attendant:

1910.146(i)(1)
Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

1910.146(i)(2)
Is aware of possible behavioral effects of hazard exposure in authorized entrants;

1910.146(i)(3)
Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under paragraph (f)(4) of this section accurately identifies who is in the permit space;
1910.146(i)(4)  
Remains outside the permit space during entry operations until relieved by another attendant;

NOTE: When the employer's permit entry program allows attendant entry for rescue, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations as required by paragraph (k)(1) of this section and if they have been relieved as required by paragraph (i)(4) of this section.

1910.146(i)(5)  
Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space under paragraph (i)(6) of this section;

1910.146(i)(6)  
Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions;

1910.146(i)(6)(i)  
If the attendant detects a prohibited condition;

1910.146(i)(6)(ii)  
If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;

1910.146(i)(6)(iii)  
If the attendant detects a situation outside the space that could endanger the authorized entrants; or

1910.146(i)(6)(iv)  
If the attendant cannot effectively and safely perform all the duties required under paragraph (i) of this section;

1910.146(i)(7)  
Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

1910.146(i)(8)  
Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

1910.146(i)(8)(i)  
Warn the unauthorized persons that they must stay away from the permit space;

1910.146(i)(8)(ii)  
Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and

1910.146(i)(8)(iii)  
Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

1910.146(i)(9)  
Performs non-entry rescues as specified by the employer's rescue procedure; and

1910.146(i)(10)  
Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

1910.146(j)  
Duties of entry supervisors. The employer shall ensure that each entry supervisor:

1910.146(j)(1)  
Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
1910.146(j)(2)
Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

1910.146(j)(3)
Terminates the entry and cancels the permit as required by paragraph (e)(5) of this section;

1910.146(j)(4)
Verifies that rescue services are available and that the means for summoning them are operable;

1910.146(j)(5)
Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

1910.146(j)(6)
Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

1910.146(k)
Rescue and emergency services.

1910.146(k)(1)
An employer who designates rescue and emergency services, pursuant to paragraph (d)(9) of this section, shall:

1910.146(k)(1)(i)
Evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified;

Note to paragraph (k)(1)(i): What will be considered timely will vary according to the specific hazards involved in each entry. For example, §1910.134, Respiratory Protection, requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.

1910.146(k)(1)(ii)
Evaluate a prospective rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular permit space or types of permit spaces identified;

1910.146(k)(1)(iii)
Select a rescue team or service from those evaluated that:

1910.146(k)(1)(iii)(A)
Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;

1910.146(k)(1)(iii)(B)
Is equipped for and proficient in performing the needed rescue services;

1910.146(k)(1)(iv)
Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and
1910.146(k)(1)(v)
Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

Note to paragraph (k)(1): Non-mandatory Appendix F contains examples of criteria which employers can use in evaluating prospective rescuers as required by paragraph (k)(l) of this section.

1910.146(k)(2)
An employer whose employees have been designated to provide permit space rescue and emergency services shall take the following measures:

1910.146(k)(2)(i)
Provide affected employees with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train affected employees so they are proficient in the use of that PPE, at no cost to those employees;

1910.146(k)(2)(ii)
Train affected employees to perform assigned rescue duties. The employer must ensure that such employees successfully complete the training required to establish proficiency as an authorized entrant, as provided by paragraphs (g) and (h) of this section;

1910.146(k)(2)(iii)
Train affected employees in basic first-aid and cardiopulmonary resuscitation (CPR). The employer shall ensure that at least one member of the rescue team or service holding a current certification in first aid and CPR is available; and

1910.146(k)(2)(iv)
Ensure that affected employees practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

1910.146(k)(3)
To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements.

1910.146(k)(3)(i)
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, above the entrant's head, or at another point which the employer can establish presents a profile small enough for the successful removal of the entrant. Wristlets may be used in lieu of the chest or full body harness if the employer can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

1910.146(k)(3)(ii)
The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet (1.52 m) deep

1910.146(k)(4)
If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

1910.146(l)
Employee participation.
1910.146(l)(1)
Employers shall consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program required by paragraph (c) of this section.

1910.146(l)(2)
Employers shall make available to affected employees and their authorized representatives all information required to be developed by this section.
Appendix A to §1910.146 -- Permit-Required Confined Space Decision Flow Chart

Note: Appendices A through F serve to provide information and non-mandatory guidelines to assist employers and employees in complying with the appropriate requirements of this section.

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**Appendix A to §1910.146—Permit-Required Confined Space Decision Flow Chart**

1. **Does the workplace contain Confined Spaces as defined by §1910.146 (b)?**
   - NO
   - YES

2. **Consult other applicable OSHA standards.**

3. **Inform employees as required by §1910.146 (c)(2).**

4. **Will permit spaces be entered?**
   - NO
   - YES

5. **Prevent employee entry as required by §1910.146 (c)(2). Do task from outside of space.**

6. **Will contractors enter?**
   - NO
   - YES

7. **Both contractors and host employees will enter the space?**
   - NO
   - YES

8. **Coordinate entry operations as required by §1910.146 (c)(3)(iv) and (d)(1). Prevent unauthorized entry.**

9. **Does space have known or potential hazards?**
   - NO
   - YES

10. **Can the hazards be eliminated?**
    - YES
    - NO

11. **Can the space be maintained in a condition safe to enter by continuous forced air ventilation only?**
    - YES
    - NO

12. **Prepare for entry via permit procedures.**

13. **Verify acceptable entry conditions (test results recorded, space isolated if needed, rescuers/means to summon available, entrants properly equipped, etc.)**
    - NO
    - YES

14. **Emergency exists (prohibited condition). Entrants evacuated entry aborts. (Call rescuers if needed). Permit is void. Reevaluate program to correct/prohibit prohibited condition. Occurrence of emergency (usually) is proof of deficient program. No re-entry until program (and permit) is amended. (May require new program.)**

15. **Audit permit program and permit based on evaluation of entry by entrants, attendants, testers and preparers, etc.**

16. **Spaces may have to be evacuated and re-evaluated if hazards arise during entry.**

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*Last updated by: J. Neighbors Page 18 of 33 Last Updated: April 2014*
Appendix B to §1910.146 – Procedures for Atmospheric Testing

Atmospheric testing is required for two distinct purposes:

evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.

(1) Evaluation testing. The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure, should be done by, or reviewed by, a technically qualified professional (e.g., OSHA consultation service, or certified industrial hygienist, registered safety engineer, certified safety professional, certified marine chemist, etc.) based on evaluation of all serious hazards.

(2) Verification testing. The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.

(3) Duration of testing. Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.

(4) Testing stratified atmospheres. When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

(5) Order of testing. A test for oxygen is performed first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere. Combustible gases are tested for next because the threat of fire or explosion is both more immediate and more life threatening, in most cases, than exposure to toxic gases and vapors. If tests for toxic gases and vapors are necessary, they are performed last.
Appendix C to §1910.146 – Examples of Permit-Required Confined Space Programs

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 tapping 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 entry) of any residues, and purged of any potential atmospheric hazards.

Welding. In addition to tank cleaning for control of atmospheric hazards, coating and surface materials shall be removed 4 inches (10.16 cm) or more from any surface area where welding or other torch work will be done and care taken that the atmosphere within the tank remains well below the LFL. (Follow the requirements of 29 CFR 1910, Subpart Q, OSHA's welding standard, at all times.)

