



SMU

PROGRAM

# CONFINED SPACE ENTRY

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SMU

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## 1.0 Applicability

This Program applies to all SMU faculty, staff and service providers who work under contract for SMU at all facilities owned and/or operated by SMU. This Program applies to all field operations and associated facilities in which SMU has significant control over operations, as well as all designated confined spaces on SMU property.

## 2.0 Scope

These are the requirements to identify permit spaces in the workplace, inform workers about the spaces, reevaluate non-permit confined spaces when there are changes in their use or configuration, and cooperate with contractors who will enter the permit spaces.

This Program provides best practices and guidelines for the safe entry and completion of work in confined spaces. Work in confined spaces can be performed safely provided that adequate safeguards and precautions are followed. Without such safeguards, personal injury or property damage may result from ignition of flammable gas or vapors, oxygen deficiency or enrichment, toxic, irritant, or other hazardous substances and/or physical hazards.

This Program conforms to SMU's policies, EHS Management System standards, and complies with regulatory requirements.

## 3.0 Definitions

The following terms are defined in order to allow a better understanding of this program:

- **Alternative Entry Procedure:** In cases where the only hazards are exclusively atmospheric in nature and where continuous forced air ventilation alone is sufficient to maintain the permit space safe for entry, entry may be by means of the "Alternate Entry Procedures" contained in paragraph (c) (5) (ii) of CFR 1910.146 standard.
- **Attendant:** An individual stationed outside a permit space who monitors the authorized entrants and performs all attendant duties assigned in the University's permit-required confined space program.
- **Authorized Entrant:** An employee or contract employee who is authorized by the University and trained to enter a permit-required confined space.
- **Confined Space:** A space that meets all of the following:
  - Is large enough and configured so an employee can bodily enter.
  - Has limited or restricted means for entry or exit.
  - Is not designed for continuous occupancy.

Examples of possible confined spaces include vessels, pipelines, storage tanks, sewers, vaults, pits, sumps, valve boxes (if space is greater than 4 ft deep), and excavations (greater than 5 ft deep that also have a potential hazard that cannot be controlled).

- **Emergency:** Any occurrence, including hazard control or monitoring equipment failure or an event internal or external to the permit space, that could endanger entrants.
- **Engulfment:** The surrounding and effective capture of a person by a liquid or finely divided (flowable), solid substance that can be aspirated to cause death by filling or plugging the respiratory system or can exert enough force on the body to cause death by strangulation, constriction, or crushing.
- **Entry:** The action by which a person passes through an opening into a permit-required confined space. Entry occurs as soon as any part of the entrant's body breaks the plane of the opening into the space. Entry includes ensuing work activities conducted in the permit-required confined space.
- **Entry Permit:** The written or printed document that the University provides to allow and control entry into a permit-required confined



- **Entry Supervisor:** The person (supervisor or designee) responsible for determining if acceptable entry conditions are present at a permit-required confined space. The entry supervisor is also responsible for properly terminating permit-required confined space entry. The entry supervisor may also serve as an attendant or an authorized entrant as long as that person is trained and equipped as required.
- **Hazardous Atmosphere:** An atmosphere that may expose employees to the risk of death, incapacitation, or impairment of ability to self-rescue (i.e. escape unaided from a confined space) due to one or more of the following causes:
  - Flammable gas, vapor or mist in excess of 10% of its lower explosive limit (LEL).
  - Airborne combustible dust at a concentration that meets or exceeds its LEL.
  - Oxygen concentration below 19.5% or above 23.5%.
  - Concentration of any toxic or hazardous substance in excess of its permissible exposure limit (PEL).
  - Any other atmospheric condition that is an immediate danger to life or health (IDLH).
  - Space configuration that could cause entrapment.
- **Immediately Dangerous to Life or Health (IDLH):** Any condition that poses an immediate or delayed threat to life that would cause irreversible adverse health effects or interfere with an individual's ability to escape unaided from a permit-required space.
- **Inerting:** A noncombustible gas (such as nitrogen) displacing the atmosphere in a permit-required space to such an extent that the resulting atmosphere is noncombustible.
- **Job Safety Analysis (JSA):** A job safety analysis (JSA) is a procedure which helps integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, each basic step of the job is to identify potential hazards and to recommend the safest way to do the job.
- **Confined Space:** OSHA defines a confined space as meeting all of the following criteria:
  - Is large enough for an employee to bodily enter and work
  - Has limited or restricted means of entry and exit
  - Cannot freely step into and out of the space without having to step over a raised threshold or stoop under the door opening
    - Ladders, stairs that are moveable, spiral, articulated (only fixed industrial works)
    - Equipment in the space or the travelling distance to the exit interferes with the entrants ability to escape in an emergency
  - Is not designed for continuous occupancy.
- **Permit-Required Confined Space:** A confined space that has one or more of the following characteristics:
  - Contains or has a potential to contain a hazardous atmosphere.
  - Contains a material that has the potential to engulf an entrant.
  - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or a floor that slopes downward and tapers to a smaller cross-section.
  - Contains any other recognized serious safety or health hazard.
- **Rescue Service:** The personnel designated to enter permit-required confined spaces to rescue employees.
- **Testing:** Process by which the hazards that may confront authorized entrants of a permit-required confined space are identified and evaluated.



## 4.0 Core Information and Requirements

### 4.1 Confined Space Classifications

All confined spaces will be identified as permit-required confined spaces until reclassified.

#### **Confined Space**

All confined spaces are considered permit required until proven otherwise. However a permit required confined space may be reclassified by the EHS Department as a non-permit confined space ONLY if the permit space poses no actual or potential **atmospheric hazards** and if all other hazards within the space are eliminated without entry into the space.

**Non-Permit Confined Space** does not contain or (with respect to atmospheric hazards) have the potential to contain any hazard capable of causing death or serious physical harm. The permit space may be reclassified, as a non-permit confined space for as long as the non-atmospheric hazards remain controlled and there is not potential for atmospheric hazards.

The surrounding area shall also be surveyed to avoid hazards such as drifting vapors from storage, process CSE, or piping.

If you determine that a space does meet the definition of “confined space,” then the entry supervisor will need to further evaluate the space to determine whether it meets the definition of “permit-required confined space.” This determination can be achieved by testing the atmospheric conditions of the confined space to ensure it is not hazardous. While within the confined space, continuous monitoring via a personal monitor will be required.

Determine if the space may be temporality declassified as non-permit required confined space and that no hazardous work (see note1) will be performed in the space; using form EHS SF-004-7. If Confined Space may be temporarily declassified, a permit is not needed to begin work: 1) keep a signed copy at worksite 2) provided signed copy to Office of Risk Management prior to work proceeding.

#### **Permit Required Confined Space (PRCS)**

Entry into **any confined PRCS** will require a completed and signed PRCS permit. Work within PRCS is inherently dangerous. Permit to Work within a confined space can only be issued by the Director of the Department facilitating the work, with additional approval from the Environmental Health and Safety Department.

SMU will address whatever hazards are present by complying with other applicable standards and the general duty clause. (Under Section 5(a)(1) of the OSH Act of 1970).

When any part of the body of an entrant breaks the plane of the opening of a PRCS large enough to allow full entry, entry is considered to have occurred and a permit is required, regardless of whether there is an intent to fully enter the space.



### **Alternate Entry Procedures**

When entries are undertaken by means of the Alternate Entry Procedures, there are no SMU requirements for a rescue provisions however SMU still requires that a confined space entry permit be used and work authorized through the permit to work system.

Solo entries are permitted. In cases where the only hazards are exclusively atmospheric in nature and where continuous forced air ventilation alone is sufficient to maintain the permit space safe for entry, entry may be by means of the "Alternate Entry Procedures". The alternate entry procedures require that before employees enter, the internal atmosphere must be tested for:

- (1) Oxygen content,
- (2) Flammable gases and vapors, and
- (3) Potential toxic air contaminants.

Once testing has been completed, the atmosphere within the space must be periodically tested to ensure the atmosphere remains safe for the entrants. There must be no hazardous atmosphere within the space when an employee is inside the space. If a hazardous atmosphere is detected during entry, employees must exit immediately, the space must be evaluated, and corrective measures must be taken.

The emphasis is squarely on use of continuous ventilation and atmospheric monitoring to ensure atmospheric hazards are controlled and that the atmosphere remains safe for entry. Because of the reliance on atmospheric monitoring to verify that conditions remain safe, OSHA has established a guideline of 50 percent of the level of flammable or toxic substances that would normally constitute a "hazardous atmosphere" as a safe level for entry using the Alternate Entry Procedures. As an example, a concentration of 5 percent LFL combustible gas, or half the PEL concentration of a toxic gas, would represent a hazardous atmosphere per the Alternate Entry guidelines.

### **Working in Excavations**

Excavations, cellars, pits, or trenches 5 feet or greater in depth are considered permit required confined spaces and require a Confined Space Entry Permit prior to worker entry.

## **4.2 Reclassification of the Space**

A non-permit confined space does not need to be reevaluated annually if there are if there are no changes in the use or configuration of the confined space.

If there are changes in conditions that might increase the hazards to entrants, the Entry Supervisor and the EHS Department shall reevaluate that space and, if necessary, permanently reclassify it as a PRCS.

If there are changes that downgrade a classification from Permit Required to Non-Permit Required, then that reclassification would remain in effect as long as the hazards remain eliminated. This reclassification would allow SMU or Contractors to have employees enter the space without implementing a full permit space program.

The elimination of the hazards can be accomplished by emptying the space of materials that pose an engulfment hazard and applying lockout/tagout to meet SMU EHS Program S-001 Control of Hazardous Energy. However, other provisions must be in place if a leak in a pipe opening in the space could lead to a hazardous atmosphere.



The Entry Supervisor shall document the basis for determining that all hazards in a permit space have been eliminated, through a written notice that contains the date, the location of the space, the atmospheric testing results, and the signature of the person making the determination. The certification shall be made available to each employee/contractor entering the space or to that employee/contractor's authorized representative and the EHS Department of the SMU ORM. The EHS Department will review the information and make a determination of reclassification. All other applicable regulations shall be followed during work in the non-permit confined space.

Determine if the space may be temporality declassified as non-permit required confined space and that no hazardous work will be performed in the space; using form EHS SF-004-7. If Confined Space may be temporarily declassified, a permit is not needed to begin work: 1) keep a signed copy at worksite 2) provided signed copy to Office of Risk Management prior to work proceeding.

If these criteria are met, rescue teams, special PPE, etc., are not required.

