

Confined Space Program

Purpose

This program provides procedures for the safe entry into and work within confined spaces. Confined space is a term used to describe an enclosed space with limited means of egress or entrance which is not designed for continuous employee occupancy. Examples of confined space include sewers, tunnels, fuel tanks, and pressure vessels. These spaces may be found throughout West Chester University and may require employee entry for many reasons including cleaning, inspection, maintenance, and repair.

General

There is a wide variety of potential hazards associated with work in confined spaces. Some hazards are due strictly to the “confined” nature of the work while other potential hazards are present with any type of work, confined or not, but are amplified greatly when tasks have to be performed in a confined space.

Policy

Definitions

- A. Acceptable Entry Conditions – The conditions that must exist in a permit space to allow entry and to ensure that employees can safely work within the space.
- B. Attendant – An individual stationed outside a permit space who monitors the authorized entrants and who performs all duties as assigned in this program.
- C. Confined Space – A space that meets all of the following conditions:
 - 1. Is large enough and so configured that an employee can bodily enter and perform assigned work
 - 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)
 - 3. Is not designed for continuous employee occupancy.
- D. Emergency - Any occurrence or event internal or external to the permit space that could endanger entrants. This includes any failure of hazard control or monitoring equipment.
- E. Entry - The action by which a person passes through an opening into a permit space. Entry includes ensuing work activities in that space and is considered to have

occurred as soon as any part of the authorized entrant's body breaks the plane of an opening into the space.

- F. Entry Permit - The written or printed document that is provided by the supervisor to allow and control entry into a permit space.

- G. Entry Supervisor - The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry, overseeing entry operations and for terminating entry as required by this program. The entry supervisor may also serve as an attendant or as an authorized entrant, as long as that person has been properly trained and equipped for each role.

- H. Hazardous Atmosphere - An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or acute illness for 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, which may be approximated as a condition in which the dust obscures vision at a distance of 5 feet 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 1910 Subpart G, *Occupational Health and Environmental Control*, or in 1910 Subpart Z, *Toxic and Hazardous Substances*, and which could result in employee exposure in excess of its dose or permissible exposure limit

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

- I. 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.

- J. 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. This procedure produces an IDLH oxygen-deficient atmosphere.

- K. Lockout/Tagout - Any procedure used to isolate the permit space from a hazardous energy source as described in the University's *Control of Hazardous Energy (Lockout/Tagout) Program*.
- L. 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.
- M. Permit-Required Confined Space (permit space) - 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, such as a liquid or finely divided solid, that has the potential to engulf 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
 - 4. Contains any other recognized serious safety or health hazard.
- A. Rescue Service - Personnel designated to rescue employees from permit spaces.
- B. Retrieval System - The equipment (including a retrieval line, chest or body harness, wristlets, and a lifting device or anchor) used for non-entry rescue of persons from a permit space.
- C. Telecommunications Center - An installation of communication equipment under the exclusive control of an organization providing telecommunications services, that is located outdoors or in a vault, chamber, or a building space used primarily for such installations.

Potential Hazards Involved with Confined Space Entry

- A. Oxygen Deficient Atmosphere - Any oxygen concentration less than 19.5% may result in some physical impairment and less than 16% may cause permanent injury or death. Oxygen deficient atmospheres are also referred to as asphyxiating atmospheres.
 - 1. Oxygen deficiencies can be caused by displacement of oxygen with another gas, by absorption by materials such as activated charcoal, by bacterial action in areas containing moisture and organic matter (e.g., sewers), or by consumption during chemical reactions (e.g., formation of rust on exposed surfaces, welding, cutting, brazing).
- B. Flammable Atmosphere - A flammable atmosphere can be created by any of the following conditions alone or in combination: vaporization of flammable liquids, enriched oxygen atmospheres (greater than 23.5%), chemical reactions, or high

concentrations of combustible dusts. An explosion or fire may result from a flammable atmosphere.