Permits. An entry permit valid for up to 1 year shall be issued prior to authorization of entry into used tank trailers, dry bulk trailers or trucks. In addition to the pre-entry cleaning requirement, this permit shall require the employee safeguards specified for new tank fabrication or construction permit areas.
Authorization. Only the area supervisor may authorize an employee to enter a tank trailer, dry bulk trailer or truck within the permit area. The area supervisor must determine that the entry permit requirements have been met before authorizing entry.
### Appendix C to §1910.146 – Sample Permits

#### Appendix D-1

Confined Space Entry Permit

<table>
<thead>
<tr>
<th>Date and Time Issued:</th>
<th>Date and Time Expires:</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______________</td>
<td>________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Job site/Space I.D.:</th>
<th>Job Supervisor:</th>
</tr>
</thead>
<tbody>
<tr>
<td>________________</td>
<td>________________</td>
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</table>

<table>
<thead>
<tr>
<th>Equipment to be worked on:</th>
<th>Work to be performed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>______________________</td>
<td>_____________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stand-by personnel:</th>
</tr>
</thead>
<tbody>
<tr>
<td>___________________</td>
</tr>
</tbody>
</table>

1. **Atmospheric Checks:**
   - Time: __________
   - Oxygen: ________%
   - Explosive: ________% L.F.L.
   - Toxic: ________PPM

2. **Tester's signature:** _____________________________

3. **Source isolation (No Entry):**
   - N/A
   - Yes
   - No
   - Pumps or lines blinded, disconnected, or blocked
     - ( )
     - ( )
     - ( )

4. **Ventilation Modification:**
   - N/A
   - Yes
   - No
   - Mechanical
     - ( )
     - ( )
     - ( )
   - Natural Ventilation only
     - ( )
     - ( )
     - ( )

5. **Atmospheric check after isolation and Ventilation:**
   - Oxygen: ________% > 19.5%
   - Explosive: ________% L.F.L. < 10%
   - Toxic: ________PPM < 10 PPM H(2)S
   - Time: __________
   - Testers signature: _____________________________

6. **Communication procedures:** ________________________________________
   ___________________________________________________________________

7. **Rescue procedures:** _______________________________________________
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________

8. **Entry, standby, and backup persons:**
   - Yes
   - No
   - Successfully completed required training?
     - ( )
     - ( )
   - Is it current?
     - ( )
     - ( )

9. **Equipment:**
   - N/A
   - Yes
   - No
   - Direct reading gas monitor - tested
     - ( )
     - ( )
     - ( )
   - Safety harnesses and lifelines for entry
     - ( )
     - ( )
     - ( )
   - Hoisting equipment
     - ( )
     - ( )
     - ( )
   - Powered communications
     - ( )
     - ( )
     - ( )
   - SCBA’s for entry and standby persons
     - ( )
     - ( )
     - ( )
   - Protective Clothing
     - ( )
     - ( )
     - ( )
   - All electric equipment listed
     - ( )
     - ( )
     - ( )
Class I, Division I, Group D and non-sparking tools

10. Periodic atmospheric tests:

- Oxygen (%) Time ____
- Oxygen (%) Time ____
- Explosive (%) Time ____
- Explosive (%) Time ____
- Toxic (%) Time ____
- Toxic (%) Time ____

Oxygen (%) Time ____
Oxygen (%) Time ____
Explosive (%) Time ____
Explosive (%) Time ____
Toxic (%) Time ____
Toxic (%) Time ____

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Permit Prepared By: (Supervisor) ________________________________
Approved By: (Unit Supervisor) ________________________________
Reviewed By (Cs Operations Personnel):

(printed name) ________________________________ (signature) ________________________________

This permit to be kept at job site. Return job site copy to Safety Office following job completion.

Copies: White Original (Safety Office)
Yellow (Unit Supervisor)
Hard (job site)
Appendix D - 2

ENTRY PERMIT

PERMIT VALID FOR 8 HOURS ONLY. ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED

DATE: - -  SITE LOCATION and DESCRIPTION ______________________________
PURPOSE OF ENTRY ______________________________________________________
SUPERVISOR(S) in charge of crews  Type of Crew Phone #
_______________________________________________________________________
_______________________________________________________________________
COMMUNICATION PROCEDURES ______________________________________________
RESCUE PROCEDURES (PHONE NUMBERS AT BOTTOM) ___________________________
_______________________________________________________________________
_______________________________________________________________________
* BOLD DENOTES MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY*

REQUIREMENTS COMPLETED    DATE            TIME
Lock Out/De-energize/Try-out                        ____            ____
Line(s) Broken-Capped-Blanked                      ____            ____
Purge-Flush and Vent                                ____            ____
Ventilation                                        ____            ____
Secure Area (Post and Flag)                        ____            ____
Breathing Apparatus                                 ____            ____
Resuscitator - Inhalator                            ____            ____
Standby Safety Personnel                            ____            ____
Full Body Harness w/"D" ring                        ____            ____
Emergency Escape Retrieval Equip                   ____            ____
Lifelines                                          ____            ____
Fire Extinguishers                                  ____            ____
Lighting (Explosive Proof)                          ____            ____
Protective Clothing                                 ____            ____
Respirator(s) (Air Purifying)                       ____            ____
Burning and Welding Permit                          ____            ____

Note: Items that do not apply enter N/A in the blank.

**RECORD CONTINUOUS MONITORING RESULTS EVERY 2 HOURS
CONTINUOUS MONITORING**  Permissible ________________________________
TEST(S) TO BE TAKEN    Entry Level
PERCENT OF OXYGEN     19.5% to 23.5%  ___ ___ ___ ___ ___ ___ ___ ___
LOWER FLAMMABLE LIMIT Under 10%                      ___ ___ ___ ___ ___ ___ ___ ___
CARBON MONOXIDE      +35 PPM                          ___ ___ ___ ___ ___ ___ ___ ___
Aromatic Hydrocarbon + 1 PPM * 5PPM                    ___ ___ ___ ___ ___ ___ ___ ___
Hydrogen Cyanide     (Skin) * 4PPM                      ___ ___ ___ ___ ___ ___ ___ ___
Hydrogen Sulfide     +10 PPM *15PPM                      ___ ___ ___ ___ ___ ___ ___ ___
Sulfur Dioxide       + 2 PPM * 5PPM                      ___ ___ ___ ___ ___ ___ ___ ___
Ammonia              *35PPM                           ___ ___ ___ ___ ___ ___ ___ ___

* Short-term exposure limit: Employee can work in the area up to 15 minutes.
+ 8 hr. Time Weighted Avg.: Employee can work in area 8 hrs (longer with appropriate respiratory protection).

REMARKS: ________________________________________________________________
## GAS TESTER NAME & CHECK #
<table>
<thead>
<tr>
<th>Used</th>
<th>Model &amp;/or Type</th>
<th>Serial &amp;/or Unit #</th>
</tr>
</thead>
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</table>

SAFETY STANDBY PERSON IS REQUIRED FOR ALL CONFINED SPACE WORK

<table>
<thead>
<tr>
<th>SAFETY STANDBY PERSON(S)</th>
<th>CHECK #</th>
<th>CONFINED SPACE</th>
<th>ENTRANT(S)</th>
<th>CHECK #</th>
<th>CONFINED SPACE</th>
<th>ENTRANT(S)</th>
<th>CHECK #</th>
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</tbody>
</table>

SUPERVISOR AUTHORIZING - ALL CONDITIONS SATISFIED

DEPARTMENT/PHONE ________________

AMBULANCE 2800  FIRE 2900  Safety  4901  Gas Coordinator 4529/5387
Appendix E to §1910.146 – Sewer System Entry

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.
Appendix F to §1910.146 – Rescue Team or Rescue Service Evaluation Criteria

(1) This appendix provides guidance to employers in choosing an appropriate rescue service. It contains criteria that may be used to evaluate the capabilities both of prospective and current rescue teams. Before a rescue team can be trained or chosen, however, a satisfactory permit program, including an analysis of all permit-required confined spaces to identify all potential hazards in those spaces, must be completed. OSHA believes that compliance with all the provisions of §1910.146 will enable employers to conduct permit space operations without recourse to rescue services in nearly all cases. However, experience indicates that circumstances will arise where entrants will need to be rescued from permit spaces. It is therefore important for employers to select rescue services or teams, either on-site or off-site, that are equipped and capable of minimizing harm to both entrants and rescuers if the need arises.