It is important to note that the difference between an alternative entry procedure and a non permit-required confined space is the use of forced-air ventilation. If forced-air ventilation is used during an entry, it cannot be classified as a non permit-required confined space. It must be classified as a permit required confined space using alternative entry procedures.

If hazards arise within a space that has been declassified to a non-permit space, each Entrant shall exit the space. The Entry Supervisor shall then re-evaluate the space, contact the SMU EHS Department, and determine whether it must be reclassified as a permit space.

### 4.3 Permit to Work

As part of SMU's Permit To Work Program, entry into a Permit Required Confined Space requires significant hazard controls to ensure all occupants will remain safe during work. The Contractor must use the SMU Confined Space Entry Permit prior to commencing work.

A Confined Space Entry Permit may be retrieved at from the Office of Risk Management, or online here [EHS Form SF-004-1](#)

The Permit(s) application is submitted by the person performing the work (PA) to the Issuing Authority (IA/AA) or the permit to work authority (PTWA) for approval **by end of business 5 days preceding the expected work** day.

No multi-employer entry is allowed. SMU employees or approved Contractors are allowed into the permit space only with written permission of a Permit to Work.

The Entry Supervisor is responsible for preparing the permit space for subsequent entry. Entry will not commence until all conditions listed on the entry permit are met.

The EHS Department will evaluate the hazardous conditions of the permit space via the SMU Confined Space Inventory and provide the contractor an inventory of permit-required spaces and inform them of known hazards. The SMU Confined Space Inventory will be updated to include the current hazards associated with the confined space, based on pre entry testing of the confined space.

The type of testing that needs to be performed is dependent on the hazards that are present within the space. For permit spaces posing atmospheric hazards, atmospheric testing would be







necessary. For other hazards, different tests will be necessary. For example, if the permit space poses thermal hazards, the temperature within the space would need to be tested.

An existing Confined Space Permit can be extended for two consecutive shifts, not to exceed 12 hours per shift if, at the beginning of each shift, both the Issuing Authority and the Performing Authority confirm that conditions remain unchanged, permit restrictions are met, and it is safe to do the work. They both must date and initial the permit in the appropriate box on the PRCS Permit.

#### 4.4 Preparation of a Job Safety Analysis (JSA)

Following a Hazard Assessment, a JSA shall be created in order to review with the team prior to entry.

A new JSA must be created for each confined space permitted to enter. See SMU EHS Q-001 Job Safety Analysis Written Program for more information on creating a JSA.

#### 4.5 Pre Entry Safety Meeting

Prior to entry, the Entry Supervisor will conduct a review of the entry permit procedures with the attendant and authorized entrants. The Pre-Entry Safety Meeting will cover at least the following:

- Purpose of Entry
- Hazard Controls
- Expected Ventilation Requirements
- Entry Conditions
- Safety Data Sheets
- Emergency/Rescue Procedures
- Air Monitoring Requirements
- PRCS Checklist
- Identification of Roles and Responsibilities
- Initial review of historical air monitoring data with Entrants and Attendants
- Communication Systems Used
- Review of JSA

#### 4.6 Atmospheric Testing

Atmospheric testing is required for two distinct purposes:

- **Evaluation** of the hazards of the permit space
- **Verification** that acceptable entry conditions exist

##### **Evaluation Testing**

Evaluation Testing is the initial testing of a confined space. The atmosphere of a permit space will be initially analyzed using testing equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise. This will provide the data used in the development of acceptable entry conditions.

##### **Verification Testing**

The atmosphere of a permit space which may contain a hazardous atmosphere will be tested prior to entry for all contaminants identified by the evaluation testing. This test will provide verification that permitted space atmospheres are within the range of acceptable entry conditions as outlined on the entry permit. The Entry Supervisor will test the atmosphere of the space for the presence of flammable, explosive, or toxic contaminants and for a deficiency or excess of oxygen. The purpose of this test is to determine the nature and extent of any such hazard. Results of testing (i.e., actual concentration, etc.) will be recorded on the entry permit.



**4.7 Maintenance and Calibration of Meters**

Meters used for testing will be maintained and calibrated by the EHS Department unless a contractor will be performing the work. If a Contractor will be performing the testing and/or entry of a confined space, the Contractor will be responsible for providing, calibrating, and maintaining of the testing meters.

Meters will be calibrated consistent and at a frequency prescribed by the manufacturer. In addition, meters may be re-calibrated if problems occur during use. Tests must be made for at least the minimum response time of the test instrument specified by the manufacturer.

Test instruments must be routinely calibrated at least monthly, and should be field calibrated each day prior to confined space entry operations.

Calibration records must be maintained for each instrument.

Adhesive stickers should be affixed to each instrument, as a quick reference to identify the last calibration date, pass or fail, and person performing the calibration.

**4.8 Atmospheric Testing Procedure**

Atmospheric tests are required for all confined spaces, to assure suitability of the confined space for entry and to identify hazards and controls. The atmosphere within a confined space must be tested prior to initial worker entry. Periodic or continuous monitoring will afford the highest level of worker protection against changing atmospheric conditions inside the confined space. The atmosphere should also be tested following complaints of possible air contamination within the confined space.

Mechanical ventilation, steaming, and purging must be discontinued prior to the initial atmospheric testing (minimum 15-30 minutes recommended).

Atmospheric tests should start at the manway, hatch, or other openings, and progress inside the permit space.

Extension probes and pumps can be used to extend detection CSE sampling inside the permit space.

All areas within the space should be tested, to identify low spots where heavier-than-air vapors may be pooled or "dead spots" where ventilation was not effective. Sludge or scale deposits inside tanks or vessels should be "stirred-up," and the air immediately above tested for LEL, H2S, etc.

Test for atmospheric hazards in the following order:

- Oxygen
- LEL
- Toxic Materials

Flashlights or lanterns "Approved for Hazardous Locations/Environments" (UL, FM, or equivalent) must be used until the atmosphere has been verified to be free of flammable gas or vapors.

Duration of Testing

For each test required on the permit, you must allow enough time for the air from the space to be drawn into the equipment and for the sensor (or other detection device) to react to the chemical if





it is present. This is considered the "minimum response time "and it will be noted by the manufacturer in the operator's manual. Be aware that you will need to add time to this "minimum response time" if you have attached hosing or a probe extension to the inlet. The additional time is needed to allow the air from the different depths of the space to be pulled into the equipment inlet.

The atmosphere within the space will be periodically tested every 30 minutes or more frequently as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. In some cases it may be necessary to send a person inside the permit space to more thoroughly test the interior atmosphere before workers enter. This should only be undertaken using positive pressure respiratory protection (airline unit with emergency escape bottle or SCBA), with the worker secured to a lifeline or other rescue device.

Testing Conditions in Spaces that May Have Layered Atmospheres

For permit spaces that are deep or have areas leading away from the entry point, the atmosphere may be layered or may be different in remote areas. For these spaces, testing must be done in the area surrounding the worker, which is considered four (4) feet in the direction of travel and to each side.

If a sample probe is used to do the testing then the worker must move slowly enough so that testing is completed, keeping the equipment "minimum response time" in mind, before he/she moves into the new area.

**4.9 Hazard Assessment**

The EHS Department and entry team Supervisors/Managers and if possible the entrants, will perform a hazard assessment on each known permit space during facility evaluations. The Entrant Team must also complete hazard assessments prior to work being started. Known hazards will be listed on the entry permit. Types of hazards encountered during the entry into a confined space include but are not limited to the following:

- Engulfment of Materials or Fluids
- Slips, Trips, and Falls
- Moving Parts
- Extreme Weather
- Caught on or between some projection or moving object. The moving object could pull the worker into the object and result in a contact injury.
- Nearby Work or Traffic affecting the area near the Confined Space
- Noise
- Electrical
- Overexertion–The worker could be injured by lifting, pulling, or pushing. This also includes sprain, strain, or repetitive job injuries.
- Exposure–This includes conditions such as exposure to toxic gas or chemicals, extreme temperatures, high noise areas, or harmful fumes or mist.
- Short Service Employees who have been with the team a short period of time, such as a new hire.

**4.10 Special Considerations**

**Cutting and Welding**

Cutting and welding operations produce fumes/vapors in addition to ignition hazards. All welding and cutting operations in permit spaces will be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency.

Entry Supervisor will inspect, monitor and verify the following requirements have been met:



- Mechanical ventilation shall be provided and should not be less than 2000 cubic feet per minute per welder.
- Monitoring of spaces adjacent to the permit space in which the hot work is to be performed, if they last contained a flammable liquid, vapor, gas, or have been inerted.
- All piping has been properly isolated and purged or inerted.
- Where possible, all combustibles, including any dry residues, in the vicinity of the hot work will be removed to a safe place or, if they cannot be moved, such items will be covered by a non-combustible blanket, flame-resistant tarpaulin, or other means to prevent ignition from heat, sparks, and slag.
- In a permit space having last contained dry materials that create an explosive atmosphere when dispersed in air, the Hot Work Permit will be issued only after the Entry Supervisor, through personal inspection, has ensured that the following requirements are satisfied:
  - All loose dust has been removed from the permit space and all surfaces have been thoroughly cleaned
  - The permit space has been isolated mechanically to prevent reintroduction of the dry material
  - Adequate fire extinguishing equipment is available at the site.
- When cutting or welding operations must take place, only the torch or welding leads should be taken into the confined space.
- All compressed gas cylinders and welding machines must remain outside of the confined space.
- Care must be taken in using inerting gases since they will create oxygen deficient atmospheres.
- After cleaning or inerting, the Entry Supervisor will monitor for flammable vapors or gases and oxygen deficiency prior to starting hot work at the beginning of each day, shift or following a shutdown period. In addition periodic monitoring may be required.
- If the concentration of flammable vapors is detected or the oxygen level becomes deficient, hot work will be stopped until the source of the problem is located and resolved or sufficient ventilation is provided to maintain acceptable entry conditions.
- Cylinder valves shall be kept closed, depressurized and hoses removed from the confined space area during lunch and other breaks. Lines must be disconnected at the end of shift. When arc welding is suspended for any substantial period of time, electrodes should be removed from holders, and the holders carefully placed so that accidental contact cannot occur.
- The arc welding machine should be disconnected from its power source.
- After welding operations are completed, the welder should mark the hot metal, if necessary, to warn others of the burn hazard.
- If hot work is to be done in or on a space that has contained a flammable liquid, vapor, or gas or adjacent to such a space, both will be cleaned or inerted.
- Welding and cutting in permit spaces may introduce a number of potentially hazardous materials such as fluxes, coatings, coverings, and filler metals.
- A Safety Data Sheet will be required to be attached to the entry permit for any products used in a permit space. These hazards will be reviewed by the Entry Supervisor and communicate to the attendants and authorized entrants during the pre-entry meeting.
- Welding or cutting in permit spaces involving metals containing lead, beryllium, cadmium, and mercury, including paint, will be performed using local ventilation or proper respiratory protection.