1. An atmosphere is considered to be flammable if a flammable gas or vapor is present at a concentration greater than 10 percent of its lower flammable limit or if a combustible dust is present at a concentration greater than or equal to its lower flammable limit
- C. Presence of Hazardous Chemicals - Poisonous or corrosive materials, some of which have poor warning properties, can be fatal, or cause serious injury in very low concentrations (e.g., CO, H₂S). Specialized knowledge of the confined space is necessary to determine if this kind of potential hazard could exist.
- D. Electrical Hazards - Possible activation of electrical equipment could cause serious injury or death. Lockout/tagout must be considered.
- E. Physical Hazards - Non-chemical physiological stresses such as heat or cold, noise, vibration, activation of mechanical equipment, and radiation may cause injury and should be evaluated prior to entry.
- F. Entrapment - A small area or internal configuration (baffles in horizontal trays, bends in tunnels, overhead structural members) that may entrap employees or make rescue and removal of an incapacitated worker more difficult.
- G. Engulfment - In areas where loose particulate matter is present, the risk of engulfment and suffocation is possible. Changes in matter should be anticipated from exposure to sun, water, or freezing temperatures, heavy equipment, overlying material, and vibration.

General Requirements

- A. Recordkeeping - Each supervisor is required to maintain all of the information necessary to comply with the provisions of this program including this document; a list of any confined spaces that his or her employees may be expected to enter; training certifications for employees who may be involved in confined space entry; a sample permit for each permit space, or group of permit spaces; and alternate procedures, if any, along with required supporting documentation.
- B. Workplace Survey - Each supervisor shall conduct a survey of his or her employees' workplace to determine if any confined spaces exist. If confined spaces are found, a list of such spaces must be developed and attached to this program.
- C. Evaluation of Confined Spaces - Before any employee is allowed to enter a confined space, his or her supervisor must identify and evaluate all hazards associated with the space. Supervisors are responsible for developing the means, procedures, and practices necessary for safe confined space entry including, but not limited to, the following:
1. Specifying acceptable entry conditions:

- a. Isolating the space through the use of lockout/tagout procedures
 - b. Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control hazardous atmospheric conditions
 - c. Providing barriers to protect entrants from hazards associated with pedestrians, vehicles, or other external hazards
 - d. Verifying that conditions in the space are acceptable for entry throughout the duration of an authorized entry
 - e. Preventing unauthorized entry
 - f. Assistance in confined space evaluation is available through Environmental Health and Safety (EHS)
- A. Training - Training will be provided by EHS in the general skills necessary for confined space entry. Supervisors are responsible for the specific training of each employee in those tasks which are unique to confined spaces they are expected to enter. Training must be conducted before the employee is first assigned duties covered by this program. Retraining must be conducted whenever there are changes in an employee's duties, changes in the confined space operations that present a hazard that the employee has not been previously trained about, or deviations from the confined space entry procedures. A certification of employee training must be kept by the supervisor and must contain each employee's name, the signatures or initials of the trainers, and the dates of training.
- B. Protective Equipment and Materials - The following protective equipment and materials must be provided by departments involved in confined space entry, as needed:
- 1. Testing and monitoring equipment
 - 2. Ventilation equipment needed to obtain acceptable entry conditions
 - 3. Communication equipment
 - 4. Personal protective equipment
 - 5. Lighting equipment necessary for employees to see well enough to work safely and to exit the space quickly in the event of an emergency
 - 6. Barriers and shields
 - 7. Equipment, such as ladders, for safe entry and exit by entrants
 - 8. Rescue and emergency equipment

9. Any other equipment necessary for safe entry into and rescue from permit spaces

Supervisors must ensure that all equipment is maintained properly and that employees are trained in its proper use. The purchasing and maintenance of equipment (including rescue and emergency equipment) is the responsibility of each department that has employees who enter confined spaces. Assistance in equipment selection is available through EHS.