(2) For all rescue teams or services, the employer's evaluation should consist of two components: an initial evaluation, in which employers decide whether a potential rescue service or team is adequately trained and equipped to perform permit space rescues of the kind needed at the facility and whether such rescuers can respond in a timely manner, and a performance evaluation, in which employers measure the performance of the team or service during an actual or practice rescue. For example, based on the initial evaluation, an employer may determine that maintaining an on-site rescue team will be more expensive than obtaining the services of an off-site team, without being significantly more effective, and decide to hire a rescue service. During a performance evaluation, the employer could decide, after observing the rescue service perform a practice rescue, that the service's training or preparedness was not adequate to effect a timely or effective rescue at his or her facility and decide to select another rescue service, or to form an internal rescue team.

A. Initial Evaluation

I. The employer should meet with the prospective rescue service to facilitate the evaluations required by §1910.146(k)(1)(i) and §1910.146(k)(1)(ii). At a minimum, if an off-site rescue service is being considered, the employer must contact the service to plan and coordinate the evaluations required by the standard. Merely posting the service's number or planning to rely on the 911 emergency phone number to obtain these services at the time of a permit space emergency would not comply with paragraph (k)(1) of the standard.

II. The capabilities required of a rescue service vary with the type of permit spaces from which rescue may be necessary and the hazards likely to be encountered in those spaces. Answering the questions below will assist employers in determining whether the rescue service is capable of performing rescues in the permit spaces present at the employer's workplace.

1. What are the needs of the employer with regard to response time (time for the rescue service to receive notification, arrive at the scene, and set up and be ready for entry)? For example, if entry is to be made into an IDLH atmosphere, or into a space that can quickly develop an IDLH atmosphere (if ventilation fails or for other reasons), the rescue team or service would need to be standing by at the permit space. On the other hand, if the danger to entrants is restricted to mechanical hazards that would cause injuries (e.g., broken bones, abrasions) a response time of 10 or 15 minutes might be adequate.

2. How quickly can the rescue team or service get from its location to the permit spaces from which rescue may be necessary? Relevant factors to consider would include: the location of the rescue team or service relative to the employer's workplace, the quality of roads and highways to be traveled, potential bottlenecks or traffic congestion that might be encountered in transit, the reliability of the rescuer's vehicles, and the training and skill of its drivers.

3. What is the availability of the rescue service? Is it unavailable at certain times of the day or in certain situations? What is the likelihood that key personnel of the rescue service might be unavailable at times? If the rescue service becomes unavailable while an entry is underway, does it have the capability of notifying the employer so that the employer can instruct the attendant to abort the entry immediately?

4. Does the rescue service meet all the requirements of paragraph (k)(2) of the standard? If not, has it developed a plan that will enable it to meet those requirements in the future? If so, how soon can the plan be implemented?

5. For off-site services, is the service willing to perform rescues at the employer's workplace? (An employer may not rely on a rescuer who declines, for whatever reason, to provide rescue services.)
6. Is an adequate method for communications between the attendant, employer and prospective rescuer available so that a rescue request can be transmitted to the rescuer without delay? How soon after notification can a prospective rescuer dispatch a rescue team to the entry site?

7. For rescues into spaces that may pose significant atmospheric hazards and from which rescue entry, patient packaging and retrieval cannot be safely accomplished in a relatively short time (15-20 minutes), employers should consider using airline respirators (with escape bottles) for the rescuers and to supply rescue air to the patient. If the employer decides to use SCBA, does the prospective rescue service have an ample supply of replacement cylinders and procedures for rescuers to enter and exit (or be retrieved) well within the SCBA's air supply limits?

8. If the space has a vertical entry over 5 feet in depth, can the prospective rescue service properly perform entry rescues? Does the service have the technical knowledge and equipment to perform rope work or elevated rescue, if needed?

9. Does the rescue service have the necessary skills in medical evaluation, patient packaging and emergency response?

10. Does the rescue service have the necessary equipment to perform rescues, or must the equipment be provided by the employer or another source?

B. Performance Evaluation

Rescue services are required by paragraph (k)(2)(iv) of the standard to practice rescues at least once every 12 months, provided that the team or service has not successfully performed a permit space rescue within that time. As part of each practice session, the service should perform a critique of the practice rescue, or have another qualified party perform the critique, so that deficiencies in procedures, equipment, training, or number of personnel can be identified and corrected. The results of the critique, and the corrections made to respond to the deficiencies identified, should be given to the employer to enable it to determine whether the rescue service can quickly be upgraded to meet the employer's rescue needs or whether another service must be selected. The following questions will assist employers and rescue teams and services evaluate their performance.

1. Have all members of the service been trained as permit space entrants, at a minimum, including training in the potential hazards of all permit spaces, or of representative permit spaces, from which rescue may be needed? Can team members recognize the signs, symptoms, and consequences of exposure to any hazardous atmospheres that may be present in those permit spaces?

2. Is every team member provided with, and properly trained in, the use and need for PPE, such as SCBA or fall arrest equipment, which may be required to perform permit space rescues in the facility? Is every team member properly trained to perform his or her functions and make rescues, and to use any rescue equipment, such as ropes and backboards, that may be needed in a rescue attempt?

3. Are team members trained in the first aid and medical skills needed to treat victims overcome or injured by the types of hazards that may be encountered in the permit spaces at the facility?

4. Do all team members perform their functions safely and efficiently? Do rescue service personnel focus on their own safety before considering the safety of the victim?

5. If necessary, can the rescue service properly test the atmosphere to determine if it is IDLH?

6. Can the rescue personnel identify information pertinent to the rescue from entry permits, hot work permits, and MSDSs?

7. Has the rescue service been informed of any hazards to personnel that may arise from outside the space, such as those that may be caused by future work near the space?
8. If necessary, can the rescue service properly package and retrieve victims from a permit space that has a limited size opening (less than 24 inches (60.9 cm) in diameter), limited internal space, or internal obstacles or hazards?

9. If necessary, can the rescue service safely perform an elevated (high angle) rescue?

10. Does the rescue service have a plan for each of the kinds of permit space rescue operations at the facility? Is the plan adequate for all types of rescue operations that may be needed at the facility? Teams may practice in representative spaces, or in spaces that are "worst-case" or most restrictive with respect to internal configuration, elevation, and portal size. The following characteristics of a practice space should be considered when deciding whether a space is truly representative of an actual permit space:

(1) Internal configuration.

(a) Open -- there are no obstacles, barriers, or obstructions within the space. One example is a water tank.

(b) Obstructed -- the permit space contains some type of obstruction that a rescuer would need to maneuver around. An example would be a baffle or mixing blade. Large equipment, such as a ladder or scaffold, brought into a space for work purposes would be considered an obstruction if the positioning or size of the equipment would make rescue more difficult.

(2) Elevation.

(a) Elevated -- a permit space where the entrance portal or opening is above grade by 4 feet or more. This type of space usually requires knowledge of high angle rescue procedures because of the difficulty in packaging and transporting a patient to the ground from the portal.

(b) Non-elevated -- a permit space with the entrance portal located less than 4 feet above grade. This type of space will allow the rescue team to transport an injured employee normally.

(3) Portal size.