- Before welding, cutting, or heating begins, the flammability and thermal decomposition products of the coating will be considered (surfaces covered with a preservative or protective coating). Where coatings are flammable, they will be stripped from the area of hot work to prevent ignition.

### Use of Power Tools

- When portable power tools are used they shall be inspected and in good condition, including cords and plugs as well as equipped with a ground fault circuit interrupter (GFCI) located outside the confined space.
- A Hot Work Permit is also required prior to portable power tool use in PRCs.
- Portable power tools are a potential ignition source, and must not be used when flammable gas or vapors are present.

### Oxygen Levels

- Safe entry without a respirator requires the oxygen level to be between 19.5% and 21.5%.
- If the atmosphere contains less than 19.5% oxygen a positive pressure airline unit (with emergency escape bottle) or SCBA is required.
- No entry is allowed if the atmosphere contains greater than 21.5% oxygen.

### Hydrogen Sulfide

- H<sub>2</sub>S tests must be conducted for any vessels, tanks, pipelines, or other permit spaces that have historically contained H<sub>2</sub>S or currently contain H<sub>2</sub>S.
- Any sign of H<sub>2</sub>S will require immediate removal of the entrants to evaluate proper PPE available. In the event that H<sub>2</sub>S is found, an onsite EHS representative must be present during the entry.
- A Multi-gas meter is used to determine the concentration of H<sub>2</sub>S in air, for entrant life-safety. Meter readings of 0 ppm to 9 ppm allow for safe entry without a respirator.
- H<sub>2</sub>S concentrations of 10 ppm to 300 ppm require positive-pressure self-contained or supplied-air respirator (back-up personnel are also required).
- If the atmosphere contains greater than 300 ppm (IDLH) additional backup personnel are required.

### Naturally Occurring Radioactive Material (NORM)

- Detecting NORM contamination inside tanks or vessels is needed in order to evaluate safe entry procedures and CSE needs. Such tests should be conducted prior to tank/vessel entry in those areas where NORM contamination has been confirmed. Testing may or may not be necessary, depending on the known history of the equipment, vessel, or space being entered.
- NORM contamination is detected by radiation surveys using Geiger-Mueller (G-M) or scintillation probes attached to a suitable survey meter. The interior of CS can be tested for gamma radiation, using a survey meter with scintillation probe. CS interiors can also be tested for alpha-beta radiation, using a survey meter with pancake G-M probe.
- Entry without personal protective equipment is allowed if the meter reading is less than 50 µR/hr (including background) gamma or less than 180 Counts Per Minute (CPM) alpha-beta. For readings equal to or greater than 50 µR/hr gamma or 180 CPM alpha-beta utilizing personal protective equipment will be required. (Repeated cleaning/washing and mechanical ventilation may reduce NORM levels sufficiently to eliminate the need for personal protective equipment.)



**Flammable Gas (%LEL)**

- For Hot work inside the confined space, the LEL must be 0%.
- A direct reading flammable gas detector or multi-gas meter is used to detect and measure the presence of flammable gas or vapor, for fire/explosion prevention and entrant life-safety (hydrocarbon vapor inhalation exposure).
- Do not attempt to test for flammable gas or vapor if the atmosphere is oxygen-deficient (<19.5%), as flammable gas detectors require normal atmospheric oxygen levels for proper sensor function. Continue ventilation until oxygen level is between 19.5% - 21.5%, then test for flammable gas or vapor.
- If the LEL is between 0% and 2% entry without respiratory protection is allowed. An appropriate cartridge respirator or canister mask respirator is required if the LEL is between 3% and 8%.
- LEL readings of 8% to 10 % require a positive pressure airline unit (with emergency escape bottle) or SCBA.
- No entry for work purposes is allowed if the atmosphere contains greater than 10% LEL.

**4.11 Known Toxic Atmospheres**

Toxic atmospheres will be tested for prior to entry by the EHS Department before workers are permitted to enter any confined space that has contained liquids, vapors, gases, or solids of toxic, corrosive, or irritant nature that can not be mitigate. The atmosphere within the space will be assumed to be IDLH. The space will be continuously monitored by the Attendant and personal protective equipment utilized.

- Results of toxic monitoring will be compared to the OSHAs Permissible Exposure Limits (PELs). A prohibited condition exists when the atmosphere of a permit space is found to be in excess of the PEL
- Safety harnesses and lifelines will be used.
- If ventilation cannot reduce the concentration below the PEL, PPE will be used.
- An attendant, also provided with appropriate required PPE, is stationed outside the permit space, holding the lifelines and observing or maintaining communication with the employees in the permit space.
- A supplied air respirator and other protective CSE will be worn as prescribed by the Worksite Supervisor.
- Ventilation efforts will be continued in order to maintain the level of contaminants as low a concentration as possible. If the concentration of toxic contaminants cannot be accurately determined by field testing, and if tests for flammability and oxygen have shown the atmosphere to be safe, employees will be permitted to enter the permit space only when provided with appropriate personal protective equipment.

**4.12 Signs and Postings**

Employees will be informed of the existence and location of PRCS by using a combination of training and posting of danger signs or tags. Post the following sign, or similar, at permanent locations where confined spaces are located:



Always refer to the SMU EHS Confined Space Inventory for a listing of known Confined Spaces on campus. A copy of the inventory may be obtained from the EHS Department.

#### 4.13 Area Preparation

Confined spaces must be cleaned and decontaminated from the outside whenever possible prior to personnel entry. Tanks, vessels, or other closed systems may require ventilation (natural or mechanical), purge (steam or inert gas), or wash (water, chemical, etc.) to eliminate toxic or flammable gases, remove hazardous liquids or solids, provide oxygen, or cool heated surfaces.

The area around the vessel, tank, or other permit space should be checked for work activities or conditions that may affect the safety of workers inside the permit space. If possible, activities involving vehicles or heavy equipment (high noise, carbon monoxide exhaust), hazardous material transfers (flammable or toxic gas/liquid releases), or other work that could negatively affect entrants or interfere with the attendants' ability to monitor/communicate with the entrants should be discontinued for the duration of the entry.

Place guards around the openings of permit spaces if necessary. Guarding can be in the form of a railing, a temporary cover or any other temporary barriers that provides protection. This measure will protect employees from falling into the space and protect entrants from foreign objects entering the space.

Once the permit space has been opened, a "Do Not Enter" tag with red tape should be attached to all points of entry to assure that personnel do not enter a confined space until it is safe to do so. Such tags should not be removed until the properly completed entry permit acknowledges that it is safe to enter, a trained attendant is present, and the entry supervisor authorizes the entry.

#### 4.14 Access and Egress

A safe means of access and egress, such as ladders or scaffolding, must be provided when confined space is entered / exited from above or below grade, or for tank / vessel interiors where internal inspections or repairs require safe access to / from interior elevated areas. Special care should be given to the proper use of ladders, which must be secured and installed at an appropriate climbing angle.

#### 4.15 Continuous Communication

An effective method of communication between Entrants and Attendants must be available for all confined space entries. Voice communication is acceptable if ambient noise levels allow. Bullhorns or air horns may be required to amplify vocal or audible signals above workplace noise levels.



#### 4.16 Safety Data Sheets (SDS)

If an injured entrant has been exposed to a substance for which SDS information is available, the SDS will be kept at the worksite and will be made available to the medical facility which may treat the exposed entrant. The specific SDS will be attached to the site-specific entry permit where applicable. SDS will be provided with the CSE Permit Application.

#### 4.17 Shift Change Coordination

If the CSE is the sole responsibility of authorized employees on a single shift, locks and tags shall be left in place until the servicing is complete.

If it is necessary for servicing to continue into the next shift, the oncoming employee shall attach their locks and tags to each energy isolation device prior to the outgoing employee removing their locks and tags.

Alternative shift change procedures must be approved by EHS. Such procedures must ensure continuity of protection for all employees.

#### 4.18 Personal Protective Equipment (PPE)

The previous contents of the confined space, corresponding SDS, atmospheric test results, and the expected work to take place, shall all be considered in the selection of personal protective that may be necessary for confined space entry.

The required PPE for each confined space entry will be identified on the entry permit.

Specific training/instruction may be necessary for various types of personal protective, in order to assure proper use.

The Entry Supervisor will specify the personal protective equipment and procedures that are required to protect authorized entrants from hazards encountered in permit spaces. These selections will be contained on the entry permit.

#### 4.19 Lighting

Proper illumination will be provided for the specific work activities to take place and for safe exit in an emergency. Work in wet conditions will require a low voltage (12 volt) lighting system with the transformer located outside the confined space. This reduced voltage lighting minimizes the potential for injury via electrical shock.

If flammable gas or vapors are or could be present, electric lighting, flashlights, or lanterns must be "Approved For Hazardous Locations/ Environments" (i.e. - UL, FM, or equivalent approved). Cords and plugs must be maintained in good condition. When electrical lighting is used in a confined space, a ground fault circuit interrupter (GFCI) shall be installed and positioned outside the confined space. NO EXCEPTIONS.

#### 4.20 Isolation

Prior to entry into any confined space, specific steps must be taken to assure proper isolation of hazardous energy sources. This includes preventing accidental introduction into the permit space of hazardous materials through interconnecting equipment such as piping, ducts, vents, drains or other means.

SMU requires that isolation from hazardous materials, atmospheres, or energy take place at the highest level of isolation reasonably possible.





**Isolations must have two levels of barriers if possible.** If it is not possible to include two levels of isolation, then the inability to isolate at two levels will be noted on the JSA and procedures for mitigation of the possible risk of exposure documented.

Such isolation may rely upon lockout/tagout of electrical energy sources, valves, and hydraulic equipment, in addition to the installation of blinds to prevent product flow. To assure proper isolation and personnel safety, refer to and follow the specific requirements set forth by the SMU and the appropriate facility/location Control of Hazardous Energy program.

Energy sources to be considered include but are not limited to:

- Electrical
- Mechanical
- Pneumatic
- Hydraulic

Isolation may include any of the following:

- Inserting a suitable full pressure blank in piping between the flanges. Blinding should take place at the flange closest to the confined space.
- Removing a valve, spool piece or expansion joint as close as possible to the permit space and placing a blank or cap on the open ends.
- Double block and bleed by shutting a least two valves in piping leading to the permit space, opening a bleed off path to atmosphere between the shut valves, and/or locking/tagging these valves.