- C. Rescue and Emergency Services - The Department of Public Safety should be contacted in the event of any emergency involving a confined space entry

Permit-Required Confined Spaces

- A. Scope and Application - This section contains requirements for entry into permit-required confined spaces. OSHA's regulations for permit-required confined spaces are found in 29 CFR 1910.146. These regulations do not apply to construction activities or to any activity covered by a specific OSHA regulation.
- B. Entry Permit - A confined space entry permit must be completed and signed or initialed by an entry supervisor prior to entry into any permit space. The entry-permit documents compliance with OSHA's regulations and this program, and must contain the following:
 1. The permit space to be entered
 2. The purpose of the entry
 3. The date and the authorized duration of the entry permit
 4. The names of the authorized entrants, attendants, and the name and signature or initials of the entry supervisor
 5. The hazards of the space about to be entered
 6. The measures, such as lockout/tagout, purging, inerting, or ventilating, used to isolate the permit space and to eliminate or control permit space hazards before entry
 7. The acceptable entry conditions
 8. The results of initial and periodic atmospheric tests, as well as the names or initials of the testers and the date and times of the tests
 9. The rescue and emergency services that can be summoned and procedures for summoning those services

10. The communication procedures to be used by authorized entrants and attendants during entry
 11. Equipment, including personal protective equipment, special tools, testing equipment, and rescue equipment to be provided during the entry
 12. Any other information which is necessary, given a particular permit space, to ensure employee safety
- C. Entry Procedures - Prior to entering a permit space, conditions within the space must be tested to determine if acceptable entry conditions, as determined during the permit space evaluation, exist. Testing or monitoring of the permit space must be done as necessary, to ensure that acceptable entry conditions are being maintained during the course of the entry operations.

If isolation of the permit space is not feasible because the space is large or is part of a continuous system (such as a sewer), pre-entry testing must be performed to the extent possible before entry is allowed and if entry is authorized, entry conditions must be continuously monitored. When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapor.

At least one attendant must be provided outside the permit space for the duration of the entry operation. Attendants may be assigned to monitor more than one space so long as they can effectively perform the duties described in *Duties of Attendants*. The entry permit must reflect the procedures to be followed by the attendant if he or she is called to respond to an emergency affecting one or more sites so as not to be distracted from his or her duties at the remaining, unaffected sites.

The completed entry permit must be made available to authorized entrants at the time entry begins by posting the permit at the entry portal or by some other equally effective means, such as a pre-entry meeting. The authorized entrants must confirm that the pre-entry preparations have been completed and must perform other duties as described in *Duties of Authorized Entrants*.

The duration of the permit may not exceed the time required to complete the assigned job or task identified in the permit. The entry supervisor must terminate the entry and cancel the permit when work has been completed, or when a condition that is not allowed under the entry permit arises in or near the permit space. The entry supervisor must also perform other duties as described in *Duties of Entry Supervisor*.

Canceled entry permits must be retained for at least one (1) year. An annual review of all entry permits will be conducted jointly by EHS and the supervisor to ensure that the procedures of the permit-required confined space entry program are

adhered to. Reviews of entry procedures must also take place whenever any of the following occur:

1. Any unauthorized entry into a confined space
2. The detection of a permit space hazard not covered by the permit
3. The detection of a condition prohibited by the permit
4. The occurrence of an injury or near-miss during entry
5. A change in the use or configuration of a permit space
6. An employee complaint about the effectiveness of the program; or
7. Any time the steps taken under the permit do not adequately protect entrants

- D. Emergency Preparedness - To facilitate non-entry rescue, retrieval systems or methods must be used whenever an authorized entrant enters a permit space, unless the retrieval equipment increases the overall risk of entry or would not contribute to the rescue of an entrant. Each authorize entrant must use a chest or full body harness, with a retrieval line attached centered in the entrant's back near shoulder level, or above the entrant's head. Wristlets may be used if a chest or full body harness is not feasible or present a greater risk and wristlets are the safest and most effective alternative. The other end of the retrieval line must be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin immediately when needed. A mechanical device must be available to retrieve entrants from vertical type permit spaces more than five (5) feet deep.

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 must be made available to the emergency personnel treating the exposed entrant.