(a) Restricted -- A portal of 24 inches or less in the least dimension. Portals of this size are too small to allow a rescuer to simply enter the space while using SCBA. The portal size is also too small to allow normal spinal immobilization of an injured employee.

(b) Unrestricted -- A portal of greater than 24 inches in the least dimension. These portals allow relatively free movement into and out of the permit space.

(4) Space access.

(a) Horizontal -- The portal is located on the side of the permit space. Use of retrieval lines could be difficult.

(b) Vertical -- The portal is located on the top of the permit space, so that rescuers must climb down, or the bottom of the permit space, so that rescuers must climb up to enter the space. Vertical portals may require knowledge of rope techniques, or special patient packaging to safely retrieve a downed entrant.
APPENDIX B: EXAMPLE UNIT-SPECIFIC CONFINED SPACE ENTRY PROGRAM
University of Illinois at Urbana-Champaign
Facilities & Services
Division of Safety and Compliance

Facilities & Services Confined Space Entry Program

Reviewed April 2014
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I. PURPOSE

Facilities & Services (F&S) at the University of Illinois at Urbana-Champaign (UIUC), through the Division of Safety and Compliance (S&C), has established this Confined Space Entry Program to protect the health of F&S employees and to assure compliance with State and Federal occupational safety and health standards, particularly the Confined Space Entry Standard of the Occupational Safety and Health Administration (OSHA) located in 29CFR 1910.146 and enforced at the UIUC by the Illinois Department of Labor. See UIUC Confined Space Entry Policy for definitions of terms.

II. POLICY

It is the policy of the F&S to provide its employees with a safe and healthful working environment. This is accomplished as far as feasible with acceptable work practices and administrative controls.

III. SCOPE

The provisions of the Confined Space Entry Program shall apply to all F&S employees who have to enter a Confined Space. Examples of Confined Spaces include, but are not limited to the following: Storage tanks, furnaces, boilers, pits, ducts, sewers, manure pits, hoppers, silos, large pipelines, vaults, dikes and open surface tanks.

IV. RESPONSIBILITIES

Entry Supervisor: The Entry Supervisor shall be assigned by the Shop Foreman and shall have the training and experience necessary to:

A. Know and understand all provisions of this Confined Space Entry Program and the UIUC Confined Space Entry Policy;
B. Know the hazards that may be present or exist during entry, including information on the routes of potential exposure (i.e. inhalation, skin contact, etc); signs or symptoms, and consequences of the exposure;
C. Verify that the appropriate entries have been made on the permit, that all tests specified on the permit have been completed, and that all equipment required on the permit has been provided and is being used;
D. Terminate operations and cancel the permit;
E. Verify that the rescue services are available and that the means of summoning them are operable;
F. Prevent unauthorized individuals from attempting to enter the permit space during entry operations;
G. Determine that entry operations remain consistent with the terms of the permit and that acceptable entry conditions are maintained; and
H. Provide all canceled permits to the Confined Space Competent Person for filing purposes.

The Entry Supervisor must be present at the entry site during the following times:

A. To sign the permit and initiate the entry;
B. At least every two hours to verify that entry operations are consistent with the terms of the permit and that acceptable entry conditions are maintained;
C. Prior to re-entry following a scheduled break lasting 30 minutes or more;
D. As requested by the attendant to deal with unauthorized individuals;
E. When a condition not listed on the permit arises (this requires close out of existing permit, re-evaluation of the space, a new permit with control/elimination measures for the new condition); and
F. During any evacuation or other emergency.

Authorized Entrants: Authorized Entrants shall be assigned by the Shop Foreman and shall have the training and experience necessary to:
A. Know and understand all provisions of this Confined Space Entry Program and the UIUC Confined Space Entry Policy;
B. Request a Confined Space Entry Permit from the Supervisor for entry and/or work to be performed in permit required confined spaces;
C. Implement the precautions identified on the Confined Space Entry Permit prior to entry.
D. Obtain the approval of the Supervisor prior to entry;
E. Know the hazards that may be present or exist during entry, including: Information on the routes of potential exposure (e.g., inhalation, skin contact, etc), signs or symptoms, and the consequences of the exposure;
F. Properly use all the required equipment;
G. Properly wear chest or full-body harnesses, and in certain circumstances, wristlets, as retrieval equipment;
H. Alert the Attendant whenever you recognize any warning sign or symptom of exposure to a dangerous situation or detect a condition that is not allowed by the permit;
I. Evacuate the permit space as quickly as possible if:
   a. An order to evacuate is given by the Attendant or the Supervisor;
   b. The Entrant recognizes any warning sign or symptom of exposure to a dangerous situation;
   c. The Entrant detects a condition that is not allowed by the permit; or
   d. An evacuation alarm is activated; and
J. Return the confined space entry permit to the Supervisor when the work is completed.

Attendants: Attendants shall be assigned by the Shop Foreman and shall have the training and experience necessary to:
A. Know and understand all provisions of this Confined Space Entry Program and the UIUC Confined Space Entry Policy;
B. Know the hazards that may be present or exist during entry, including information on the routes of exposure (i.e. inhalation, skin contact, etc.), signs or symptoms, and consequences of the exposure;
C. Be aware of the possible behavioral effects of hazard exposure in authorized entrants;
D. Monitor and maintain the safety of the Authorized Entrants inside the confined space at all times;
E. Continuously maintain an accurate count of the Authorized Entrants in the permit space;
F. Remain outside the permit space during operations until relieved by another Attendant. If relieved by another Attendant, provide a complete status of conditions and personnel in the confined space;
G. Post the permit on or near the confined space and assure that the conditions stipulated on the permit are being met. Warn unauthorized persons to stay away from the space;
H. Know how and where to activate the rescue service requirements;
I. Communicate with Authorized Entrants as necessary to monitor the entrant status and to alert entrants of the need to evacuate the space;
J. Order the evacuation of the confined space if:
   1. A condition which is not allowed on the permit is observed;
   2. The Authorized Entrant exhibits behavior effects indicative of hazard exposure;
3. A situation outside the space is detected which could endanger those who are working inside the space;
4. An uncontrolled hazard is detected inside the space; or
5. The Attendant can not effectively and safely perform all of the required duties;

K. Render any medical aid that can be done safely;
L. An attendant should never enter a confined space in an emergency unless they are equipped and trained with suitable emergency equipment and back up personnel; and
M. Perform no duties that might interfere with the primary duty to monitor and protect the Authorized Entrants.

(Note: Passing tools to Authorized Entrants and monitoring the atmosphere of the permit space are permitted provided the Attendant does not break the plane of an opening into a confined space.)

Confined Space Competent Person: The Confined Space Competent Person for F&S is a Safety Officer who is located in the Division of Safety and Compliance. The Confined Space Competent Person shall have all of the training and experience necessary to:

A. Understand the requirements of this Confined Space Entry Program, the UIUC Confined Space Entry Policy, and applicable OSHA regulations;
B. Create, maintain, revise, implement, and enforce this Confined Space Entry Program;
C. Attend training, as needed, to enforce the requirements of this Confined Space Entry Program;
D. Identify personnel who require confined space entry training;
E. Train or arrange training for all affected personnel on the requirements of this Confined Space Entry Program;
F. Coordinate training for supervisors, attendants, and entrants in accordance with the requirements outlined in Section XII Training Requirements;
G. Ensure that the requirements of this Confined Space Entry Program are followed; and
H. Maintain a training record for all employees that have been trained in the components of this Confined Space Entry Program.