Planning for proper isolation of vessels and similar equipment should take into consideration the following:

- Proper isolation must also include level columns, pressure taps, sight gauges, etc., that could hold or trap product.
- Pipeline compression plugs or bull plugs must not be used, since they cannot be relied upon to withstand pressure.
- Rated blinds provide a positive method of isolation and should be utilized whenever possible.
- "Pancakes" and non-rated blinds may provide an acceptable means of protection to prevent gas, vapor, and/or liquid migration into a confined space. This form of isolation should only be used when it can be assured that the pressure will not exceed atmospheric.
- Double block and bleed is an acceptable method of isolation, however, it is recommended that more positive forms of isolation be used whenever possible. If a double block and bleed must be used, the bleed must be sufficiently sized to allow the safe release of any potential pressure build up, assuring that gas/liquid cannot escape past the final closed valve and enter the confined space. The bleed must be positioned to prevent personnel exposure and ignition sources from coming in contact with toxic or flammable gases that may be vented from the bleed line. For air-operated valves, the instrument air source for both valves must be disabled. For manual valves, both valves should be chain locked in the closed position and tagged while the bleed valve should be locked open and tagged. Personnel must assure that the bleed is not plugged.



- All energy sources will be evaluated and if determined to be hazardous to permit space entrants will be secured, relieved, disconnected and/or restrained before personnel are permitted to enter.
- Machinery and equipment containing unguarded moving parts that are located in the permit space where they could cause injury to entrants or attendant will be de-energized and tagged out or locked and tagged out.

#### 4.21 Inspection

After the confined space has been isolated, it must be visually inspected for obvious interior physical or chemical hazards and re-tested for atmospheric contaminants.

Measurement of ambient and metal surface temperature inside the confined space should be considered, in order to establish a reasonable duration of work in a hot environment and to identify any burn potential associated with hot surfaces. An air temperature of less than 100° F is recommended inside the permit space, and entry should not be permitted if interior temperature exceeds 125° F, or if surface temperatures exceed 140° F. For high interior temperatures consideration should be given to using some type of cooling vest for personnel.

Interior physical hazards might include broken or loose piping or metal trays inside a vertical process vessel, elevated interior ambient temperature or metal surface temperatures, or areas where scaffolding or ladders must be erected for safe access by workers.

A visual inspection to identify the presence of pyrophoric iron sulfide scale is recommended for vessels, tanks, or pipelines which have contained sulfur-bearing stocks. Safe test for entry is no visual indication of pyrophoric iron scale. When pyrophoric iron sulfide scale dries out in air, it may begin "smoking," glow incandescent, and present a source of ignition. If pyrophoric iron deposits are suspected, it is important that the material be kept wet until removed and isolated to a safe, remote location.

Interior chemical hazards might include iron sulfide, scale, chemical residue from wash down, etc.

A test for pH using a meter or pH paper should be considered for vessels or tanks that have contained acid or caustic, or which have been acid, caustic, or solvent-washed, during CSE/area preparation. A pH, in the range of 6.5 to 7.5, is required for safe entry without protective suits.

#### 4.22 Ventilation Procedures

A confined space may be entered with use of ventilation equipment only if all of the following are met:

- All physical hazards are eliminated (no engulfment, internal safety or health hazards, slanted floors, etc.).
- Atmospheric hazards are controlled to acceptable entry levels with the use of ventilation equipment (documentation of determination and supporting data must be available to each person entering the space by use of a permit).
- Ventilation equipment is set up without entry into the space.

Ventilation must be used when a confined space has a hazardous atmosphere identified in the confined space permitting procedure.

The Entry Supervisor assures that ventilating equipment needed to obtain acceptable entry conditions is available at the work site and that all such equipment is:



- in good working order
- classified for use in hazardous locations
- properly located so that no additional contaminants are brought into the space
- fitted with spark arrestors and filters as necessary

1. After initial testing has been conducted, the Entry Supervisor will determine which type of ventilation is best to control the hazards present and for the work to be performed.

#### Forced Air Dilution Ventilation

Forced air dilution ventilation is used to provide oxygen and to control low concentrations of materials that are not highly toxic. It uses air movers such as copus blowers or venturi blowers to either draw contaminated air out of an area or supply fresh air. The air supply for the forced air ventilation must be from a clean source and must not increase the hazards in the space. Drawing air out is usually better when low concentrations of contaminants are produced at a fairly uniform rate and the workers are not close to the source since blowing air in can spread contaminants.

#### Local Exhaust Ventilation

Local exhaust ventilation is used to capture contaminants at the point of origin and remove them from the space. This type of ventilation is best for control of flammable and toxic materials produced at a single point and during hot work.

2. The Entry Supervisor begins ventilating the space. Ventilation must meet the following conditions:
  - a) Ventilation should begin far enough in advance of re-testing to assure displacement of hazardous vapors or gases.
  - b) Authorized entrants may not enter the space until the forced air ventilation has controlled any hazardous atmosphere to the acceptable conditions listed on the permit. The forced air ventilation must continue until all authorized entrants have left the space.
  - c) The air eductor or blower should be located as near the top of the space as possible to maximize ventilation. Measures should be taken to reduce vibration noise caused by the eductor sitting on a metal surface (i.e., bolting it to flange.) For floating roof tanks, the eductor should be mounted on the shell.
  - d) Ventilation equipment and non-conductive hose nozzles must be grounded and electrically bonded to the confined space.
  - e) The ventilation equipment must have enough capacity to ventilate the entire space. A series of fans may be necessary to move air in long or large spaces.
  - f) Exhaust outlets must be located so that contaminants won't be drawn back into the space and will not be dispersed in such a way as to endanger nearby workers. If exhaust could be flammable, assure all ignition sources are removed from the area.



3. A Qualified Gas Tester repeats testing to determine that ventilation alone will reduce the atmospheric hazards to acceptable entry levels and records the levels in the next available column on the permit.
4. If gas testing shows that ventilation alone will not control atmospheric hazards to acceptable entry levels, STOP WORK and contact EHS.  
  
If gas testing shows that all atmospheric hazards have been controlled to acceptable entry levels as outlined on the permit, continue.
5. The Entry Supervisor posts the approved permit at the entrance to the space before work may begin in the space. The permit may be placed on a clipboard at the entrance of the space, but must be visible and accessible to all entrants.
6. The atmosphere within the space must be tested continuously or at the minimum interval of every 30 minutes if authorized on the permit by the Supervisor. Gas testing must be conducted as necessary to assure there is no accumulation of hazardous vapors. Results must be recorded on the permit every thirty minutes.

When the space has been vacated for more than 30 minutes, gas testing must be conducted again before re-entry.

Contact the EHS Department for additional information on ventilation rates, etc.

Always begin ventilating the area sufficiently in advance so that the air will be safe before anyone enters the space (this may take hours).

Before entry can be made, ventilation equipment must be shut down for a minimum of 15 min and the atmosphere re-tested to ensure that a safe condition exists.

Continue to ventilate the confined space during entry to ensure that a safe atmosphere is provided.

Some atmospheric hazards cannot be eliminated by ventilation alone, so it is critical that testing is done before entry and continuous testing is done during entry to ensure the atmosphere remains safe.

Other considerations during ventilation include the following:

- Use clean air (never oxygen).
- All electrical equipment shall be grounded and bonded to the confined space.
- Explosion proof ventilation equipment is mandatory if used around flammable atmospheres.
- It is important that the intake for the air supply be located far away from any hazardous atmospheres and from the air being removed from the confined space (this can be accomplished by ducting on the intake side of the blower to draw air from an uncontaminated area).
- If exhausting flammable or toxic atmospheres from the space, you may have to duct this to a safe area.



#### 4.23 Rescue and Emergency Removal

##### Emergency Removal

If a hazardous atmosphere is detected while working in a space, ventilation equipment fails, or a worker becomes ill, all of the following must occur.

Use Stop Work Authority and:

1. Each worker must leave the space immediately.
2. If there has been an injury or exposure, contact EHS and if there is an emergency dial 911 for medical treatment.
3. The Entry Supervisor must terminate the entry and cancel the permit if a condition that is not allowed under the entry permit arises in or near the Permit Required Confined Space.
4. The space must be re-evaluated to determine how the hazardous atmosphere developed.
5. All equipment must be thoroughly inspected.
6. Measures must be taken to protect workers from the hazardous atmosphere before the next entry takes place.
7. Space must be retested and determine whether it must be reclassified.
8. After workers have exited the space, the Entry Supervisor completes the entry by closing off a confined space.
9. The Entry Supervisor cancels the permit by removing it from the site.

If an injured entrant is exposed to a substance for which a safety data sheet (SDS) or other similar written information is required to be kept at the worksite, that information shall be available to the medical facility treating the exposed entrant.

The Entry Supervisor must review all confined space entries using ventilation. The review must identify any problems and document that all actions protected entrants from hazards during the entry. The Entry Supervisor will correct task level problems locally prior to authorizing additional entries. The Entry Supervisor must notify EHS to revise procedural problems.

Deficiencies which could result in injury must be corrected before the next entries are authorized. A review of the problems should be conducted with the EHS Department to assure that these conditions are communicated and, therefore, do not occur elsewhere. (Examples of circumstances requiring review include unauthorized entry, detection of a hazard not covered by the permit, injury or near miss, and employee complaint).

##### Rescue

Site-specific procedures must be developed and implemented for:

- Summoning rescue and emergency services
- Rescuing entrants from permit spaces
- Providing necessary emergency services to rescued employees
- Providing required training

On-site rescue services personnel must:

- Be properly equipped and trained.
- Receive the same training as authorized entrants; on-site rescue services personnel must also be trained in using personal protective and rescue equipment, first aid, and CPR.



- Practice simulated rescues that are properly documented at least once every 12 months if employees are performing rescue functions.
- Be available for any entry into an IDLH environment.

Outside rescue services must:

- Be made aware of the hazards they might confront when called on to perform rescue at a University facility.
- Be given information about all permit spaces from which rescue might be necessary so that the rescue service can develop rescue plans and practice rescue operations.
- Be evaluated: if an outside service is used to perform rescues, the Supervisor responsible for the entry must evaluate and select the service based on the following factors:
  - Ability to respond in a timely manner (normally 5 to 15 min)
  - Appropriate skills and rescue equipment for the types of spaces to be entered
  - Knowledge of the type of potential hazards to be encountered
  - Ability to provide appropriate medical services
  - Adequate methods to communicate with the service

#### Retrieval Systems

Retrieval systems or methods shall be used whenever an authorized entrant enters a permit-required confined space unless the retrieval equipment increases the overall risk of entry or does not contribute to rescuing the entrant.