E. Duties of Attendants

1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure
2. Be aware of possible behavioral effects of hazard exposure in authorized entrants
3. Continuously maintain an accurate count of authorized entrants in the permit space and ensure that the identities of all entrants are recorded
4. Remain outside the permit space during the entry operation unit relieved by another attendant
5. Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants to the need to evacuate from the space

6. Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order the entrants to evacuate under any of the following situations
 - a. If the attendant detects a prohibited condition
 - b. If the attendant detects the behavioral affects of hazard exposure in an authorized entrant
 - c. If the attendant detects a situation outside the space that could endanger the authorized entrants
 - d. If the attendant cannot effectively and safely perform all duties described in this section
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
8. Take the following actions when unauthorized persons approach or enter a permit space while entry is underway
 - a. Warn the unauthorized persons that they must stay away from the permit space
 - b. Advise the unauthorized persons that they must exit immediately if they have entered the permit space
 - c. Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space
 - d. Perform non-entry rescue using retrieval equipment
 - e. Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

F. Duties of Authorized Entrants

1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure
2. Properly use all equipment necessary for the entry
 - a. Communicate with the attendant as necessary to enable the attendant to monitor status and to enable the attendant to alert entrants of the need to evacuate the space
 - b. Alert the attendant whenever
 - I. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation

II. The entrant detects a prohibited condition

3. Exit from the permit space as quickly as possible whenever
 - a. An order to evacuate is given by the attendant or the entry supervisor
 - b. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation
 - c. (3) The entrant detects a prohibited condition.

G. Duties of Entry Supervisors

1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure
2. Verify that all pre-entry tests are completed, and that all necessary equipment is available prior to endorsing the permit and allowing entry
3. Terminate the entry and cancel permits as necessary
4. Verify that rescue services are available and that the means for summoning them are operable
5. Remove unauthorized individuals who enter or attempt to enter the permit space during entry operations
6. Determine, whenever responsibility for a permit space operation is transferred and at intervals dictated by the hazards and operations performed in the space, that entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained

- H. Alternate Procedures for Permit Space Entry - Alternate procedures for permit space entry are allowed for spaces whose only hazard is an actual or potential hazardous atmosphere that can be rendered safe by continuous forced air ventilation. If any other hazard is present, then these alternate procedures cannot be utilized. Before alternate procedures may be used, monitoring and inspection data regarding the permit space must be obtained and documented. If an initial entry of the permit space is necessary to obtain data, the entry must be performed in compliance with permit-required confined space entry procedures.

After it has been established that only atmospheric hazards that can be controlled by continuous forced air ventilation are present in the permit space, the following alternate procedures may be used:

1. A written certification containing the date, the location of the space, and the signature of the person providing the certification must be provided prior to entry to all employees entering the space. This certification must verify that the space is safe for entry and that all necessary tests and inspections have been accomplished
2. Any condition making it unsafe to remove an entrance cover must be eliminated before the cover is removed
3. When entrance covers are removed, the opening must be guarded by a railing, temporary cover, or other 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
4. Before any employee enters the space, the internal atmosphere must be tested using a calibrated direct-reading instrument for the following conditions in the order given:
 - a. Oxygen content
 - b. Flammable gases and vapors
 - c. Potential toxic air contaminants
5. There may be no hazardous atmosphere within the space whenever an employee is inside the space. Continuous forced air ventilation must be used as follows:
 - a. An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere
 - b. The forced air ventilation must be so directed as to ventilate the immediate areas where an employee is or will be working and must continue until all employees have left the space
 - c. The air supply for the forced air ventilation must be from a clean source and may not increase the hazard in the space
6. The atmosphere must be periodically tested, in the manner listed above, to ensure that no hazardous atmosphere has accumulated
7. If a hazardous atmosphere is detected during entry, then all employees must leave the space immediately. The space must then be reevaluated to determine how the hazardous atmosphere developed and measures must be implemented to protect employees during any subsequent entry

When changes in the use or configuration of the space are made that might increase the hazards faced by entrants, then that space must

be reevaluated to determine if alternate procedures can still be effectively used or if permit-required confined space entry procedures are to be instituted.