V. SPACE EVALUATION

Identification and Classification
Each space that has not been previously classified or may changes have been made to the space that could alter the classification shall be evaluated by an Entry Supervisor using the Procedures for Atmospheric Testing (Appendix A) and the Space Evaluation Form (Appendix B). Once the Entry Supervisor has completed the Space Evaluation Form, it shall be given to the Confined Space Competent Person for review and approval. The Confined Space Competent Person shall maintain a copy of the Space Evaluation Form and log the information into an electronic database. Based on the Space Evaluation Form, each space shall be classified as:

- Non-Permit Required Confined Space (see Section VI);
- Permit Required Confined Space (see Section VII);
- Alternate Entry Procedures Confined Space (see Section VIII); or
- Special Procedures Space (see Section IX).

Signage
Once a space has been evaluated and classification has been approved, a sign shall be placed on each Permit Required Confined Space and Alternate Entry Procedures Confined Space and the space shall be secured from unauthorized entry. The sign shall state "DANGER - PERMIT-REQUIRED CONFINED SPACE, DO
NOT ENTER" or similar language in the vicinity of the space or by some other effective means to prevent unauthorized entry.

Reclassification of Permit Space
A Permit Required Confined Space and Alternate Entry Procedures Confined Space may be reclassified as a Non-Permit Required Confined Space if the space:

- Possesses no actual or potential atmospheric hazards and all other hazards can be eliminated without entry into the space; or
- Previous testing and inspection of the permit space demonstrates that all hazards within have been eliminated.
- Meets and continues to meet the requirements identified in Section II and IV of the Non-Permit Entry Reclassification Form located in Appendix C.

Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards.

In order to reclassify a permit space an Entry Supervisor must fill out the Non-Permit Entry Reclassification Form and submit it to the Confined Space Competent Person for approval. The completed Non-Permit Entry Reclassification Form must be maintained on file for review by potential entrants. Signage shall be removed from the space upon approval of the Non-Permit Reclassification Form.

VI. NON-PERMIT REQUIRED CONFINED SPACES

A Non-Permit Required Confined Space is 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 serious physical harm. Non-Permit Required Confined Spaces do not require written permits, attendants, special testing, or special training for entry. Entrants are required to verify that there are no changes in condition within the space that have created or have the potential to create a hazard.

VII. PERMIT REQUIRED CONFINED SPACES

Permit Required Confined Spaces have known or potential hazards. An Entry Permit is required for entry into Permit Required Confined Spaces. Additional requirements for entry into a Permit Required Confined Space are detailed below.

Acceptable Entry Conditions
Known or potential hazards must be eliminated or controlled prior to entry through the use of engineering, controls, administrative controls and/or personal protective equipment. Additional details of acceptable entry conditions are included on the Entry Permit located in Appendix D. Methods for adequately controlling and/or eliminating hazards follow:

- Isolation – The process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages. Additional
information can be found in the F&S Lockout/Tagout Procedures for Isolating Machines from Energy Sources.

- Flushing and Inerting – In confined spaces with atmospheres that are flammable or have atmosphere that are immediately dangerous to life and health (IDLH), elimination of the hazardous atmosphere is required. This can be done through flushing with forced air or inerting with a noncombustible gas such as nitrogen. Note that inerting may result in an oxygen-deficient atmosphere.

- Verification Monitoring – Monitoring of the atmosphere must be conducted prior to entry. Constituents must be monitored in accordance with Procedures for Atmospheric Testing located in Appendix A. Acceptable constituent levels are listed on the Entry Permit (Appendix D). Periodic air monitoring throughout entry is required, although continuous monitoring is recommended. Monitoring results are to be recorded on the Entry Permit at least every hour or more often if conditions warrant by either the Attendant or Entry Supervisor and verified by the Entry Supervisor at least every two hours. Continuous monitoring is required when isolation of the space is infeasible. See for Atmospheric Testing located in Appendix A for more details.

Permitting System
Confined Space Entry Permits (Appendix D) must be filled out prior to each entry into a permit required confined space. A new permit is required for each new work shift.

Preparation
Prior to entry into a permit required confined space, an Entry Permit must be completely filled out, signed by an authorized Entry Supervisor, and posted at the entry to the confined space.

Issue/Use
Work conducted in a permit required confined space shall not deviate from the requirements identified on the Entry Permit including work activities to be conducted, time to conduct work, and equipment to be used.

Concluding Operations/Canceling Permits
Once entry operations are complete all entrants must evacuate the space, the space must be closed/sealed up to pre-entry conditions, and the Entry Supervisor must cancel the permit. Entry must not exceed the expiration date and time indicated on the Entry Permit. Cancellation of the Entry Permit by the Entry Supervisor is also required when activities or situations arise that are not allowed by the Entry Permit.

The canceled Entry Permit shall be given to the Confined Space Competent Person for review. Canceled Entry Permits shall be maintained by the Confined Space Competent Person for a minimum of one year.

Disclosure
Each Authorized Entrant and/or their authorized representative must have the opportunity to observe the completed permit, pre-entry monitoring or testing of the permit space prior to entry, and subsequent monitoring or testing of the permit space. The permit space must also be reevaluated in the presence of the Authorized Entrant or their authorized representative upon their request.

Coordination with Contractors
Contractors are responsible for identifying, evaluating, and classifying spaces that their employees will enter. All available information will be provided by F&S to contractors about spaces to be entered. Contractors shall not reclassify a permit space to non-permit space without a written justification and concurrence by S&C or
applicable departmental safety personnel. Contractors must have and implement their own Confined Space Program and provide their own equipment. Contractors must debrief their F&S contact about hazards identified during their evaluations, methods of control and/or elimination of hazards, and any issues encountered during entry.

If F&S personnel will be working in the same space as contractor personnel, then each group will conduct work in accordance with their own Confined Space Entry Programs. F&S and the contractor must each provide an Entry Supervisor.

A single Attendant from either group is acceptable as long as both Entry Supervisors agree on the duties of the Attendant and proper communication is maintained between the Attendant and Entrants. This information must be documented on both Entry Permits. Only one group will need to conduct pre-entry air monitoring and other hazard control/elimination activities as long as both Entry Supervisors agree with the results and that the requirements of both Entry Permits are satisfied.

**Barriers**

Barriers must be used during permit required confined space entry to prevent unauthorized entrance and protect personnel participating in the entry from external hazards such as overhead hazards and vehicular traffic.

**Attendants**

At least one Attendant must be present for each permit required confined space entry to verify that conditions in the permit space are continuously acceptable for entry throughout the duration of the authorized entry. The Attendant can monitor more than one ingress/egress point as long as they are able to adequately perform their duties. Monitoring of multiple spaces by a single attendant is prohibited.

**Entry Supervisor**

Each entry requires an Entry Supervisor who is responsible for determining hazards, hazard mitigation actions, signing the permit to initiate the entry, and canceling the entry. The Entry Supervisor may also serve as either an entrant or attendant.

**VIII. ALTERNATE ENTRY PROCEDURES**

Alternate Procedures may be used for entering a confined space if it can be demonstrated that the only hazard faced by employees entering the space is an actual or potential atmospheric hazard that can be controlled using continuous forced air ventilation.

Once a space has been identified and approved as an Alternate Entry Procedures space using the Space Evaluation Form (Appendix B), the Alternate Entry Procedures form (Appendix E) shall be utilized to document the appropriate mitigating measures that must be taken to eliminate non-atmospheric hazards. Pre-entry and periodic air monitoring must be conducted and documented during each Alternate Entry Procedures entry and the F&S Safety Officer must verify that the space still meets all of the conditions for an Alternate Entry Procedures space.

If hazards are introduced into the space as part of the entry, the space shall be evaluated considering these hazards. If the introduced hazards can not be controlled using continuous forced air ventilation the space shall
be considered a permit required confined space. See Section VIII for requirement for PERMIT REQUIRED
CONFINED SPACES.

Once non-atmospheric hazards have been eliminated and atmospheric hazards are controlled, Alternate Entry
Procedure spaces do not require the use of the Entry Permit or Attendant. Training is still required for
personnel participating in entry into Alternate Entry Procedure spaces.

IX. SPECIAL PROCEDURES

Special Procedures spaces are spaces that are unique and do not necessarily fall into one of the other three
categories of confined spaces and following typical procedures for Permit Required Confined Spaces or
Alternate Entry Procedures would be more hazardous to the Entrants. Special Procedures will be written on an
as needed basis, providing detailed information for safe entry into a specific space.

Sewers contain unique hazards and are among the permit spaces that Special Procedures will need to be written.
Appendix F Special Considerations for Sewer Entry contains information that should be reviewed and used in
the production of the Special Procedure.

X. EQUIPMENT

Equipment required during a permitted entry must be listed on the permit and may include:
A. Atmospheric testing and monitoring equipment;
B. Forced air ventilation equipment;
C. Communications equipment;
D. Lighting equipment needed to enable employees to work safely within the permit space and exit said
space quickly in the event of an emergency;
E. Barriers and shields necessary to prevent pedestrian and vehicular access;
F. Ladders;
G. Rescue equipment such as fall arrest systems and retrieval devices as required in Section XI. RESCUE
AND EMERGENCY PROCEDURES; and
H. Miscellaneous personal protective equipment (PPE) such as eye protection, foot protection, head
protection, etc. as necessary to work safely within the confined space.

Personnel must be trained on the proper use of the equipment and equipment must be inspected prior to each
use. Atmospheric Monitoring equipment can be checked out from the Electricians Shop. If the atmosphere
needs to be tested for constituents other than carbon monoxide, oxygen, hydrogen sulfide, and lower
flammability limit please contact S&C at 265-9828 for assistance. The rest of the equipment can be checked out
from the Tool Room. Most PPE can be obtained from Campus Stores or ordered through one of the F&S
preferred vendors for safety equipment and supplies.

XI. RESCUE AND EMERGENCY PROCEDURES

The UIUC Emergency Rescue Services are the Champaign and Urbana Fire Departments depending upon your
location on campus. The appropriate fire department must be contacted prior to entry into a permit space. The
Urbana Fire Department non-emergency phone is 384-3420 and the Champaign Fire Department non-
emergency phone is 403-7200.
Emergency Evacuation Procedures
In the event of an emergency, the Attendant will notify the Entrants of the need to evacuate. The Attendant will also notify the Entry Supervisor and, if necessary, the UIUC Emergency Response Service by calling 911. The Entry Supervisor will cancel the entry permit. If re-entry is to be performed, a new permit must be used.

See the Section below on Rescue Procedures if Entrants are unable to evacuate the space on their own.

Rescue Procedures
If a rescue is required:
- The Attendant must immediately contact the UIUC Emergency Response Service by calling 911;
- The Attendant will attempt to evacuate the Entrant(s) using non-entry retrieval methods;
- The Attendant will provide the UIUC Emergency Response Service with the number and location of the Entrants in the space, the reason emergency rescue is required, the hazards associated with the space, and provide them with the permit to review; and
- All personnel will follow the instructions of the UIUC Emergency Response Service commander upon their arrival.

XII. TRAINING REQUIREMENTS

All F&S personnel who are involved in entry into Permit Required Confined Spaces, Alternate Entry Procedures spaces, and Special Procedure spaces must attend confined space training provided by S&C. F&S personnel who will act as an Entry Supervisor must attend additional S&C-approved confined space training. Personnel entering Non-Permit Required Confined Spaces are not required to attend training.

Training Frequency
F&S personnel are required to attend training prior to their first work assignment associated with a confined space. Additional training is required when there is a change in assignment, operation, procedures, or the Entry Supervisor and/or Confined Space Competent Person determine additional training is required for safe operations.

Documentation
F&S personnel attending the confined space training provided by S&C will be required to sign-in with their name, signature, and badge number. Personnel attending the additional training through an outside consultant must provide a copy of the attendance sheet or completion certificate to S&C. Sign-in sheets and certificates will be scanned for electronic filing. Training information will be stored in the S&C training database.

XIII. CONFINED SPACE PROGRAM REVIEW

The Confined Space Competent Person shall review the F&S Confined Space Program at least annually and revise as needed. The review shall include canceled permits, this Program document, and input from F&S personnel involved in confined space entry. Additional reviews may be warranted based on unauthorized entries, violations of Entry Permit requirements, failure to identify and isolate/eliminate hazards prior to entry, and complaints that the requirements of this Program document including attached forms and procedures are inadequate.
Policy Statement
The following procedures were developed to protect Facilities & Services (F&S) personnel from potential exposure to atmospheric hazardous materials during entry into confined spaces.

Purpose
Atmospheric testing is required to evaluate the hazards of a permit space and verify that acceptable entry conditions for entry into that space exist.

Evaluation Testing
Evaluation testing shall be conducted as part of the work planning process for entry into a confined space. The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space.

Evaluation and interpretation of the evaluation data and development of the entry procedure shall be conducted by the Entry Supervisor and reviewed by the Confined Space Competent Person based on evaluation of all serious hazards.

Verification Testing
Verification testing shall be conducted prior to entry and periodically throughout the entry (continuous monitoring is recommended). The atmosphere of a permit space which may contain a hazardous atmosphere shall be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) shall be recorded on the permit in the space provided.

If isolation of the space is infeasible because the space is large or part of a continuous system (e.g., storm sewer), pre-entry testing shall be performed to the extent feasible before entry is authorized and, if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized entrant are working.

Duration of Testing
Measurement of values for each atmospheric parameter shall be made for at least the minimum response time of the test instrument specified by the manufacturer.

Testing Stratified Atmospheres
When monitoring for entries involving a descent into atmospheres that may be stratified (in layers of gases), the atmosphere should be tested in increments of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

Order of Testing
Testing shall be done in the following order:
- Oxygen testing is performed first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere;
- Combustible gases are tested next because the threat of fire or explosion is both more immediate and more life threatening, in most cases, than exposure to toxic gases and vapors; and
- Tests for toxic gases and vapors are performed last.
## Appendix B
Confined Space Evaluation Form

<table>
<thead>
<tr>
<th>Section I</th>
<th>Space Description:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Location:</td>
<td>Job #:</td>
<td>W.O. #:</td>
</tr>
</tbody>
</table>

### Confined Space Identification:  
1. Is the space large enough and shaped so an employee can enter and work? **Yes** **No**
2. Does the space have a limited or restricted means of ingress or egress? **Yes** **No**
3. Is the space NOT designed for continuous employee occupancy? **Yes** **No**

If **ANY** answer in Section II is **“NO”**, proceed to Section IV and mark the **“Not A Confined Space”** box, sign as the evaluator, and give this form to the Confined Space Competent Person. If **ALL** answers in Section II are **“YES”**, proceed to Section III.

### Confined Space Evaluation:  
1. Does the space contain, or have the potential to contain either through processes inherently within the space or introduced through work activities during entry (e.g., hot work), a hazardous atmosphere? (e.g., oxygen deficiency, flammable vapors or dusts, toxic gases or dusts, volatile chemicals, or other hazardous substance).  **Yes** **No**
   - If yes, Specify known or potential hazards:
2. Does the space contain a material with the potential for engulfment of a worker? (e.g., grain, sand, or water)  **Yes** **No**
   - If yes, Specify known or potential hazards:
3. Does the space have an internal shape such that a worker could be trapped or suffocated by inwardly converging walls, floor, or ceiling?  **Yes** **No**
   - If yes, Specify known or potential hazards:
4. Does the space contain, or have the potential to contain, any other recognized safety or health hazards? (e.g., mechanical, exposed electrical wires, energized equipment, gas or chemical lines, elevated work, temperature extremes, noise, biological, radioactivity)  **Yes** **No**
   - If yes, Specify known or potential hazards:
5. Is this space represented as a Special Procedures through use of Standard Operating Procedures for entry?  **Yes** **No**

### Confined Space Classification:  
1. If **ANY** answers in Section II are **“NO”**, then this is **Not A Confined Space**.
2. If **ALL** answers in Section III are **“NO”**, then this is a **Non-Permit Required Confined Space**.
3. If **ONLY** question 1 in Section III is **“YES”** and the atmospheric hazard **CAN** be controlled through use of forced air ventilation, then this is an **Alternate Entry Procedures** space.
4. If question 1 in Section III is **“YES”** and the atmospheric hazard **CAN** be controlled through use of forced air ventilation and if any of questions 2, 3, or 4 are **“YES”** and **CAN** be eliminated, then this is an **Alternate Entry Procedures** space.
5. If question 1 in Section III is **“YES”** but the atmospheric hazard **CAN NOT** be controlled through use of forced air ventilation or if any of questions 2, 3, or 4 are **“YES”** but **CAN NOT** be eliminated, then this is a **Permit Required Confined Space**.
6. If question 5 in Section III is **“YES”**, then this is a **Special Procedures** space.

### Certification:
I certify that I have evaluated this space including all known and potential hazards, and have classified it accordingly based on my evaluation.

Entry Supervisor:  
| (Signature) | (Print Name) | (Phone) | (Date) |

I certify that I have reviewed this Confined Space Evaluation Form and have verified that this space has been properly classified.

F&S Safety Officer:  
| (Signature) | (Print Name) | (Phone) | (Date) |
## Section I

**Type of Space:**

**Date:**

**Specific Location:**

**Job #:** *W.O. #:*

**Known/Potential Hazards:**

## Section II

**Original Hazards:**

**Steps Taken to Eliminate Hazards:**

**Elimination Steps Performed By:** *(Name)*

## Notes:

1. All hazards must be ELIMINATED. CONTROL of the hazards is not an acceptable reason for reclassification.

2. Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards. If a hazardous atmosphere is the only known or potential hazard and can be controlled through continuous forced air ventilation, see the Alternate Entry Procedures Form.

3. Introduction of a hazard into the space (e.g., paint thinner, hot work, etc.) requires the use of the full permit process.

## Section III

**Time Tests Are Taken:**

"tests are to be taken in the following order"

<table>
<thead>
<tr>
<th>Tests to be Taken</th>
<th>Limit</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Oxygen</td>
<td>19.5-23.5 %</td>
<td></td>
</tr>
<tr>
<td>% of LEL</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>25 ppm</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>10 ppm</td>
<td></td>
</tr>
<tr>
<td>Others (List):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Monitoring Instrument Name:**

**Serial #:**

**Date of Calibration:**

**Notes:**

1. Continuous / periodic tests shall be conducted before beginning a job. For questions pertaining to test requirements, contact your supervisor.

2. Cal. Date = Date of last documented calibration.

## Section IV

I certify that I have verified the elimination of all known and potential hazards associated with this space.

**Entry Supervisor:** *(Signature)* *(Print Name)* *(Phone)* *(Date)*

I certify that I have reviewed this reclassification form and have verified that all known and potential hazards have been eliminated. Reclassification to a non-permit space is approved.

**F&S Safety Officer:** *(Signature)* *(Print Name)* *(Phone)* *(Date)*
Appendix C
Non-Permit Entry Reclassification Form

**General Notes:**
1. Introduction of a hazard into the space (e.g., paint thinner, hot work, etc.) requires the use of the full permit process.
2. This space must be re-evaluated if a change in the use or configuration of a non-permit space could increase the hazards to entrants. Based on the re-evaluation, reclassification as permit-required may be necessary.
3. If entry into the space must be performed to eliminate hazards then it must be conducted using the full permit process.
4. Once this reclassification form has been completed and approved by the F&S Safety Officer, it must remain on file and available to employees entering the space.
5. Prior to each entry into a non-permit space, an Entry Supervisor must verify that the space still meets all of the conditions for a non-permit space. This includes verifying that the steps taken in Section II continue to eliminate hazards from the space and that testing of the atmosphere confirms no atmospheric hazards are present.
6. Once the space has been approved for reclassification as a non-permit required space, remove signage.
# Appendix D
## Entry Permit

### Section I
- **Type of Permit-Required Space:**
- **Specific Location:**
- **Job #:**
- **W.O. #:**
- **Date:**
- **Start Time:**
- **Originator:**
- **Phone #:**
- **Location:**
- **Originator:**
- **Phone #:**
- **Scheduled Expiration:**
- **Actual Expiration:**

### Section II
<table>
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<tr>
<th>Safety Requirements</th>
<th>Yes</th>
<th>N/A</th>
<th>Equipment</th>
<th>Yes</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>Lock Out – to “Zero Energy State”</td>
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<td>Non-Entry Rescue</td>
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<td></td>
</tr>
<tr>
<td>Lines Broken – Capped or Blanked – for isolation</td>
<td></td>
<td></td>
<td>Retrieval Unit (more than 5ft)</td>
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<td></td>
</tr>
<tr>
<td>Purge – Flush &amp; Vent</td>
<td></td>
<td></td>
<td>Lifelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting (adequate or low voltage)</td>
<td></td>
<td></td>
<td>Emergency Communications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation Provided</td>
<td></td>
<td></td>
<td>Fire Extinguisher</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secure Area</td>
<td></td>
<td></td>
<td>PPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Procedures</td>
<td></td>
<td></td>
<td>Protective Clothing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td>Respiratory Protection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section III
**Air Monitoring Information**
- **Monitoring Instrument Name:**
- **Serial #:**
- **Date of Calibration:**

**Note:** Continuous / periodic tests shall be conducted and recorded on the accompanying Air Monitoring Log before beginning a job, after scheduled breaks, and at least every hour or more often as conditions warrant. Continuous monitoring is required if isolation of the space is infeasible. For questions pertaining to test requirements, contact your supervisor.

### Section IV
**Authorized Entrant(s):**
**Emergency Procedure (Brief Explanation):**
**Safety Attendant(s):**
- **What will be the means to summon rescue?**
- **Has pre-entry meeting been held?**
- **Emergency communication operable?**

**Emergency:** 911 | **Non-emergency CFD:** 403-7200 | **UFD:** 384-2420

**Note:** Use the Permit Space Entry Log Sheet to maintain an accurate account of Authorized Entrants within the space. See Section IV, note 5 on reverse side for additional details.

### Section V
**Originator:**
- **(Signature)**
- **(Print Name)**
- **(Phone)**
- **(Date)**

**Entry Supervisor:**
- **(Signature)**
- **(Print Name)**
- **(Phone)**
- **(Date)**

**Annual Review By:**
- **(Signature)**
- **(Print Name)**
- **(Phone)**
- **(Date)**
Appendix D
Entry Permit

GENERAL
1. Verify that all confined space personnel have received proper training and authorization to perform duties assigned.
2. An entry permit must be issued prior to entry by the authorized entrant(s) for any scheduled work activity into any permit required Confined Space. All people involved in the Confined Space Entry will participate in a safety review of the completed permit. Each individual is responsible for following the requirements of this permit.
3. The permit or a copy of the permit shall be securely fastened at the point of entry, or if this is impractical, by any other equally effective means.
4. All permits are to be returned to the supervisor/manager approving the permit at the end of the shift for which the permit was issued. Expired permits must be returned to the F&S Safety Officer. Permits must be kept on file for one year.

SECTION I
The permit covers all work to be done by all the various departments on the job for which it was issued.
1. Type of Permit-Required Space: identify by name (e.g., vault, tank, etc.)
2. Specific Location: designate a specific area of campus (e.g. Area, bldg., floor, room, etc.)
3. Purpose of Entry: specific type of work to be performed (e.g. clean out, weld, burn, repair, etc.)
4. Product last in space: use common names (e.g. sulfuric acid, caustic soda, sewer water, etc.)
5. Permit duration: OSHA defines one shift as an 8 hour period. Permits must be reviewed and reinstituted at shift changes.

SECTION II
1. Fill out the special requirements sections of the permit by reviewing the SOP for that permit-required Confined Space.
2. Additional information on Personal Protective Equipment and fire protection can be found by consulting the appropriate MSDS. The attendant shall have immediately available the same Personal Protective Equipment as the person entering the Confined Space.
3. The electrical equipment shall be checked for proper voltage and operations before entry. All portable power equipment must use Ground Fault protection and the Ground Fault Interrupter shall be located outside the Confined Space.
4. Seek the work supervisor’s help when written entry approval cannot be made in accordance with Safe Entry Procedures.
5. Indicate if other special procedures are required. Maintain other required procedures/permits with the entry permit.

SECTION III
1. Record instrument name, serial #, and last calibration date on the permit.
2. Record test results on the accompanying log sheet.
3. Take tests as necessary to verify a suitable atmosphere with 1 hour minimum sampling/recording intervals. Continuous atmospheric monitoring is recommended with periodic recording at least every hour. Continuous monitoring required if isolation of the space is infeasible.
4. Retesting is required after lunch, scheduled breaks, and at least every hour or more often as conditions warrant.

SECTION IV
1. An attendant must be appointed to watch the authorized entrant(s) entering the Confined Space. The attendant will have no responsibility except watching the person in the Confined Space. The attendant must have communication equipment to quickly notify rescue personnel of an emergency (e.g., telephone, radio).
2. The person(s) entering the Confined Space shall, when required, be attached by a lifeline (with a minimum breaking strength of 3600 lbs.) controlled by the attendant at all times. The Confined Space entrant(s) must exit without question when instructed by the attendant to do so. Any vertical entry more than 5 feet deep must have a mechanical retrieval system.
3. A rescue plan and equipment must be agreed to before Confined Space entry.
4. Specify type of communication between attendant and entrant(s) (e.g. radio, verbal, tug on lifeline, etc.).
5. Entrants shall document each time they enter and exit the permit space on the Permit Space Entry Log. The Attendant(s) shall maintain the Permit Space Entry Log as a means to meet their responsibility to maintain an accurate account of entrants in the permit space.

SECTION V
1. All permits must be approved by the person in charge of the work crew entering the Confined Space, or in the supervisor’s/manager’s absence, the next higher authority.
2. Complete signatures must be used, not just initials.
3. F&S Safety Officer will review expired permits on an annual basis.

**Air Monitoring Log**

<table>
<thead>
<tr>
<th>Time</th>
<th>% Oxygen</th>
<th>% LEL</th>
<th>CO</th>
<th>H2S</th>
<th>Other:</th>
<th>Other:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit</td>
<td>19.5-23.5%</td>
<td>10%</td>
<td>25 ppm</td>
<td>10 ppm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Appendix D
## Entry Permit

<table>
<thead>
<tr>
<th>Date:</th>
<th>Type of Permit-Required Space:</th>
<th>Specific Location:</th>
<th>Job #:</th>
<th>W.O. #:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authorized Entrant Name:</th>
<th>Badge/UIN #</th>
<th>Time In</th>
<th>Time Out</th>
<th>Time In</th>
<th>Time Out</th>
<th>Time In</th>
<th>Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Last updated by: J. Neighbors
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Last Updated: April 2014

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217-265-9828
Appendix E
Alternate Entry Procedures

<table>
<thead>
<tr>
<th>Section I</th>
<th></th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Space:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Location:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job #:</td>
<td>W.O. #:</td>
<td></td>
</tr>
<tr>
<td>Product Last in Space:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section II</th>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Evaluation:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Are there known or potential Atmospheric Hazards?</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2. Can the Atmospheric Hazards be controlled by forced air ventilation?</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>3. If the forced air ventilation were to fail, would the space become Immediately Dangerous to Life or Health (IDLH)</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>4. Are there other known hazards?</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>5. Can the other known hazards be eliminated without entrance into the space?</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Note: If the answer to questions 2 OR 5 is “NO”, OR the answer to question 3 is “YES”, then the full Entry Permit process must be used.

<table>
<thead>
<tr>
<th>Section III</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Hazards:</td>
<td>Steps Taken to Eliminate Hazards:</td>
<td>Elimination Steps Performed By: (Name)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section IV</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Test(s) Are Taken</td>
<td>“tests are to be taken in the following order”</td>
<td></td>
</tr>
<tr>
<td>Tests to be Taken</td>
<td>Limit</td>
<td>Test Results</td>
</tr>
<tr>
<td>% of Oxygen</td>
<td>19.5-23.5 %</td>
<td></td>
</tr>
<tr>
<td>% of LEL</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>25 ppm</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>10 ppm</td>
<td></td>
</tr>
<tr>
<td>Others (List):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Monitoring Instrument Name: Serial #: Serial #:

Date of Calibration:          |

Notes:
1. Initial air monitoring tests shall be completed before entry. Periodic air monitoring throughout entry is required. Continuous air monitoring is recommended. For questions pertaining to test requirements, contact your supervisor.
2. Cal. Date = Date of last documented calibration.

<table>
<thead>
<tr>
<th>Section V</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I certify that I have verified that all atmospheric hazards are being controlled by continuous forced air ventilation and all other known and potential hazards associated with this space have been eliminated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entry Supervisor:</td>
<td>(Signature)</td>
<td>(Print Name)</td>
</tr>
</tbody>
</table>

I certify that have reviewed this alternate entry procedures form and have verified that all atmospheric hazards are being controlled by continuous forced air ventilation and all other known and potential hazards associated with this space have been eliminated. The use of alternate entry procedures for the confined space identified in Section I is approved.

F&S Safety Officer: (Signature) (Print Name) (Phone) (Date)

Last updated by: J. Neighbors Page 1 of 2 Last Updated: April 2014

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General Notes:
1. Introduction of a hazard into the space (e.g., paint thinner, hot work, etc.) may require the use of the full Entry Permit process.
2. This space must be re-evaluated if a change in the use or configuration of the Alternate Entry Procedures space could increase the hazards to entrants. Based on the re-evaluation, use of the full Entry Permit process may be necessary.
3. Any conditions making it unsafe to remove or open an entrance cover shall be eliminated before the cover is removed.
4. When an entrance cover is removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary means which prevent people and tools from accidentally falling into the confined space.
5. Once this Alternate Entry Procedures form has been completed and approved by the F&S Safety Officer, it must remain on file and available to employees entering the space.
6. Prior to each entry into an Alternate Entry Procedures space, the F&S Safety Officer must verify that the space still meets all of the conditions for an Alternate Entry Procedures space. This includes the verification that the steps taken in Section III continue to eliminate hazards from the space and that testing of the atmosphere confirms that all atmospheric hazards are controlled by continuous forced air ventilation.
7. An Attendant is not required for Alternate Entry Procedure spaces.
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.
Appendix F
Special Consideration for Sewer Entry

(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.