Retrieval systems must meet the following requirements:

- Each entrant into an IDLH atmosphere shall use a full body harness with a retrieval line; if it is not possible to use a full body harness safely and effectively, wristlets or anklets may be used.
- The other end of the retrieval line shall be attached to a mechanical device or fixed point outside of the permit space.
- A mechanical device must be available to retrieve entrants from vertical permit spaces more than 5 ft deep.

#### Choosing a Rescue Service

It is important for SMU 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.

SMU will ensure that each member of a rescue team is appropriately trained.

SMU will ensure that each member of the rescue team will receive basic first aid and cardiopulmonary resuscitation (CPR). At least one of these members must hold current certification in first aid and CPR.

SMU will ensure that rescue team members will practice rescue techniques at least annually from the actual or similarly configured spaces(s).

For all rescue teams or services, SMU's evaluation should consist of two components:

- an initial evaluation, in which SMUs 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





- a performance evaluation, in which SMUs measure the performance of the team or service during an actual or practice rescue. For example, based on the initial evaluation, SMU 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.

### Initial Evaluation

SMU should meet with the prospective rescue service to facilitate the evaluations required by OSHA §1910.146(k)(1)(i) and §1910.146(k)(1)(ii).

At a minimum, if an off-site rescue service is being considered, the SMU 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.

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 SMU in determining whether the rescue service is capable of performing rescues in the permit spaces present at the SMU's workplace.

1. What are the needs of SMU 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 SMU'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 SMU so that SMU can instruct the attendant to abort the entry immediately?
4. Does the rescue service meet all the requirements of the OSHA Rescue 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 SMU's workplace? (An SMU 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, SMU 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), SMUs should consider using airline respirators (with escape bottles) for the rescuers and to supply rescue air to the patient. If the SMU 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 SMU or another source?

#### Performance Evaluation

During a performance evaluation, SMU 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.

Rescue services are required 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 SMU to enable it to determine whether the rescue service can quickly be upgraded to meet SMU's rescue needs or whether another service must be selected. The following questions will assist SMU 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.

#### 4.24 Emergency Action Plan

An Emergency Action Plan is required to be completed for Permit Required Confined Space Entries. The Entry Supervisor completes the Emergency Action Plan by conducting the tasks in the Emergency Action Plan section of the permit.

Specify a procedure for the emergency notification of the Attendant by authorized entrants, including the following provisions:

1. A means for the entrants to communicate with the Attendant as necessary to enable the Attendant to monitor their status and to order evacuation as necessary. Devices such as alarms horns, radios, or hand signals may be used.
2. A means for entrants to alert the Attendant whenever the entrant recognizes any warning sign, symptom of exposure, or other dangerous situation.
3. A means for all entrants to exit from the Permit Required Confined Space as quickly as possible whenever:
  - an order to evacuate is given by the Attendant or the Entry Supervisor
  - the entrant recognizes any warning sign or symptom of exposure to a dangerous situation
  - the entrant detects a prohibited condition
  - an evacuation alarm is activated

The Emergency Action Plan must provide for at least one Attendant who will remain outside the Permit Required Confined Space for the duration of entry operations. This Attendant cannot perform any other duties other than to be an Attendant.

A Secondary Attendant must be designated on the Emergency Action Plan and be available to relieve the Attendant if the Attendant needs to enter the Permit Required Confined Space to execute rescue. The Secondary Attendant must either be available by radio or telephone and must be present at the site of entry prior to the Primary Attendant leaving.

Select the rescue procedures to be used based on the following and define the responsibilities of each worker. Document on the Emergency Action Plan that all workers understand these procedures and their responsibilities.

The plan should use non-entry rescue techniques if possible. Non-entry rescue does not require the Attendant to enter the confined space, nor does it require the presence of a fully trained



rescue team. The Entry Supervisor may authorize the use of equipment other than that outlined if that equipment can be shown to provide adequate protection of all authorized entrants.

Entry should be made through a side opening whenever possible. If entry cannot be made through a side opening, 3½ feet or less from the work level, top entry may be allowed by the Entry Supervisor. Based on the direction of entry, determine the retrieval systems or methods to be used for non-entry rescue whenever an authorized entrant enters a Permit Required Confined Space.

If the retrieval equipment would increase the overall risk to the entrant or would not contribute to the rescue of the entrant, the Emergency Action Plan must reflect an alternate method of rescue without equipment. Such cases could include obstructions or turns that prevent pull on the retrieval line or where a person being rescued with the retrieval system would be injured because of forceful contact with projections in the space - also, if supplied air line could not be controlled to prevent entanglement with the life line.

#### Entry Rescue by Independent Outside Service

Where non-entry rescue plans are not practical, a rescue team must be available. Time should be the main consideration in deciding if an independent outside service is appropriate. Treatment for cardiopulmonary arrest should begin within four minutes to be effective. Atmospheric hazards which deprive a person of oxygen are life threatening after five minutes. Some hazards may kill faster than five minutes. Realistic response times must be considered when depending on entry rescue.

The rescue team should be an independent outside rescue team where available. This could be the local fire department, specialized rescue service, or mutual aid rescue team of contracted members.

The Entry Supervisor must inform the rescue service in advance of the hazards they may confront if called on to perform entry rescue at the facility prior to approving the Emergency Action Plan and the Confined Space Entry Permit.

The rescue team must provide the rescue service with access as requested, to all Permit Required Confined Spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

The following requirements apply to persons who enter Permit Required Confined Spaces to perform rescue services:

- Each member of the rescue team has the personal protective and rescue equipment necessary for making rescues from Permit Required Confined Spaces and is trained to use them properly.
- Each member of the rescue service is trained to perform the assigned rescue duties.
- Each member of the rescue service practices making Permit Required Confined Space rescues at least once every 12 months. Simulated rescue operations in which they remove dummies, mannequins, or actual persons from the actual Permit Required Confined Spaces or from representative Permit Required Confined Spaces fulfill this requirement. Representative Permit Required Confined Spaces must, with respect to opening size, configuration and accessibility, simulate the types of Permit Required Confined Spaces from which rescue is to be performed



- Each member of the rescue service is trained in basic first-aid, cardiopulmonary resuscitation (CPR) and blood-borne pathogens(BBP). At least one member of the rescue service holds a current certification in first aid and CPR.

The rescue team specify the type and amount of rescue equipment to be used. Rescue equipment must meet the following specifications unless otherwise noted on the permit:

- Each authorized entrant must wear a life line or a chest or full body harness(for top entry) with a retrieval line attached at the center of the entrant's back near shoulder level or above the entrant's head.
  - Working without a life line must be approved on the permit by the Entry Supervisor and the alternate method of rescue outlined on the Emergency Action Plan. Wristlets may only be used in lieu of the chest or full body harness if it can be demonstrated that the use of a chest or full body harness is unfeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.
- The life line must be at least one half ( $\frac{1}{2}$ ) inch diameter high-tensile strength nylon rope of 5400 lb. test or equivalent strength cable.
- The other end of the retrieval line must be attached to a mechanical device or fixed point outside the Permit Required Confined Space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device must be available to retrieve personnel from all vertical-type Permit Required Confined Spaces more than five feet deep.
- If appropriate, a portable or fixed emergency hoist must be mounted and ready for use. An air hoist is preferred; however, an electric hoist may be used. Electric motors must be suitable for the classification of the area. The hoist should be mounted in such a manner that a disabled authorized entrant will be visible at all times while being rescued. The hoist must lift the authorized entrant clear of the opening. Physical strength should not be depended upon for removing a disabled entrant.
- When entry into a confined space is made through the top or an opening that is more than  $3\frac{1}{2}$  feet above the work level, a three-point suspension harness which maintains a disabled authorized entrant in an upright position must be used.

The rescue team specify a procedure for emergency notification of the rescue team, e.g., telephone; radio, etc. (include all emergency numbers).

The rescue team specify a procedure for handling a medical emergency. For example, heart attack, burn, or other medical emergency.

The rescue team specify two emergency escape routes and assembly areas.

The rescue team specify a procedure for preventing unauthorized personnel from attempting a rescue.

When unauthorized persons approach or enter a Permit Required Confined Space while entry is underway, the Attendant must:

- Warn the unauthorized persons that they must stay away from the Permit Required Confined Space (signs may be used)





- Advise the unauthorized persons that they must exit the Permit Required Confined Space immediately
- Inform the authorized entrants and the Entry Supervisor

The Entry Supervisor must remove unauthorized entrants immediately.

A review of the plan with all entrants. Each person who is assigned rescue responsibilities must initial that they understand. Post the completed Emergency Action Plan and the completed permit at the entrance to the space. The Emergency Action Plan and permit may be placed on a clipboard at the entrance of the space, but must be visible and accessible to all entrants.

#### 4.25 Permit Required Confined Space Entry Process

Procedures for evaluating, entering, and working in confined spaces vary depending on space configuration and the type of work performed.

1. Define the scope of work
2. Perform a Hazard Assessment of the Confined Space and Surrounding Area
  - Test the atmosphere
  - Perform the Job Safety Analysis onsite
3. Notify the SMU of the Planned Entry
  - List of employees
  - Training verifications
  - List of tools used inside CSE
  - List of chemicals used inside the CSE
  - Written Plan Including Ventilation Plan and Rescue Planning
4. Notify and Submit Permit-To-Work for Confined Space for signature approval to Issuing Authority of Responsible Department.
5. Determine if the Space is Permit Required  
Refer to the flowchart SMU EHS Form SF-004-2 which summarizes proper Permit To Work determination procedures in combination with the following procedures of this Program to determine safe work practices and to adhere to SMU policy and regulations.
6. In conjunction with planning the work, the Person-in-Charge completes a written Emergency Action Plan. The Emergency Action Plan must be posted at the worksite along with the confined space entry permit.
7. The Entry Supervisor assures that the following additional equipment is at the work site and is in proper operating order:
  - Ventilating equipment needed to obtain acceptable entry conditions
  - Rescue and emergency equipment needed as specified in the Emergency Action Plan, except for equipment that is provided by rescue services.
  - Any other equipment necessary as specified by the Entry Supervisor for safe entry into and rescue from Permit Required Confined Spaces.
8. Perform an onsite JSA **Review**
9. Prepare the surrounding area
10. Test the atmosphere
11. Isolate to Control Hazardous Energy
12. Re-Test the atmosphere and record (verify removal of hazard)



13. Inspect the Space
14. If ventilation is needed, the Entry Supervisor completes the appropriate section of the permit and begins ventilating the confined space.
15. The Entry Supervisor reviews the permit conditions and gas test results, approves the permit by signing on the appropriate line in the Approval Signatures section of the Safe Work Permit. The approved permit must be posted at the entrance to the space before work may begin.