- I. Non-Permit Confined Spaces - A confined space that poses no actual or potential atmospheric hazard and in which all internal hazards are eliminated without entry into the space, may be classified as a non-permit confined space. A permit-required confined space may be reclassified as a non-permit confined space if atmospheric and other internal hazards are eliminated. The control of atmospheric hazards through forced air ventilation does not constitute elimination of such hazards. If no other hazards were present in such cases, then alternate procedures for permit space entry would still apply.

A certification must be prepared for permit-required confined spaces that are reclassified as non-permit confined spaces which contain the date, the location of the space, and the signature of the person making the determination that the space should be reclassified. This certification must be made available to each employee entering the space.

If changes in the use or configuration of a non-permit space occur, the space must be reevaluated and reclassified, if necessary. If hazards arise within the space, all employees must immediately leave the space and it must be reevaluated and, if necessary, reclassified as a permit-required confined space.

- J. Work Performed by Contractors - Whenever work is performed by outside contractors that involves a permit-required confined space, the Project Manager must ensure that the following procedures are used
1. The contractor must be informed that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting OSHA's requirement in 29 CFR 1910-146
 2. The contractor must be apprised of the elements that make the space in question a permit space, including the hazards identified and the University's experience with the space
 3. The contractor must be apprised of any precautions or procedures that the University has implemented for the protection of employees in or near the permit spaces where the contractor's personnel will be working
 4. Operations must be coordinated with the contractor whenever both University and contractor employees will be working in or near the same permit spaces
 5. The contractor must be debriefed at the conclusion of the entry operations regarding the permit space program followed and

regarding any hazards confronted or created in the permit space during the contractor's operations

Telecommunications Work

- A. Scope and Application - This section contains requirements for telecommunications work performed in manholes and unvented vaults. OSHA's regulations covering telecommunications activities in confined spaces are found in 29 CFR 1910.268(o).

- B. Guarding Manholes and Street Openings - Whenever the cover of a manhole or vault is removed, the opening must be immediately guarded by a railing, temporary cover, or some other suitable barricade to prevent an accidental fall through the opening and to protect employees working in the space.

If work is to be done in the vicinity of vehicular or pedestrian traffic, warning signs and/or flags or other traffic control devices must be used to alert and channel approaching traffic. Where additional protection is needed, barricades must be used. Barricades and warning lights must be used during night-time hours.

- C. Entry Procedures - Before entering a manhole or unvented vault, the atmosphere must be tested for the presence of combustible gas and, where continuous forced ventilation is not provided, oxygen deficiency. When unsafe conditions are detected, the work area must be ventilated and otherwise made safe before entry is allowed. Continuous forced ventilation is required while work is performed in spaces under any of the following conditions where:
 - 1. Combustible or explosive gas vapors have been initially detected and subsequently reduced to a safe level
 - 2. Organic solvents are used
 - 3. Open flame torches are used
 - 4. The manhole is near vehicular traffic and/or exposed to gas seepage
 - 5. A toxic gas or oxygen deficiency is found.

Ladders must be used to enter or exit manholes exceeding four feet in depth.

Where open flames are used, a test for combustible gas must be made immediately before using the open flame device, and at least hourly thereafter. A fuel tank, such as acetylene, may only be in the manhole while in actual use.

- D. Attendant - A person with basic first aid training must be available to render immediate assistance if the preceding procedures do not adequately protect employees entering manholes or vaults, or if the worksite is jointly occupied by an electric utility. Examples of situations that would not be considered adequately protected include:
1. Manholes where safety hazards are created by traffic patterns that cannot be corrected by the procedures included in *Guarding Manholes and Street Openings*
 2. Manholes that are subject to unusual water hazards that cannot be abated by conventional means.

A qualified employee working alone may enter manholes jointly occupied by telecommunications and an electric utility for short periods of time for the purpose of inspection, housekeeping, taking readings, or similar work if such work can be performed safely.

Construction Activities in Confined Spaces

- A. Scope and Application - This section applies to construction activities in any confined space at West Chester University. OSHA's regulations for construction activities are found in 29 CFR Part 1926, which contains general and specific guidelines for work in confined spaces. This section is broken into several parts in order to address those specific situations regulated by OSHA.
- B. General - According to 29 CFR 1926.21(b)(6)(i), "all employees required to enter into confined or enclosed spaces shall be instructed as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment" required for the type of work being performed. Employers are required to "comply with any specific regulations that apply to work in dangerous or potentially dangerous areas." Specific regulations which apply to construction activities in confined spaces are covered below. It is important to note that these general provisions apply to any confined space activity that is not covered by a specific standard.

For construction purposes, OSHA defines "confined or enclosed spaces" as "any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere." Examples of confined or enclosed spaces include, but are not limited to, storage tanks, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, and open top spaces more than four (4) feet in depth such as pits, tubs, vaults, and vessels.

- C. Engine Powered Equipment - Whenever internal combustion engine powered equipment exhausts in or near enclosed spaces, test must be made and recorded to ensure that employees are not exposed to unsafe

concentrations of toxic gases or oxygen deficient atmospheres, in accordance with 29 CFR 1926.550(a)(11).

- D. Excavations and Trenches - The following procedures, included in 29 CFR 1926.651(g), must be used when working in excavations or trenches greater than four (4) feet deep which could reasonably be expected to develop a hazardous or oxygen deficient atmosphere, such as excavations in landfill areas or excavations in areas where hazardous substances are used or stored nearby:
1. The atmosphere must be tested before employees enter the excavation. The test must be for oxygen deficiency, flammable gases, or other toxic air contaminants
 2. If an oxygen deficient atmosphere is detected, ventilation or appropriate respiratory protection must be provided and used
 3. Ventilation must be used to control an atmosphere that contains flammable gas in excess of 20 percent of the lower flammable limit of the gas, or to reduce the levels of air contaminants to acceptable levels
 4. When any of these controls are used, testing must be conducted as often as necessary to ensure that the atmosphere remains safe.
- E. Underground Construction - Contained in 29 CFR 1926 Subpart S, entitled *Underground Construction, Caisson, Cofferdams and Compressed Air*, are procedures for working in confined spaces created during the construction of underground tunnels, shafts, chambers, and passageways. EHS should be consulted if this type of construction is planned and would involve University employees
- F. Underground Electrical Lines - The requirements for working in manholes and unvented vaults which contain electric utility services, found in 29 CFR 1926.956, are the same as those found in the *Telecommunications* section of this program, with the exception that an attendant must be available in the immediate vicinity of the manhole to render emergency assistance whenever this type of work is performed. The attendant may also occasionally enter the manhole to render other than emergency assistance. This does not preclude a qualified employee, working alone, from entering a manhole for brief periods of time for the purpose of inspection, housekeeping, taking readings, or similar work if such work can be done safely

Welding and Cutting in Confined Spaces

- A. Scope and Application - This section applies to welding and cutting operations in confined spaces. OSHA's regulations for these activities can be

found in 29 CFR 1910.252 for General Industry, and 29 CFR 1926.352 for Construction.

- B. Ventilation - Ventilation and/or respiratory protection is required for all welding and cutting done in confined spaces. The type of protection needed varies with the materials involved in the operation. Assistance in the selection and use of respiratory protection is available through EHS.
- C. Procedures - The following procedures must be used for all welding and cutting operations conducted in confined spaces:
 1. Ensure ventilation is appropriate and adequate
 2. Gas cylinders and welding machines must be left outside the space when work is performed in such spaces as tanks, boilers, or pressure vessels. Heavy portable equipment mounted on wheels must be securely blocked to prevent movement
 3. Whenever the welder must enter the confined space through a manhole or other restricted opening, some means for his or her quick removal must be provided. This could include a body harness and lifeline attached to mechanical retrieval equipment. An attendant with a preplanned rescue procedure must be available to observe the welder and to initiate rescue should it become necessary
 4. When operations are suspended for any substantial period of time, such as lunch or overnight, then electrodes must be removed from their holders and the arc welding machines must be disconnected from their power source. If gas welding or cutting is in use, the fuel gas and oxygen supply must be shut off with the torch valves and at some point, outside the confined space. Where possible, the hoses and torches must be removed from the space
 5. After operations are completed, the welder must mark the hot metal or provide for some other means of warning others working in the area.