**Enter the space and continuously monitor**

The Attendant must remain at the entrance to the space, monitor activities and evacuate and/or summon help in the event of an emergency. The Attendant must also:

- Continuously maintain an accurate count of authorized entrants in the Permit Required Confined Space and assure that the permit accurately identifies who is in the Permit Required Confined Space
- Communicate with entrants as necessary to monitor status and to alert entrants of the need to evacuate the space
- Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and evacuate the Permit Required Confined Space immediately if the Attendant detects a prohibited condition; and
- Summon rescue and other emergency services as soon as it is determined that entrants may need assistance to escape from Permit Required Confined Space hazards

Unless specifically relieved of their duties as The Attendant and replaced by another trained and qualified Attendant, No Attendants may enter a Permit Required Confined Space to attempt a rescue even if they have been trained and equipped for rescue operations if they are still filling the role as Attendant.

A Qualified Gas Tester must continuously monitor the atmosphere within the space. Results must be recorded on the permit every thirty minutes. When the space has been vacated for more than 30 minutes, gas testing must be conducted again before re-entry.

No multi-employer entry is allowed; only SMU employees or approved Contractors are allowed within the permit space unless written permission and contract detailing work permission by Department Director.

The Entry Supervisor is responsible for preparing the permit space for subsequent entry. Entry will not commence until all conditions listed on the entry permit are met.

Once the job has been completed and after the authorized entrants have exited the space, the Entry Supervisor will conclude the entry by closing off a Permit Required Confined Space. The Entry Supervisor will cancel the permit by removing it from the site.

The Entry Supervisor must review all permit-required entry operations. The review must identify any problems and document that all entrants were protected from hazards during the entry. The Entry Supervisor will correct task-level problems locally prior to authorizing additional entries.

The Permit will be signed as “Closed” and filed with the Office of Risk Management.



## 5.0 Roles and Responsibilities

### 5.1 Executives and Administrators

- Ensure that responsibilities assigned within this Program are carried out within their administrative work units.
- Monitor implementation of this Program within their work unit.
- Ensure adequate funding is available to support this Program.

### 5.2 Office of Risk Management

- Assist work units in implementing the provisions of this Program.
- Develop training materials related to this Program.
- Assist in providing general CSE training to employees.
- Maintain records in accordance with this document.
- Periodically audit and update the CSE Program as needed.
- Coordinate implementation of the CSE Program within the work units.
- Ensure required training is provided to employees within the work units.
- Assist in the investigation of all injuries and incidents involving CSE.
- Verify individual certification received after training.
- Evaluate the campus for confined spaces and document appropriately.
- Maintain, calibrate and issue instrumentation required for employee PRCS entry.
- Audit PRCS practice and review canceled entry permits annually.
- Recommend and Audit personal protective PPE as needed for PRCS entry.
- Provide technical assistance and support.
- Assist with Permit to Work and perform initial air monitoring when needed.

### 5.3 Directors and Managers

- Be thoroughly informed of the contents of this program and how it applies to their areas of responsibility and authority.
- Ensure employees and contractors comply with all provisions of the CSE program.
- Identify all authorized employees under their supervision.
- Ensure copies of the Confined Space Entry Permit (SF-004-1) are available for employee use.
- Ensure authorized employees receive general CSE training.
- Provide training to employees on CSE-specific CSE procedures within the work unit.
- Investigate all injuries and incidents involving CSE.
- Ensure that employees are provided with sufficient locks, tags, and lockout devices.
- Complete annual CSE inspections in accordance this document.
- Take prompt corrective action when unsafe CSE conditions or practices are observed.

### 5.4 Employees

- Comply with all provisions of the CSE program.
- Attend CSE training sessions as required.
- Promptly report any concerns related to CSE to their immediate supervisor.
- Employees or their authorized representatives involved in confined space entry work will:
  - Help develop and implement permit requirements.
  - Have the opportunity to observe confined space testing.
  - Have access to any data or information developed pursuant to this procedure.
  - Be able to comment on and suggest modifications to the confined space procedure.



### 5.5 The Worksite Supervisor (Person In Charge) must:

- Know the hazards that may be faced during entry, including information on the route of entry, signs or symptoms of overexposure such as behavioral effects, and consequences of the exposure
- Define personnel, equipment requirements and assigning duties for everyone involved in the entry operation. The Entry Supervisor may delegate these duties. The Entry Supervisor is required to be available on site (readily accessible - not necessarily at the space) at all times during the confined space entry
- Verify 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 and the Emergency Action Plan are in place before approving the entry
  - Assure that operations remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained
  - Terminating the entry and cancel permit if conditions warrant
  - Verify that rescue services are available

### 5.6 The Entry Attendants must:

- The Attendant will only monitor one (1) permit space at a time, with no exceptions.
- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure. This will be accomplished during the pre-entry meeting.
- Know the internal configuration of the permit space, including entry and exit points.
- Be stationed outside the confined space at the manway, hatch, or other suitable point of observation. The Attendant must be in visual and/or audible contact with entrants inside the confined space at all times.
- Remain outside and not enter the permit space during entry or rescue operations until relieved by another attendant.
- Maintain a record of all persons entering and leaving the confined space on the entry log. (This form is an integral part of the entry permit, and must be retained with permit records.)
- Understand and be capable of effectively implementing the communication system/signals to be used with Entrants or rescue personnel.
- Constantly monitor the confined space, in order to alert Entrants of the need to exit for the following:
  - If the Attendant identifies an unsafe condition or work activity inside or outside the confined space that could endanger Entrants.
  - If the Attendant recognizes any known or suspected behavioral affect associated with chemical exposure, oxygen deficiency, etc., while observing Entrants.
  - If the Attendant cannot effectively and safely perform all required duties (i.e., cannot remain outside the confined space to monitor Entrants, and a suitable replacement is not immediately available).
- Summon rescue and other emergency services as soon as the Attendant determines that an entrant may need to escape from the space.
- Take the following actions when unauthorized persons approach or enters a permit space while entry is underway:
  - Warn the unauthorized persons that they must stay away from the permit space.
  - Advise the unauthorized persons that they must exit immediately if they have entered the permit space.
  - Inform the Authorized Entrants and the Entry Supervisor if unauthorized persons have entered the permit space.





**5.7 Authorized Entrants**

The Authorized Entrants are responsible for:

- knowing the hazards that may be faced during entry, including information on the route of entry, signs or symptoms of overexposure such as behavioral effects, and consequences of the exposure
- complying with all conditions and requirements of the Confined Space Entry Permit and in this procedure
- assuring proper use of equipment
- alerting the attendant of changing conditions or other safety concerns.

**5.8 Contract Personnel:**

If contractors are required to perform work that involves confined space permit-required entry, then **SMU shall:**

- Inform the contractor that the workplace contains permit-required spaces and permit-required space entry is allowed only through compliance with a permit space program
- Apprise the contractor of the elements that make the space in question a permit-required space, including the hazards identified and the SMU's experience with the space.
- Apprise the contractor of any precautions or procedures that the SMU has implemented to protect employees in or near the permit-required spaces where contractor personnel will be working.
- Coordinate entry operations with the contractor.

**The Contractor Shall:**

- Attempt to temporarily declassify the PRCS.
- Use alternate entry methods if possible.
- Debrief the SMU at the conclusion of the entry operations regarding the permit space program or any hazards confronted or created in permit-required spaces during the entry operations.

In addition to complying with the confined space requirements, the contractor shall:

- Obtain any available information regarding permit space hazards and entry operations from the SMU
- Coordinate entry operations with the SMU
- Inform the SMU of any hazards confronted or created in permit spaces.

Whenever contract personnel are to be engaged in activities covered by this program, the primary SMU contact and the contract employer shall inform each other of their respective CSE procedures.

The exchange of CSE procedures between SMU and the contract employer must take place before beginning any service activities subject to CSE.

Contract employers are responsible for ensuring that their personnel understand and comply with the requirements of OSHA CSE Standard.

If a contractor is utilized to perform operations within a permit space, the contractor will ensure compliance with applicable OSHA regulations and this program. A contractor may utilize another program if submitted in writing and approved by the EHS Director. However the Contractors and the alternative program must still comply with the requirements of this procedure. This program will be subject to audit by the EHS Director.



## 6.0 Goals, Objectives and Performance Measures

### 6.1 Performance Measures

It is the Goal of SMU to have Zero accidents. This goal can only be met by setting objectives and measuring our current performance against those objectives. Audits and inspections of the program and usage of the program by SMU employees and contractors will take place periodically and annually.

Department Performance measures are will be incorporated into EHS scorecards.

Individual performance measures related to this Program are incorporated evaluations and monitoring.

### 6.2 Periodic Inspections

Inspections will be conducted to evaluate and correct any deficiencies in the program. Periodic inspections are completed as part of an ongoing quality process.

- Supervisors of authorized employees are responsible for completing periodic inspections on at least an annual basis in order to ensure adherence to the CSE procedures described in this document.
- CSE inspections will be conducted using the checklist found in Appendix E.
- Inspections will focus on correcting any deviations from CSE procedures.
- Inspection records are to be maintained by the work unit and must be available for review by EHS.

### 6.3 Annual Inspections

An evaluation of each facility must be conducted in order to identify all confined spaces. This evaluation should be an initial survey of the entire facility rather than one conducted at the time of confined space entry.

- Hazards (physical and chemical) must be identified and described for each confined space prior to entry, including any past and/or current uses of the space that could adversely affect its atmosphere, physical characteristics, configuration, location, and testing of the internal atmosphere.
- The Confined Space Workplace Evaluation Worksheet will be used to document this required workplace evaluation and identification of all permit-required confined spaces.
- The workplace evaluation can be conducted with the assistance of the EHS Group.
- The Confined Space Workplace Evaluation Worksheet must be reviewed and updated on an annual basis.

SMU will perform a single annual CSE Permit review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.

### 6.4 Consequences

ORM will record any reports or observations of unsafe operations or conditions. Failure to follow this program, the procedures, render common practices or courtesies, or follow regulation standards may resulting in progressive disciplinary action up to and including termination.





## 7.0 Training

- SMU will keep records of employee training. The training records will include employee name, training date, and the content of the training. Keep documentation on training for at least three years from the training date. The level of CSE training provided to employees is based on their level of involvement with CSE procedures.
- Personnel assigned responsibility to use gas detection instruments must be trained in their proper use and calibration. The individual performing tests, prior to issuance of the confined space entry permit, shall possess knowledge of the confined space's previous contents, including chemicals that may have been used during the cleaning phase, and shall conduct the appropriate tests to determine presence or absence of such contaminants. Test results and the time such tests were performed will be noted on the entry permit.
- Each work unit is responsible for maintaining a master list of all authorized employees and delivering to the EHS Department.
- "Authorized employees" will be trained in the purpose and use of CSE procedures, the recognition of hazardous energy sources, the types and magnitude of hazardous energy sources expected to be encountered, and the methods that are necessary for proper energy isolation and control.
- "Affected employees" and "other employees" will be trained in the purpose of CSE procedures. They will also be shown samples of the locks and tags used during CSE procedures. They will be instructed not to remove locks or tags for any reason nor to attempt to energize CSE that is being serviced.
- EHS is available to assist work units in providing general CSE training to their employees.
- Supervisors are responsible for training their employees on CSE-specific CSE procedures.
- Retraining will be provided to employees whenever there is a change in job assignments, processes, or CSE that creates a new hazard. Retraining will also be provided whenever there is a change in CSE procedures.
- Work units are responsible for maintaining a record of all CSE training provided to their employees. EHS will maintain records of CSE training provided by EHS personnel.
- General CSE training materials have been developed by EHS.
- The EHS Department facilitates or will develop and deliver PRCS training classes. The purpose of training is to ensure employees have the understanding, knowledge, and skills necessary for the safe performance of their duties.
- Certification that the required training has been accomplished will be maintained. The certification will contain each employee's name, the signature or initials of the trainers, and the dates of training. The certification will be available for inspection by employees and the Worksite Supervisor.
- Training will be provided to each affected employee:
  - Before the employee is first assigned duties that require entry into permit spaces.
  - Before a change in assigned duties.
  - Whenever there is a change in permit space operations that present a hazard about which an employee has not previously been trained.
  - Whenever the Entry supervisor or EHS 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.
  - All employees whose work is regulated by this procedure shall be trained in order to acquire the understanding, knowledge, and skills necessary for the safe performance of duties assigned. This training shall be provided to each affected employee before the employee is first assigned duties related to confined space entry, or whenever there is a



change in permit space operations or exposures that present hazards about which the employee has not been previously trained.

- Refresher training shall be provided as required by local regulatory standards, or as deemed necessary by supervisory personnel.

**8.0 Program Evaluation**

The ORM will review the effectiveness of the Confined Space Entry Program by:

- Verify and document that all qualified persons have had appropriate CSE training.
- Review of injuries related to CSE operations.
- Verify and document that all qualified persons have had appropriate CSE training.
- Review of incidents related to CSE operations.
- Document and review the periodic inspections and annual program inspections of CSE use as documented by individual departments. Identification of any deficiency will result in an appropriate change in procedures, or other measure being taken.
- Providing an annual review of the CSE program for compliance and opportunities for improvement.
- Review the effectiveness of the Confined Space procedures by conducting a review of all canceled permits on an annual basis. Identification of any deficiency will result in an appropriate change in work control procedures, or other measure being taken.
- Revise the written CSE program as required.

**9.0 Resources**

Business Units shall ensure that appropriate resources are identified, allocated, and verified to ensure this Program is communicated and implemented.

**10.0 Associated Forms, Documents, and References**

**10.1 Forms**

- Appendix A: (Authorized Employee) Confined Space Entry Permit Form SF-004-1
- Appendix B: (Authorized Employee) Confined Space Entry Decision Flowchart SF-004-2
- Appendix C: (Authorized Employee) Confined Space Entry Responsibility Matrix SF-004-3
- Appendix D: (Authorized Employee) Confined Space Inventory Form SF-004-4
- Appendix E: (EHS Department) CSE Annual Review Form SF-004-5

**10.2 Document Control**

The Confined Space Workplace Evaluation Worksheet must be kept for five (5) years at the appropriate office. This evaluation worksheet must be made available to all employees upon request. A copy of the evaluation must be posted on the appropriate office's bulletin board.

SMU EHS will retain each canceled entry permit for at least 2 years to facilitate the review of the permit-required confined space program. 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.

SMU will 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.

SMU may discard the cancelled entry permits after the review at the discretion of EHS.

However OSHA's standard on access to employee exposure and medical records CFR 29 1910.1020 requires the SMU to maintain employee exposure records for at least 30 years.

If you needed to monitor the entrants' exposure to toxic substances during the entry, SMU expects you to keep a record of this exposure, report the exposure to the Office of Risk Management as an Incident Report, and SMU EHS will keep the entry permit and all associated documents for 30 years.

The hard copies of safety permits are to be posted at the job site. Upon completion of work, the permit hard copies are returned to the University-designated responsible party. The responsible party must file permits locally upon completion of work.

In case of an incident/accident, permits must be retained (along with the investigation) for 5 years. The completed permit also must be retained to allow review of this confined space entry program. Any problems encountered during an entry operation shall be noted on the permit so the program can be revised.

All training records related to confined space entry shall be retained per the University document retention policy.

The PRCS entry permit contained will be prepared, issued, terminated and retained as follows:

- SMU will develop and implement a system for the preparation, issuance, use, and cancellation of entry permits a required by this section.
- The Entry Supervisor is responsible for preparing and issuing the entry permit.
- The Entry Supervisor is responsible for use and termination of the entry permit.
- Having all personnel sign the document as an acknowledgment of understanding of PRCS operations.
- Retained at or near the entrance to the permit space.
- Upon termination of operations the entry permit will be cancelled and returned to the EHS Department.
- EHS Department will file the entry permit in the University files. Canceled entry permits will be retained for two years and will be used in the annual PRCS review.

### 10.3 References

- A. 29 CFR 1910 Subpart J, General environmental controls
- B. 29 CFR 1910.146, Permit-required confined spaces
- C. 29 CFR 1910 Subpart Q, Welding, cutting, and brazing
- D. 29 CFR 1910.252, General requirements
- F. OSH Act; General Duty Clause, Section 5a



SMU

PROGRAM

# CONFINED SPACE ENTRY

Owner: Risk Management  
Revision No: 01

Document number: EHS S-004  
Date last revised: 08-2-2018

## 11.0 Reviewed By

Date of Review	Reviewed By	Reason for review
01-08-2018	EHS Group	Internal audit for compliance, design control
05-25-2018	Manager Review Group	Awareness, EHS quality process- Management Review
05-25-2018	AVP / CRO	Approval of draft program

## 12.0 Revision History

Revision Number	Date of Revision	Revision Description	Basis for Revision
Draft			
1	08-2-2018	Out of draft status	Internal reviews completed

## 13.0 Decision Record

Date of Decision	Approved By	Decision Description	Basis for Decision
08-2-2018	AVP / CRO	Implementation of program	EHS quality process - Continual Improvement



# CONFINED SPACE ENTRY PERMIT

Owner: Risk Management  
Revision No: 01

Document number: EHS SF-004-1  
Date last revised: 08-2-2018

### Section 1: Permit Request

Application Date:	Description of Work (include Sq Ft of space) :
Project:	
Company:	Start Work Date:
Location / Area:	Equipment to be Engaged:
Number of Workers:	Confined Space Name:

### Section 2: Safety Requirements and Checklist

<b>Known Hazards:</b> <input type="checkbox"/> Oxygen deficiency (less than 19.5%) <input type="checkbox"/> Oxygen enrichment (greater than 23.5%) <input type="checkbox"/> Flammable gases or vapors (greater than 10% of LEL) <input type="checkbox"/> Airborne combustibile dust (meets or excess LEL) <input type="checkbox"/> Containment pressure release <input type="checkbox"/> Energized electrical work (Electrical Shock) <input type="checkbox"/> Toxic substances <input type="checkbox"/> Heavy equipment movement <input type="checkbox"/> Engulfment <input type="checkbox"/> Other:	<b>Emergency services:</b>		
	Name:		
	Phone:		
	Equipment required for entry and work Specify special equipment required for this job.		
	PPE	<input type="checkbox"/> SMU	<input type="checkbox"/> Contractor
	Ventilation	<input type="checkbox"/> SMU	<input type="checkbox"/> Contractor
	Communication	<input type="checkbox"/> SMU	<input type="checkbox"/> Contractor
	Rescue Equipment	<input type="checkbox"/> SMU	<input type="checkbox"/> Contractor
	Other:	<input type="checkbox"/> SMU	<input type="checkbox"/> Contractor

	Yes	N/A		Yes	N/A
Notification of affected departments.			Services, stability and safety of adjacent structures and services evaluated and ensured.		
CSE competent supervisor available.			Risk Assessment addressed to the crew.		
Atmospheric testing completed. Oxygen % _____ LEL % _____ H2s / Toxins % _____ CO % _____			All hazardous lines have been isolated: Isolation methods?		
Gas Monitor on-site and is calibrated			Forced or exhaust ventilation provided.		
Entry and emergency procedure briefed, Rescue plans in place.			Ensure dewatering system where required to provided and functioning properly.		
Non-sparking tools.			All surface encumbrance removed or supported.		
PPE available			Location plan / Layout attached.		
The confined space has been drained.			Ground Fault Circuit Interrupters provided.		
Electrical equipment rated for explosive atmospheres.			Warning barriers and signs in place.		

### Section 3: Crew Details

No	Name	Designation (Attendant, Entrant, Rescue)	Trade



# CONFINED SPACE ENTRY PERMIT

Owner: Risk Management  
Revision No: 01

Document number: EHS SF-004-1  
Date last revised: 08-2-2018

### Section 4: 30 Minute Continuous Monitoring When Required

Time	O2 (19.5% to 23.5%)	LEL (> 10 %)	Co (35 ppm)	H2S (10 ppm)		Time	O2 (19.5% to 23.5%)	LEL (> 10 %)	Co (35 ppm)	H2S (10 ppm)
:00						:00				
:30						:30				
:00						:00				
:30						:30				
:00						:00				
:30						:30				
:00						:00				
:30						:30				
:00						:00				

### Section 5: Declaration by Performing Authority

I hereby declare that:

Alternative entry will be used: Yes  No

- Permit is issued only for a 12 hour shift (day /night)
- Permit extension is allowed only one time till the end second 12 hour shift
- Permit should be available and displayed at workplace till completion of work
- The above requirement / precaution are in place and addressed to the team and we are fully aware of the same
- Permit to work will be suspended by the inspecting official if any non-compliance noticed
- Permit will be closed-out upon completion of work and returned to EHS Department and Issuing Work Unit on same day issued

Performing Authority (Name): \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### Section 6: SMU Permit Issue

This Permit is valid till (Date): \_\_\_\_\_ Time: \_\_\_\_\_ Hours: \_\_\_\_\_ Permit Number: \_\_\_\_\_

#### Issuing Authority

Name: \_\_\_\_\_ Signature: \_\_\_\_\_

#### Area Authority / Permit To Work Authority

Name: \_\_\_\_\_ Signature: \_\_\_\_\_

### 12 Hour Extension

Issuing Authority

Area Authority / Permit To Work Authority

Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Name: \_\_\_\_\_ Signature: \_\_\_\_\_

### Section 7: Permit Inspection

Name	Title	Company	Compliance (Yes / No)	Date	Time	Signature

This permit is cancelled due to:-  Recommended precautions not in place:  
 Other (specify) \_\_\_\_\_

Cancelled by Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

### Section 8: Permit Closure

- It is to confirm that the work completed on \_\_\_\_\_ at \_\_\_\_\_ hours
- The area inspected and found safe
- Permit closed at \_\_\_\_\_ hours

Issuing Authority (Name): \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_





Owner: Risk Management  
Revision No: 01

Document number: EHS SF-004-1  
Date last revised: 08-2-2018

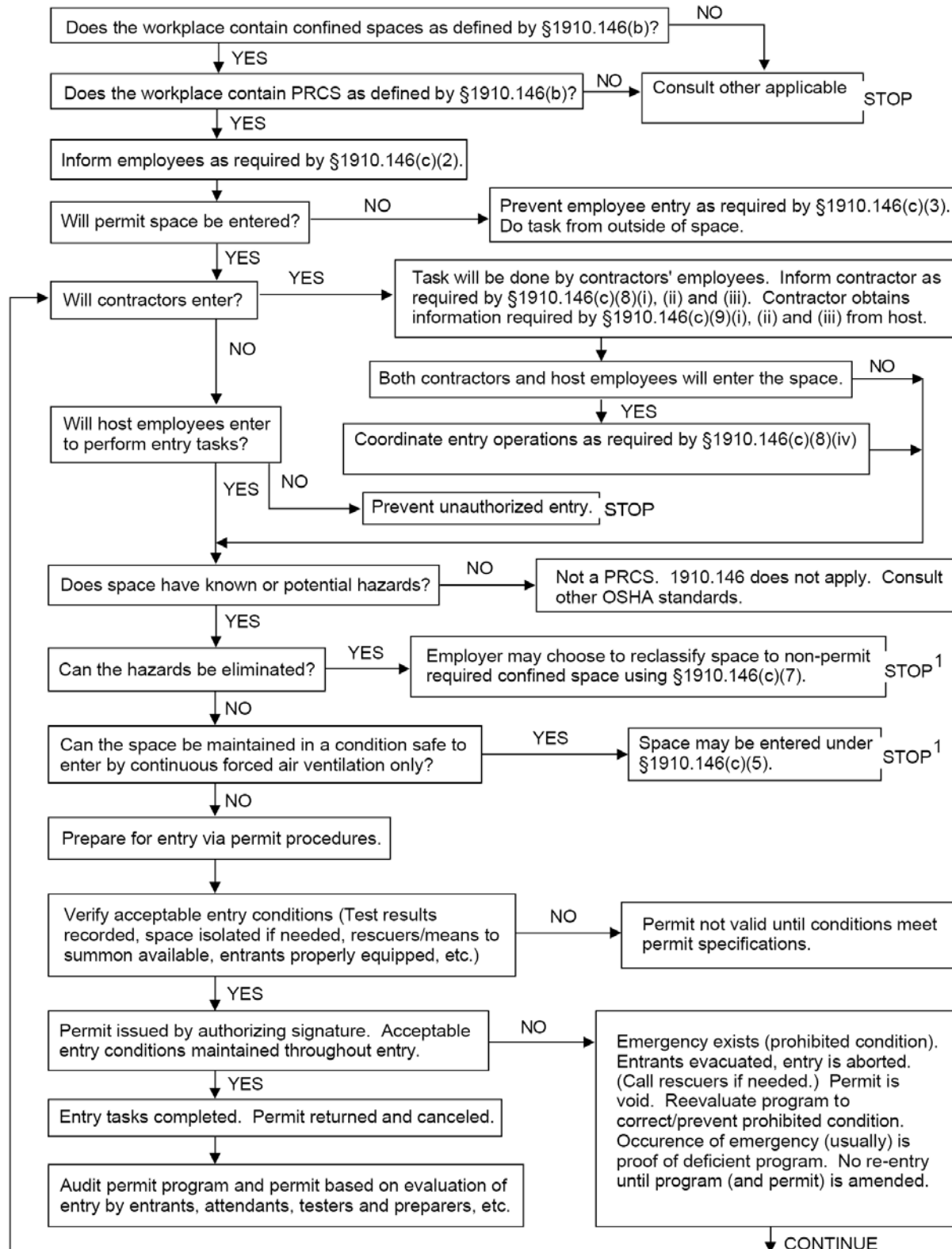
## ATTENDANT/AUTHORIZED ENTRANT LOG

### Attendant Duties

- Know the hazards that may be faced during confined space entry.
- Know the possible behavioral effects of hazards.
- Continuously maintain an accurate count of entrants.
- Remain outside of the permit space during confined space operations until relieved by another authorized attendant.
- Communicate as necessary to monitor status and alert of any need to evacuate the space.
- Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order evacuation when:
  - Attendant detects a prohibited condition.
  - Attendant detects the behavioral effects of hazard exposure in an authorized entrant.
  - Attendant detects a situation outside the space that could endanger authorized entrants.
  - Attendant cannot effectively and safely perform all required duties.
- Summon rescue and emergency services when emergency exit from permit space is necessary.
- Perform non-entry rescues.
- Take action to prohibit unauthorized entry into the permit space.
- Perform no duties that may interfere with the primary duty to monitor and protect authorized participants.
- Prohibit entry of unauthorized personnel.
- Verify the Confined Space Entry Permit.

ATTENDANT: \_\_\_\_\_  
\_\_\_\_\_

	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1. _____								
2. _____								
3. _____								
4. _____								
5. _____								
6. _____								
7. _____								
8. _____								
9. _____								
10. _____								
11. _____								
12. _____								
13. _____								
14. _____								
15. _____								
16. _____								
17. _____								
18. _____								
19. _____								
20. _____								





DUTY/RESPONSIBILITY	ENTRANT	ATTENDANT	SUPERVISOR
Keep unauthorized entrants away from the space.		X	X
Remove unauthorized individuals who enter or who attempt to enter the permit space.			X
Communicate with entrants, monitor their status, and tell them when to evacuate.		X	
Inform the entrants and the entry supervisor if unauthorized persons enter the permit space.		X	
Communicate with the attendant regularly.	X		
Remain outside the space during entry operations until relieved by another attendant.		X	
Know the number and identity of authorized entrants.		X	
Use all equipment properly.	X		
Determine that acceptable entry conditions are maintained.			X
Exit from the permit space immediately given an order to evacuate, an alarm warning, or a sign of hazardous condition.	X		
Know permit space hazards, including the mode, symptoms, and consequences of exposure.	X	X	X
Notify the attendant of any signs or symptoms of exposure to a hazardous condition.	X		
Terminate the entry and cancel the permit when entry operations are finished or if a prohibited condition arises.		X	
Verify entry conditions are acceptable before signing the permit and allowing entry.			X
Perform non-entry rescues if necessary.		X	
Verify rescue services are available and the means for summoning them are effective.			X
Summon emergency responders when entrants need their services.		X	



# CSE INVENTORY

**Owner:** Risk Management  
**Revision No:** 01

**Document number:** EHS SF-004-4  
**Date last revised:** 05-22-2018



Please contact ORM EHS for any required changes to this Program.

Uncontrolled when printed



The purpose of this document is to comply with the program review requirements of the SMU *Confined Space Entry* program (S-004, 05-2018 revision), and OSHA 1910.146 pertaining to permit required confined spaces (PRCSE):

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.”

This annual permit review included:

- A representative sample of completed and filed entry permits and reviewing for accuracy, consistency, etc.
- A review of any needs for policy changes or a need for a special addendum in accordance with findings resulting in corrective actions.

During this portion of the annual review, the following program element was evaluated: Confined Space Permits.

<b>Confined Space Permits</b>	<b>Assessed</b>
1. Are cancelled permits retained for one year?	
2. Are the dates and locations of entry correctly written on the permits?	
3. Are the meters assigned numbers or serial numbers written on the permits?	
4. Is the type of work performed correctly written on the permits?	
5. Are all hazards correctly identified on the permits?	
6. Is safety equipment and PPE correctly identified on the permits?	
7. Are the results of atmospheric monitoring correctly written on the permits?	
8. Is the duration of the permit correctly identified on the permits?	
9. Are all entrants, attendants and entry supervisors identified on permits?	
10. Are appropriate approvals and signatures documented on the permits?	
11. Are related permits (hot work etc.) written when work is done in confined spaces?	

**Unsafe practices reported:**

**Questions or concerns discussed:**

The following corrective actions are suggested as a result of this review.

<b>Corrective Actions</b>	<b>Complete/Date</b>	
1.		
2.		



SMU

FORM

# CONFINED SPACE TEMPORARY DECLASSIFICATION

Owner: Risk Management  
Revision No: 01

Document number: SF-004-7  
Date last revised: 07-13-2018

**Applicability.** A permit-required confined space (PRCS) qualifies for temporary declassification only if both of these conditions are met: **a)** no actual or potential atmospheric hazards exist and **b)** all hazards associated with the confined space can be eliminated from outside the space for the duration of the entry (per 29 CFR 1910.146, (c), 7). If hazards arise in a confined space that has been declassified, each employee must exit the space. The entry supervisor or SMU must determine if the space needs to be reclassified as a permit-required confined space. **If forced-air ventilation is used during an entry, it cannot be classified as a nonpermit-required confined space.**

**Instructions.** This form must be completed by the Performing Authority and Issuing Authority before anyone enters the space and kept at or near the entrance to the space during entry. Forms must be delivered to the Issuing Authority once work is completed. To ensure entry conditions are acceptable, this form is good for one workday only.

Section 1: PRCs Identification	
Application Date:	Confined Space ID No and Name :
Project:	Description of Work:
Company:	Start Work Date:
Location / Area:	Equipment to be Engaged:
Section 2: Hazard Identification	
List all known and potential hazards associated with the space and introduced by planned work:	Describe how each hazard will be eliminated:
Section 3: PRCs Declassification Approval	
I confirm that the named PRCs and the planned work qualify for temporary declassification.	
Performing Authority (Name): _____	Signature: _____ Date: _____ Time: _____
Issuing Authority (Name): _____	Signature: _____ Date: _____ Time: _____