Rescue and Emergency Services

Just before entry, public safety offices of the university must be informed that a confined space entry is about to be made.

In the case of confined space entry being planned by the employees of the Physical Plant department, work control center must also be informed of the imminence of a confined space entry. This must be done by radio just prior to the actual entry by the standby worker stationed at the entrance to the confined space to be entered.

A standby worker, equipped and trained to act in case of an emergency, must be stationed

at the entrance to the confined space. He/She shall be equipped with a supplied air respirator or self-contained breathing apparatus, safety harness, a safety line and where necessary, protective clothing. The respiratory protective equipment must have U.S. Bureau of Mines approval or NIOSH (National Institute, Occupational Safety and Health) certification under Schedule 13 for protection against atmospheres immediately hazardous to life.

In the event of an actual emergency occurring, the offices of public safety, as well as work control center must be informed immediately and asked to call in the local fire and emergency services in for assistance.

Standby worker will then provide immediate assistance to the worker inside the confined space in all possible ways but must continue to remain at the entrance and maintain radio contact until such time that at least one other person, arrive at the scene. At this time individuals may enter the confined space to begin rescue operations while ensuring that at least one individual remains outside to keep the lines of communications open with the public safety.

The first line supervisor must carry a radio at all times when individuals under his supervision plan to enter a confined space. The supervisor must contact the standby worker at the entrance to confined space at least once every ten minutes to ensure that all is well. In the event of there being no response from the worker at the entrance to the confined space, the supervisor must immediately proceed to the sight of the entry to investigate.

Confined Space Entry Permit

THIS PERMIT MUST REMAIN AT THE JOBSITE UNTIL JOB IS COMPLETED

LOCATION OF CONFINED SPACE: _____

PURPOSE OF ENTRY: _____

DATE: _____ TIME: _____ DURATION: _____

| SPECIAL REQUIREMENTS BEFORE ENTRY | Yes | No | N/A |
|--|------------|-----------|------------|
| DE-ENERGIZE / TEST AND VERIFY | | | |
| PURGE / FLUSH AND VENT | | | |
| VENTILATION ESTABLISHED? | | | |
| AREA SECURED? | | | |
| RETRIEVAL HARNESS REQUIRED? | | | |
| RETRIEVAL SYSTEM REQUIRED? | | | |
| LIFELINES REQUIRED? | | | |
| FIRE EXTINGUISHERS IN PLACE? | | | |
| EXPLOSION PROOF LIGHTING REQUIRED? | | | |
| PERSONAL PROTECTIVE EQUIPMENT REQUIRED? | | | |
| RESPIRATOR REQUIRED? | | | |
| HEAD/EYE/HEARING PROTECTION REQUIRED? | | | |
| COMMUNICATIONS EQUIPMENT | | | |
| HOT WORK PERMIT REQUIRED? | | | |

INDICATE WHETHER THE LEVELS ARE ACCEPTABLE BY CIRCLING Y OR N

| | | | | | |
|----------------------------------|-----|-----|-----|-----|-----|
| DATE | | | | | |
| TIME | | | | | |
| OXYGEN (19.5% - 23.5%) | Y N | Y N | Y N | Y N | Y N |
| LEL BELOW 10% | Y N | Y N | Y N | Y N | Y N |
| HYDROGEN SULFIDE 0-10 PPM | Y N | Y N | Y N | Y N | Y N |
| HYDROGEN CYANIDE 0-10 PPM | Y N | Y N | Y N | Y N | Y N |
| SULFUR DIOXIDE 0-5 PPM | Y N | Y N | Y N | Y N | Y N |
| AMMONIA 0-50 PPM | Y N | Y N | Y N | Y N | Y N |
| CARBON MONOXIDE 0-50 PPM | Y N | Y N | Y N | Y N | Y N |

AUTHORIZED ATTENDANTS: _____

AUTHORIZED ENTRANTS: _____

Comments:
