



**UTHealth**<sup>TM</sup>

**The University of Texas  
Health Science Center at Houston**

**Confined Space Manual**

**Department of Environmental Health & Safety**

**June 2016 Revised**

# INTRODUCTION

This document has been developed to ensure the safety of personnel required to enter and conduct work in confined spaces. The program contained herein describes reasonable and necessary policies and procedures for any and all facilities, departments, and individuals who are associated with confined space entry operations. This program and all parts of 29 CFR 1910.146 shall apply to all confined space entry operations conducted at The University of Texas Health Science Center at Houston. As it is the policy of The University of Texas Health Science Center at Houston to provide its employees with the safest work environment possible, The University requires compliance with the procedures set forth in this manual.

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## I. OBJECTIVE

The purpose of **University of Texas Health Science Center- Houston** Confined Space Program is to set procedures that will ensure workers safe entry into confined spaces and permit-required confined spaces to perform routine tasks associated with their employment. This procedure is designed to provide the minimum safety requirements in accordance with the Occupational Safety and Health Administration's (OSHA) Confined Space Standard, 1910.146.

### 1. DEFINITION OF CONFINED SPACES

An understanding of why spaces on campus are considered confined spaces and the ability to identify these spaces around the institution is an important step in ensuring safe entry. A definition of a confined space and two sub-categories of confined spaces are listed below:

1.1 A **Confined Space** is any space that has the following characteristics:

- a. It is large enough or so configured that an employee can fit his entire body within the space after entry to perform assigned work.
- b. It has limited or restricted means for entry or exit.

Confined-space openings are limited primarily by size and location. If an employee is required to use his hands or contort his body to either enter or exit the space, it is classified as a confined space. Openings may be small in size or may be difficult to move through. Size or location may make rescue efforts difficult.

- c. It is not designed for continuous employee occupancy.

Confined spaces are not designed for employees to enter and work on a routine basis and hazards are commonly present in the spaces. These spaces may be designed to store product, machinery, and equipment; therefore, these spaces are not designed for continuous occupancy. Common hazards in confined spaces are inadequate ventilation, changes in walking surfaces, and lighting. Hazards increase the danger and difficulty of inspection, maintenance, repair, cleanup, or other normally routine tasks.

1.2 A **Non-Permit Confined Space** is a confined space that does not contain (nor has the potential to contain) any hazard capable of causing death or serious physical harm. Examples of non-permit required confined spaces might include the interiors of HVAC units, certain air plenums and mechanical chases, walk-in freezers or refrigerators, and some building crawl spaces.

1.3 A **Permit-Required Confined Space (PRCS)** is a confined space that may contain hazards with the potential to threaten the life or wellbeing of an entrant. A permit-required confined space has one or more of the following characteristics:

- a. Contains or has a potential to contain a hazardous atmosphere.
- b. Contains a material that has the potential to engulf an entrant.

- c. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly-converging walls or by a floor that slopes downward and tapers to a smaller cross-section; or
- d. Contains any other recognized serious safety or health hazard. Examples of serious safety or health hazards might include fall hazards, unguarded machinery, extreme heat or cold, steam pipes or chemical lines, hazardous noise levels, electrical hazards, asbestos, and potentially hazardous levels of dust.

The lack of ventilation in most confined spaces increases the potential for the development of a hazardous atmosphere. Therefore, spaces without adequate ventilation must be designated “permit-required,” and the procedures for making entry into a permit-required space must be followed. Examples of permit-required confined spaces at UTHealth include sewers, electrical vaults, elevator shafts and pits, sump pits, certain mechanical rooms, some excavations, and other types of enclosures. Any space that is accessed by lifting a manhole cover shall be considered a permit-required confined space.

Other spaces may be designated permit-required confined spaces at the discretion of Environmental Health & Safety. Such areas shall be clearly marked as permit-required spaces.

It is the primary duty of EH&S to identify confined spaces throughout the campus and determine whether or not they are permit required. Surveys will be done periodically to determine whether any spaces on campus should be designated as permit required confined spaces. Additional investigations into the identification or classification of confined spaces may be done at the request of any campus employee. If confined spaces are created or accessed during construction work on campus being performed by a contractor, it is the sole responsibility of the contractor to identify and manage issues relating to confined spaces.

The Entry Supervisors (see appendix for definition) are directly responsible for ensuring the safety of the Entrant(s) in confined spaces. It is the responsibility of Entry Supervisors to evaluate potentially hazardous spaces and areas to ensure that the proper precautions are taken for safety. This includes, but is not limited to, clearly identifying permit-required confined spaces, ensuring employees are trained, and ensuring proper entry procedures are followed. These responsibilities may be delegated to another competent and qualified person. The Entry Supervisor may request assistance from EH&S in the completion of these roles if needed.

If the Entry Supervisor is unable to make a final determination as to whether a space is potentially hazardous and/or requires a permit, EH&S should be contacted to make the determination.

It may be determined that certain confined spaces present no real danger for employees. All spaces should be considered potentially dangerous until they have been evaluated and tested by the UTHealth Department of Environmental Health & Safety. Once a space has been evaluated, EH&S shall determine if the confined space requires a permit and will apply any appropriate labeling.

## 2. CONFINED SPACE HAZARDS

Once a space has been identified as confined, the hazards that may be present within the confined space must be identified. Confined-space hazards can be grouped into the following categories:

1. Oxygen-deficient atmospheres
2. Flammable atmospheres
3. Toxic atmospheres
4. Mechanical and physical hazards

Every confined space on campus must be evaluated for these four types of hazards prior to entry. The atmospheric hazards are often the most difficult to identify as they require the use of a gas monitor for detection.

### 2.1 Oxygen-deficient Atmospheres

The normal atmosphere is composed of approximately 21% oxygen and 79% nitrogen. An atmosphere containing less than 19.5% oxygen shall be considered oxygen-deficient. The oxygen level inside a confined space may decrease as the result of either consumption or displacement.

A number of processes can consume oxygen in a confined space, including the combustion of flammable materials, as occurs during welding, cutting, or brazing. In addition, oxygen consumption occurs with bacterial action, as in the fermentation process, and chemical reactions, such as the formation of rust. Human respiration in a confined space can also impact oxygen levels, particularly in small spaces with high levels of activity and poor ventilation. Oxygen levels can also be negatively impacted if oxygen is displaced by other gases.

### 2.2 Flammable Atmospheres

Flammable atmospheres are generally the result of the presence of flammable gases, vapors, dust mixed in certain concentrations with air, or oxygen-enriched atmospheres.

Gases or vapors can accumulate and reach concentrations at which they are flammable or explosive in areas with inadequate ventilation. Gases that are heavier than air can be create hazardous conditions in lower levels of a confined space where they can accumulate. Therefore, atmospheric testing should be conducted at all levels of a confined space.

Oxygen-enriched atmospheres are those atmospheres that contain an oxygen concentration greater than 22%. An oxygen-enriched atmosphere will cause flammable materials such as clothing and hair to burn violently when ignited.

The work being conducted in a confined space can create a flammable atmosphere. Spray-painting, coating, the use of flammable solvents for cleaning can allow gases, vapors, or dusts to reach flammable levels. Welding or cutting with oxyacetylene equipment can also cause a dangerous atmosphere in a confined space and shall not be allowed without a hot work permit. Because small leaks in oxygen and acetylene hoses may allow these gases to generate an explosive atmosphere, they should be removed when not in use. The atmosphere shall be tested continuously while **any** hot work is being conducted within the confined space.

## 2.3 Toxic Atmospheres

Toxic atmospheres may be present within a confined space as the result of one or more of the following:

a. The product stored in the confined space

When a product is stored in a confined space, the product may emit vapors that are hazardous to inhale. The toxic vapors can remain in the atmosphere after the product is removed from the confined space if the space is poorly ventilated. In addition, the product may be absorbed by the walls and emit toxic vapors even when the product is removed or when cleaning the residual material commences.

b. The work being conducted in the confined space

Toxic atmospheres can be generated as the result of work being conducted inside the confined space. Examples of such work include: Welding or brazing with metals capable of producing toxic vapors, painting, scraping, sanding, etc. Many of the solvents used for cleaning and/or degreasing can produce toxic vapors.

c. Areas adjacent to the confined space

Toxic fumes produced by processes near the confined space may enter and accumulate in the confined space. For example, if the confined space is lower than the adjacent area and the toxic fume is heavier than air, the toxic fume may "settle" into the confined space.

## 2.4 Mechanical and Physical Hazards

Problems such as rotating/moving mechanical parts or energy sources can create hazards within a confined space. All rotating or moving equipment such as pumps, process lines, electrical sources, etc., within a confined space must be identified.

Physical factors such as heat, cold, noise, vibration, and fatigue can contribute to accidents and must be evaluated in all confined spaces.

Excavations could present the possibility of engulfment. Employees shall be protected from cave-ins by sloping, benching, or shoring systems when the depth of the excavation is more than four feet, in accordance with 29 CFR 1926.652. In some circumstances, air monitoring may also be required.

The primary physical hazard identified in confined spaces is the potential for engulfment in the large tanks on campus. Water should be drained in all tanks prior to entry and all valves leading to the tanks should be locked out and tagged out to ensure that entrants will not be subjected to sudden inflow of water.

### **3. CONFINED SPACE ENTRY PROGRAM**

#### **3.1 Identifying All Confined Spaces**

1. All confined spaces located within the facility should be identified and reported to EH&S for inclusion in the confined space program. Once the space has been identified as Confined, EH&S shall determine if a permit is required.
2. All appropriate employees (for example, those in facilities or on construction teams) shall be made aware of these confined spaces through training or instruction provided by Entry Supervisors or their designees. Assistance in this training shall be provided by EH&S.

#### **3.2 Preventing Unauthorized Entry**

1. All employees shall be instructed by Entry Supervisors that entry into a permit required confined space is prohibited without an authorized permit.
2. Entry Supervisors shall instruct all employees to list their names on the authorized permit before they will be allowed to enter a confined space.

#### **3.3 The Permit System**

1. When a permit required confined space must be entered, a permit shall be completed by the Entry Supervisor and authorized by Environmental Health & Safety prior to entry into the confined space. This permit shall serve as certification that the space is safe for entry. The permit shall contain the date, the location of the space, and the signature of the person providing the certification and be prominently displayed at the confined space entrance.
2. A permit shall not be authorized until all conditions of the permit have been met. The permit to be used by UTHSC-H personnel can be found in Appendix A.

#### **3.4 Entry into any Confined Space**

All confined spaces, whether designated as permit confined spaces or not, present special hazards for entrants because of the difficulty entering or exiting the space. While the following entry procedures have been developed specifically for permit required confined spaces, they can be applied to non permit confined spaces as a method of evaluating whether any hazards have developed in the space since the last evaluation and of protecting workers who enter the space. While the level of detail required for permit required confined space entry may not be necessary or appropriate for non permit entry, following the steps listed below will provide an ideal hazard analysis for entry into non permit spaces.

#### **3.5 Planning the Entry**

The first steps towards conducting a safe confined-space entry are to plan the entry, allowing for the identification of all hazards and for the determination of all equipment necessary, to complete the project.

1. Gathering General Data
  - a. Identify the confined space. Give the location of the confined space and the confined space identification number as listed in appendix c. If no identification number has been created for this confined space, a new one will be created for the space.

- b. Give the reason for entering the confined space. Be specific. Also, identify if hot work will be done.
  - c. Identify the contents of the confined space. This refers to any chemicals or other materials and energy that are usually present in the confined space.
2. Identifying the Hazards
- NOTE: Atmospheric testing shall be conducted by an Environmental Health & Safety representative prior to entering permit-required confined spaces.**
- a. The EH&S Representative will determine the oxygen content and record this on the entry permit.
  - b. The EH&S Representative will determine flammable gas content and record this on the entry permit.
  - c. The EH&S Representative will determine levels of H<sub>2</sub>S and Carbon Monoxide and record this on the entry permit.
  - d. If a toxic substance is determined to be in the confined space during testing by the EH&S Representative, Environmental Health & Safety shall assist in obtaining a Material Safety Data Sheet or other chemical information to determine what type of personal protective equipment is required, the potential health effects, the Permissible Exposure Limits, and any other information needed to safely conduct the work.
  - e. The EH&S Representative and the Entry Supervisor will determine mechanical and physical hazards. They should list all items and energy that will require lockout/tagout, blanking and bleeding, disconnecting, or securing. Physical hazards should also be listed.
3. Ventilation of the Confined Space
- a. Indicate whether mechanical or natural ventilation will be used. Describe the procedures to be used.
- NOTE: If mechanical ventilation is to be used, the exhaust must be pointed away from personnel or ignition sources. Also, mechanical ventilators should be bonded to the confined space.**
4. Isolating the Confined Space
- a. Describe the procedures for disconnecting equipment or lockout and tagout. All mechanical, electrical, or heat-producing equipment should be disconnected or locked and tagged out. This would also include any pumps that pull fluid from, or pump fluid into, the confined space.
5. Purging/Cleaning the Confined Space
- a. Indicate if the confined space will be purged. Purging with inert gas is not recommended. If the space must be purged, describe the procedures.
  - b. Indicate the type of cleaning methods to be used. If chemical cleaners are to be used, name the type and describe the procedures. The MSDS for the chemical should be consulted prior to use.
- NOTE: When introducing a chemical into a confined space, the compatibility of that chemical with the contents of the confined space must be evaluated. If in doubt, consult Environmental Health & Safety.**
- NOTE: If steam is to be used, the hose should be bonded to the confined space.**
6. Placement of Warning Signs
- a. Indicate if warning signs or barriers will be needed to prevent unauthorized entry or to protect workers from external hazards. If the confined space will be left open and unattended for any length of time,

warning signs and barriers such as barricades and/or caution tape are required.

7. Identifying All Personnel
  - a. List all employees that will be required to prepare the confined space and complete the work inside the space.
  - b. List all employees who will be responsible for monitoring work from outside of the confined space (Attendants).
8. Identifying Necessary Equipment
  - a. List all equipment that will be necessary to complete the project, including equipment required for the task to be performed, for any required isolation of the space, for ventilating the space, for

### 3.6 Conducting Pre-Entry Training

Annually, Environmental Health & Safety will conduct Confined Space Entry training for all employees who may be involved in a confined space entry through the purview of their work. An additional event-specific training should be conducted no earlier than one day before entry is to be made. The Entry Supervisor is responsible for providing this training, but may seek the assistance of an EH&S Representative if assistance developing the content for the training is required.

The following outline should be used for the entry-specific training:

1. Identify the confined space and the reason(s) for entry.
2. Identify work detail
  - a. Assign each employee the job(s) he/she is to perform in the entry project (entrant, standby person, etc.).
  - b. If an employee is required to use a piece of equipment, be sure that he/she is capable of using the equipment properly.
  - c. Inform all personnel that no one is to enter the confined space unless the attendant is present at the work site.
3. Inform entrants of all known or suspected hazards
  - a. Inform personnel of any access or exit problems.
  - b. Inform personnel of all equipment that must be locked out or tagged out.
  - c. Inform personnel of the contents of the confined space.
  - d. Inform personnel of all atmospheric levels that must be maintained before entering and while working in the confined space.  
***If a toxic atmosphere or substance is present or could become present, the following additional training must be completed:***
  - e. If respiratory protection is not going to be used, inform personnel of the maximum permissible exposure level (PEL) that can exist within the confined space, and the method used to monitor PEL.
  - f. Inform personnel of the potential health effects of exposure to the toxic atmosphere or substance.
  - g. Inform personnel of the signs and symptoms of exposure to the toxic fume.
  - h. Inform personnel of the personal protective equipment (PPE) that they will be required to wear.
  - i. If entrants are unaware of the proper use of the PPE, they must be trained in the proper use of this equipment.
  - j. Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. A local physician shall determine what health and

physical conditions are pertinent, and a fit test shall be performed. The respirator user's medical status should be reviewed periodically (annually).

4. Identify isolation procedures
  - a. Inform the personnel responsible for the lockout/tagout of all equipment that must be isolated.
  - b. Inform the personnel responsible for performing this function of the methods to be used.
5. Identify purging and/or ventilation procedures, and inform all personnel responsible for performing this function of the methods to be used.
6. Identify all equipment needed
  - a. Inform personnel involved in the project of all equipment that will be necessary to complete the project, as identified earlier.
  - b. Make sure that all employees are capable of using their assigned equipment properly.
7. Determine necessary personal protective equipment
  - a. Inform personnel of all PPE that must be used to ensure their safety.
  - b. Make sure that all personnel required to use PPE are trained in the proper use of the equipment.
8. Establish communication
  - a. Inform all entrants that they are required to maintain communication with the attendant.
  - b. Inform attendant that he/she must maintain constant contact with all entrants.
  - c. Inform personnel of the type of communication they are to use.
9. Protect from external hazards
  - a. Inform personnel where signs and barriers will be placed to prevent unauthorized entry and protect entrants from external hazards.
  - b. Identify any hazards that are likely to arise based on conditions existing outside of the confined space so that attendants may be alert to their development.
10. Pre-plan rescue procedures
  - a. The designated attendant(s) should be informed of the rescue procedures to be followed. Rescue procedures to be used are listed in Item 10 of this section.
  - b. The attendant should be informed that he/she can have no other duty but to maintain contact with personnel inside the confined space.
  - c. Inform the attendant(s) that they must not enter the confined space under any circumstances.
11. Place the confined space back into service
  - a. Inform personnel of the steps to be taken to place the confined space back into service.

### 3.7 Preparing the Confined Space for Entry

Once the entry has been planned and personnel have been trained, the next step is to prepare the confined space for entry.

The following steps are to be followed when preparing the confined space for entry:

1. Place warning signs or barriers around the confined space to prevent unauthorized entry as necessary.
2. Place all tools, safety equipment, monitoring equipment, etc., near the confined space.
3. Isolate all mechanical and/or electrical hazards as necessary.

4. Purge/ventilate the confined space as necessary.
5. Test the atmosphere using an appropriate gas monitor.
  - a. If oxygen content is less than 19.5% or greater than 21.5%, perform additional ventilation. Then shut off ventilation equipment and re-test the oxygen content.
  - b. If oxygen content is between 19.5% and 21.5%, continue entry preparation.
6. Test for flammable gases.
  - a. If the meter reading is less than 10% of the lower explosive limit (LEL), continue entry preparations.
  - b. If the meter reading is above 10% of the LEL, continue ventilation of the confined space. Then shut off the ventilation and have the atmosphere re-tested.
  - c. If the meter reading is still above 10% of the LEL, the confined space must be cleaned before entry is permitted. If the confined space must be entered for cleaning purposes, the procedures outlined in Item 3.9 of this section must be followed.
7. Test for toxics
  - a. If a toxic atmosphere is present, no person should be permitted to enter the confined space at a level exceeding the Permissible Exposure Limit without proper Personal Protective Equipment. Environmental Health & Safety should be called to assist in identifying proper precautions and the protective measures to be taken.
8. Assemble all personnel involved and review rescue procedures. The EH&S Representative will then add any needed information, then complete and sign the permit.

### 3.8 Utilizing Safety Equipment

Where practical, and determined on a case-by-case basis, personnel entering a confined space should be equipped with a means of retrieval and/or other personal protective equipment as determined by the EH&S Representative.

### 3.9 Atmospheric Testing Procedures

1. All of the manufacturer's operating instructions must be followed.
2. The test equipment should be calibrated properly to insure its accuracy.
3. Ventilation equipment must be shut off before conducting any atmospheric tests.
4. The atmosphere must be tested at the bottom, top, and middle of all confined spaces.
5. The atmosphere must be continuously monitored while work is being conducted in the confined space.
6. If the confined space is left for any reason, the atmosphere must be re-tested before re-entering the space.

### 3.10 Confined Space Cleaning Procedures

If cleaning must be conducted in a confined space to achieve acceptable atmospheric conditions, the following procedures must be followed:

1. All entrants must be equipped with the safety equipment designated in Item 3.7.
2. All entrants must be equipped with an SCBA.
3. No spark-producing tools will be allowed for use.

### 3.11 Rescue Procedures

In the event of an emergency, the attendant should:

1. Immediately summon the emergency services by telephone. (Dial 911)
2. Attempt to remove the victim by use of the retrieval line from outside the confined space if this can be accomplished without creating further hazard for the entrant or the attendant.
3. If the attendant is able to remove the victim with the retrieval line, he/she should administer aid within the limits of his/her training until emergency medical services (EMS) arrive.
4. If the attendant is unable to remove the victim by using the retrieval line, he or she must wait for help to arrive. The attendant(s) is not to enter the confined space for any reason.
5. Give EMS personnel any information they request.

### 3.12 Non-Permit Entry to a Permit-Required Confined Space

Many of the confined spaces on campus present hazards that render the space permit-required because they present an IDLH (Immediately Dangerous to Life and Health) hazard that is not related to the air within the space. In this case, entry to the confined space **may** be allowed without a permit, provided that all the hazards within the space can be completely eliminated prior to entry. This does not apply to any space in which the hazards are related to atmospheric conditions, such as the Pump house at SRB/IMM.

In order to proceed with non-permit entry to a confined space, the following steps **must** be completed:

1. Check to see if the space is a permit required confined space by checking signage around the space and checking Appendix D, the confined space inventory for the space and the associated hazards.
2. Ensure all IDLH hazards within the space can be eliminate prior to entry, either by lockout/tag-out, blanking and blinding, or other mechanical means.
3. Eliminate hazards as above.
4. Ensure the task to be performed does not introduce any additional IDLH hazards to the space. Examples of such tasks include:
  - a. Any hot work, which introduce flammable gases and fire
  - b. Any toxic chemicals used to clean the space. While soap is okay, harsh abrasives are not.
5. Contact EH&S to test the Air Quality to ensure no atmospheric hazards are present within the space. If the Entry supervisor is capable of testing the air inside the confined space, EH&S will not be required to perform the testing.
6. Complete the Non-permit Confined Space Entry Notification Form in full.
7. Submit the form to EH&S
8. Proceed safely with work.

**NOTE: This process is not to be used when any atmospheric hazards are present in the space. When atmospheric hazards exist, a full permit must be completed and approved prior to work commencing.**

#### **4. PERSONNEL RESPONSIBILITIES AND TRAINING**

Each person involved in a confined-space entry project has certain responsibilities and requires training. It is very important that every individual is familiar with his/her responsibilities. This section outlines the responsibilities and training requirements of each individual involved in a project.

##### **4.1 Responsibilities of the EH&S Representative:**

The EH&S Representative or his/her designated representative shall be responsible for the following:

1. Reviewing and updating the UTHHealth Confined Space Entry Program to conform to current CFR standards.
2. Periodic survey of confined spaces around campus to ensure all confined spaces have been identified and labeled appropriately, and to ensure hazards associated with the confined spaces are understood.
3. Issuing of confined space permits for all UTHSC-H employee entries.
4. Ensuring compliance with the program by periodic inspection of entry sites and canceling permits where unsafe conditions are present.
5. Maintaining a list of confined spaces around the institution and periodic testing of air quality in the spaces.
6. Assisting Entry Supervisors with:
  - a. Providing training as set forth in the program
  - b. Identification of confined spaces
  - c. Identifying spaces that require a permit for entry
  - d. Labeling permit-required confined spaces
  - e. Monitoring permit-required confined spaces for air quality
  - f. Performing annual confined spaces training.

##### **4.2 Responsibilities of Entry Supervisors:**

Entry Supervisors shall be responsible for the following:

1. Identifying confined spaces within facilities or areas under their control, and ensuring that EH&S has been made aware of the spaces.
2. Identifying hazards within a confined space under their control and ensuring that EH&S has been made aware of the hazards.
3. Documenting that all training requirements for a specific confined space entry have been met by signing the pre-entry authorization space on the entry permit.
4. Ensuring that the required atmospheric tests are performed at the confined space and results recorded on the permit prior to entry authorization.
5. Obtaining and maintaining all equipment necessary to complete the confined-space entry project.
6. Authorize entry by signing the Entry Authorization space on the entry permit after all conditions for a safe entry have been met.
7. Terminating the entry and canceling the permit when:
  - a. Entry operations covered by the entry permit have been completed.
  - b. A condition that is not allowed under the entry permit arises in or near the permit space.
  - c. Determining, whenever confined space responsibility is transferred or when dictated by the hazards and operations performed within the space, that entry operations remain in compliance with terms of the permit and that acceptable entry conditions are maintained.

#### 4.3 Responsibilities and Training Requirements of Authorized Entrants

The person(s) authorized to enter a confined space shall be responsible for and receive training in the following:

1. The knowledge of hazards that may be faced during entry, including the signs or symptoms and consequences of the exposure.
2. Proper use of equipment, which includes:
  - a. Ventilating equipment needed to maintain acceptable entry conditions.
  - b. Communication equipment necessary to maintain contact with the attendant.
  - c. Personal protective equipment as needed.
  - d. Lighting equipment as needed.
  - e. Barriers and shields as needed.
  - f. Equipment, such as ladders, needed for safe ingress and egress.
  - g. Rescue and emergency equipment as needed.
  - h. Any other equipment necessary for safe entry into and rescue from permit spaces.
3. Communication with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space if required.
4. Alert the attendant whenever:
  - a. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
  - b. The entrant detects a prohibited condition.
5. Exiting the permit space as quickly as possible whenever:
  - a. An order to evacuate has been given by the attendant or the Entry Supervisor, or the EH&S Representative.
  - b. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
  - c. The entrant detects a prohibited condition.
  - d. An evacuation alarm is activated.

#### 4.4 Responsibilities and Training Requirements of Attendants

Persons authorized to perform duties as attendant shall be responsible for and receive training in the following:

1. Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.
2. Awareness of possible behavioral effects of hazard exposure in authorized entrants.
3. Continuously maintaining an accurate count of authorized entrants in the permit space and ensuring that the means used to identify authorized entrants accurately identifies who is in the permit space.
4. Remains outside the permit space during entry operations until relieved by another attendant.
5. Attempting **non-entry** rescue if proper equipment is in place and the rescue attempt will not present further hazards to the entrant or attendant.
6. Communicating with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space when conditions warrant.

7. Monitoring activities inside and outside the space to determine if it is safe for entrants to remain in the space and ordering the authorized entrants to evacuate the permit space immediately under any of the following conditions:
  - a. If the attendant detects a prohibited condition.
  - b. If the attendant detects the behavioral effects of hazard exposure in an authorized entrant.
  - c. If the attendant detects a situation outside the space that could endanger the authorized entrants.
  - d. If the attendant cannot effectively and safely perform all the duties required by this program.
8. Summoning rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
9. Taking the following actions when unauthorized persons approach or enter a permit space while entry is underway:
  - a. Warning the unauthorized persons that they must stay away from the permit space.
  - b. Advising the unauthorized persons that they must exit immediately if they have entered the permit space.
  - c. Informing the authorized entrants and the Entry Supervisor if unauthorized persons have entered the permit space.
10. Performing no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

## **5. SPECIAL CONSIDERATIONS FOR CONTRACTORS**

Any person who is not an employee at UTHSC-H but has been contracted to perform work on the campus of the institution must have a confined space program that complies with all pertinent OSHA regulations, including those related to Confined Spaces (29 CFR 1910.146).

Any contractor who will be performing work in confined spaces at the Institution is expected to have a thorough Confined Space Program, including, but not limited to:

1. Confined Space Identification,
2. Hazard Identification within confined spaces,
3. Training,
4. Supplying Personal Protective Equipment,
5. Permit Issuance, and
6. Identification of Personnel Responsibilities.

Any entry into a confined space by any contractor on the campus of the institution is required to be reported to EH&S, project manager and building maintenance leader. This is to ensure that the contracting company coordinates the entry with other staff who will work in the area to ensure that no work creates any additional hazards for entrants. This requirement may be waived if the permit controlled confined space is part of a construction site that is under the sole control of the contracting company rather than the building staff.

When the confined space work is being performed on a construction site that is under the primary control of a contracting company, the workers are expected to adhere to any programs developed by the company.

EH&S will assist contractors with determining confined spaces on campus, but the ultimate responsibility for the safety of the entrants is with the contracting company.

EH&S reserves the right to prevent any entry into a confined space, to stop work and evacuate any confined space that is being performed by a contractor if EH&S is not satisfied either the safety of the entrants or safety of the employees of the Institution are not being sufficiently protected.

## 6. LIST OF KEY TERMS

**Attendant** - A person designated by the project representative to remain outside the confined space and to be in constant communication with the personnel working inside the confined space.

**Authorized Entrant** - A person who is approved or assigned by the project representative to perform work within a confined space.

**Blanking or Blinding** – The absolute closure of a pipe, line or duct by the fastening of a solid plate that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line or duct with no leakage beyond the plate.

**Bonding** - The joining of two or more items with an electrical conductor so that all ends joined have the same electrical charge or potential.

**Combustible Gas** – The airborne concentration of gas or vapor that presents the risk of fire or explosion if an ignition source of sufficient energy is introduced. This term also applies to all flammable vapor and explosive gases.

**Confined Space** – A space that by design:

1. Is large enough and so configured that an employee can bodily enter and perform assigned tasks.
2. Has limited or restricted means of entry or exit.
3. Is not designed for continuous human occupancy.

**Double Block and Bleed** – The closure of a line, duct or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two valves.

**Engulfment** – The surrounding and effective capture of a person by a liquid or finely divided floodable solid substance that can cause asphyxiation, 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 includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

**Entry Permit** - The written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in this program.

**Entry Supervisor** – Individual responsible for the work to be done in the confined space, and therefore responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this program.

**Note:** An *Entry Supervisor* also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this program for each role he or

she fills. Also, the duties of Entry Supervisor may be passed from one individual to another during the course of an entry operation.

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

- Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit (LFL).
- Airborne combustible dust at a concentration that meets or exceeds its LFL. This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less.
- Atmospheric oxygen concentration below 19.5% or above 23.5%.
- Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of 29 CFR 1910 and that could result in employee exposure in excess of its dose or permissible exposure limit. (*SEE NOTE BELOW*)

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

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

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

**Hazardous Entry** – Form of entry into a permit required confined space which presents the risk of engulfment or has an unknown or unacceptable air quality.

**Hazardous Substance(s)** – A substance or mixture of substances which may cause death, injury or illness.

**Hot Work** - Any operation that provides a source of ignition for any flammable, combustible or explosive gas within the confined space. Examples include, but are not limited to, cutting, splicing, welding, torch soldering, and brazing. See Hot Works Guidance Document.

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

**Immediately Dangerous to Life or Health** - An atmosphere that poses an immediate threat of loss of life: may result in irreversible or immediate severe health effects; may result in eye damage/irritation; or other condition that could impair escape from a confined space.

**Lower Explosive Limit (LEL)** - The minimum concentration of a combustible gas or vapor in air that will ignite if an ignition source is introduced.

**Non-Permit Required Confined Space** - (see page 2)

**Oxygen-Deficient Atmosphere** - An atmosphere that contains an oxygen concentration of less than 19.5% by volume.

**Oxygen-Enriched Atmosphere** - An atmosphere that contains an oxygen concentration greater than 22% by volume.

**Permit Required Entry Briefing** – A conference held between employees and the Project Representative prior to allowing employees to enter a permit required confined space.

**PPE - Personal Protective Equipment:** Any devices or clothing worn by the worker to protect against hazards in the environment. Examples are respirators, gloves, and chemical splash goggles.

**PEL - Permissible Exposure Level:** - Concentration of a substance to which an individual may be exposed repeatedly without adverse effect.

**Permit Required Confined Space** - (see page 2)

**Purging** - The removal of gases or vapors from a confined space by the process of displacement.

**Rescue Procedures** - A predetermined written set of actions that are to be taken when a rescue is necessary.

**Rescue Summoning** – A predetermined written set of actions that are to be taken when rescue personnel are needed to perform a rescue.

**Work-induced hazard** – A hazard created due to the nature of work, such as welding or painting that would create adverse conditions, such as fumes or gas.

## 7. REFERENCES

ANSI/ASSE z117.1-2003 – American National Standard: *Safety Requirements for Confined Spaces*.

National Safety Council Data Sheet 1-704-85 - *Confined Space Entry Control System for R&D Operations*, National Safety News.

N.I.O.S.H. Training and Resource Manual - *Safety and Health in Confined Workspaces for the Construction Industry*.

N.I.O.S.H. 87-113 - *A Guide to Safety in Confined Spaces*.

Title 29 of the Code of Federal Regulations Part 1910.146 - *Permit-Required Confined Spaces*. U.S. Government Printing Office.

Title 29 of the Code of Federal Regulations Part 1926.652 - *Requirements for Protective Systems*.

Title 29 of the Code of Federal Regulations Part 1910.150 - *The Control of Hazardous Energy*.

Title 29 of the Code of Federal Regulations Part 1910.134 - *Respiratory Protection*.

## **ANNEX A. CONFINED SPACE PERMIT**

The following form is required to be completed prior to confined space entry, submitted to EH&S for approval, and posted at the job site while work is being performed.

If the permit is not approved by EH&S, further safety precautions are required before work can be commenced.

**CALL 911 IMMEDIATELY IN THE EVENT OF AN EMERGENCY**



### CONFINED SPACE ENTRY PERMIT

Permit Number: \_\_\_\_\_ Date: \_\_\_\_\_

Confined Space ID# & Location: \_\_\_\_\_  
Description of Confined Space: \_\_\_\_\_  
Purpose of Entry: \_\_\_\_\_

Scheduled Start: \_\_\_\_\_ (Day / Date / Time)      Expected Finish: \_\_\_\_\_ (Day / Date / Time)

UT Entry Supervisor: \_\_\_\_\_ Phone: \_\_\_\_\_

Entrant(s): \_\_\_\_\_  
Attendant(s): \_\_\_\_\_

Work to be performed: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Pre-Entry Authorization:** I certify that all entrants and attendants have been properly trained on the hazards inherent in all confined spaces and specifically presented in the case of this entry: **Signature of Entry Supervisor:** \_\_\_\_\_

**Safety Precautions:**

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Barricade Job Area       | <input type="checkbox"/> Signs Posted                 | <input type="checkbox"/> Ventilation                        |
| <input type="checkbox"/> Lighting                 | <input type="checkbox"/> Lockout/Tagout               | <input type="checkbox"/> Blocking/Blinding                  |
| <input type="checkbox"/> Bonding of equipment     | <input type="checkbox"/> Lifeline & Full Body Harness | <input type="checkbox"/> Respirators                        |
| <input type="checkbox"/> Fire Extinguishers       | <input type="checkbox"/> Fire-Retardant Clothing      | <input type="checkbox"/> Self Contained Breathing Apparatus |
| <input type="checkbox"/> Ground Fault Interrupter | <input type="checkbox"/> Purging                      |   |
| <input type="checkbox"/> Other _____              |   |   |

**Communication system to be used between attendant and entrant:** \_\_\_\_\_

**Allowable Environmental Conditions:** % Oxygen: 19.5% - 23.5%; % LEL: No more than 10%; H<sub>2</sub>S: 2 ppm; CO: 35 ppm; Other: Any toxics that may exist in or be introduced to the confined space must be tested for and be present at levels lower than OSHA PEL's.

**Environmental Conditions at time of entry:**      Time of Test: \_\_\_\_\_ % Oxygen: \_\_\_\_\_  
% LEL: \_\_\_\_\_ % H<sub>2</sub>S: \_\_\_\_\_ % CO: \_\_\_\_\_ Other: \_\_\_\_\_

**Environmental Conditions retest:**      Time of Test: \_\_\_\_\_ % Oxygen: \_\_\_\_\_  
% LEL: \_\_\_\_\_ % H<sub>2</sub>S: \_\_\_\_\_ % CO: \_\_\_\_\_ Other: \_\_\_\_\_

Instrument(s) Used: \_\_\_\_\_ Employee conducting Test: \_\_\_\_\_

<p><b>Entry Authorization:</b> All actions and/or conditions required for safe entry and work into the designated confined space have been performed to my satisfaction. Signature: _____ Name: _____ Date: _____</p>
<p><b>Entry Completion:</b> Entry has been completed and all entrants have exited permit space. All equipment has been removed from the space and all equipment has been returned to service. Signature: _____ Name: _____ Date: _____</p>
<p><b>Permit Cancellation:</b> Satisfactory completion of all actions and or conditions required for safe entry has <b>NOT</b> been completed. Work is not allowed to begin or is being stopped to prevent injury and illness to workers. Signature: _____ Name: _____ Date: _____</p>

## **ANNEX B. NON-PERMIT CONFINED SPACE ENTRY NOTIFICATION FORM**

The following form must be used to notify EH&S of any entry into a permit required confined space, if and only if ALL hazards that make the space Permit Required have been eliminated by engineering controls prior to entry.

For example, consider the situation of entry into a tank that is considered permit required because of the possibility of engulfment by water while inside the tank. The following steps may be taken to use Non-Permit Entry to the tank, provided no additional atmospheric hazards will be introduced by the work to be performed in the space:

1. Drain the tank of all water.
2. Close the valves on all pipes leading directly to the tank, and follow lockout /tag-out procedure to ensure valves remain closed throughout entry.
3. Barricade entrance so no accidental unauthorized entry occurs.
4. Test Air Quality to ensure air in the tank does not present a hazard to the entrant.
5. Notify EH&S prior to tank entry with the following form.

**NOTE:** This option is not allowed for any space that contains or has the possibility to contain a hazardous atmosphere, either because of the nature of the confined space or the nature of the work to be done. Air in the confined space must be tested prior to entry to ensure that no atmospheric hazards are present in the space.



## NON-PERMIT CONFINED SPACE ENTRY NOTIFICATION FORM

Date: \_\_\_\_\_

Confined Space ID# & Location: \_\_\_\_\_

Description of Confined Space: \_\_\_\_\_

Purpose of Entry: \_\_\_\_\_

Scheduled Start: \_\_\_\_\_ (Day / Date / Time)

Expected Finish: \_\_\_\_\_ (Day / Date / Time)

UT Entry Supervisor: \_\_\_\_\_ Phone: \_\_\_\_\_

Entrant(s): \_\_\_\_\_

Work to be performed: \_\_\_\_\_

**Allowable Environmental Conditions:** % Oxygen: 19.5% - 23.5%; % LEL: No more than 10%; H<sub>2</sub>S: 2 ppm; CO: 35 ppm; Other: Any toxics that may exist in or be introduced to the confined space must be tested for and be present at levels lower than OSHA PEL's.

**Environmental Conditions at time of entry:** Time of Test: \_\_\_\_\_ % Oxygen: \_\_\_\_\_

% LEL: \_\_\_\_\_ % H<sub>2</sub>S: \_\_\_\_\_ % CO: \_\_\_\_\_ Other: \_\_\_\_\_

Instrument(s) Used: \_\_\_\_\_ Employee conducting Test: \_\_\_\_\_

**Hazards associated with the tank (as listed in Appendix D of Confined Space program, or as noted by Entry Supervisor):** \_\_\_\_\_

**NOTE: IF A HAZARDOUS ATMOSPHERE EXISTS IN THE TANK, NON-PERMIT ENTRY IS NOT ALLOWED**

**Additional hazards associated with the task to be performed in the confined space:** \_\_\_\_\_

**NOTE: IF HAZARDOUS CHEMICALS, FLAMMABLE GASES, OR OTHERWISE TOXIC SUBSTANCES ARE BEING INTRODUCED TO THE SPACE, NON-PERMIT ENTRY IS NOT ALLOWED**

**Methods used to eliminate ALL above hazards:** \_\_\_\_\_

**Pre-Entry Authorization:** I certify that all the above methods are in place and will remain in place for the duration of the entry into the confined space AND that a hazardous atmosphere is not present in the confined space, nor is it likely to develop as a result of the work to be done. **Signature of Entry Supervisor:** \_\_\_\_\_

**CALL 911 IMMEDIATELY IN THE EVENT OF AN EMERGENCY**

**NOTE: THIS FORM MUST BE SUBMITTED TO EH&S PRIOR TO ENTRY**

**CALL 911 IMMEDIATELY IN THE EVENT OF AN EMERGENCY**

# ANNEX C. CONFINED SPACE ENTRY PLANNING WORKSHEET

What is the type of the confined space? \_\_\_\_\_

Where is the confined space located? \_\_\_\_\_

Reason for entering the confined space: \_\_\_\_\_

Contents of the confined space: \_\_\_\_\_

List oxygen level \_\_\_\_\_

Describe the procedures used to test oxygen and the testing equipment used: \_\_\_\_\_

List flammable gas level \_\_\_\_\_

Describe the procedures used to test flammable gas level and the testing equipment used: \_\_\_\_\_

List toxic gas levels \_\_\_\_\_

Describe the procedures used to test toxic gas levels and the testing equipment used: \_\_\_\_\_

List all mechanical and physical hazards: \_\_\_\_\_

Describe the procedures for isolating all mechanical and physical hazards: \_\_\_\_\_

What type of ventilation will be used?  Mechanical  Natural

Describe procedures: \_\_\_\_\_

Will the confined space be purged? \_\_\_\_\_

If yes, list the procedures: \_\_\_\_\_

Will confined space be cleaned? \_\_\_\_\_

If yes, list procedures: \_\_\_\_\_

List all chemicals that will be used: \_\_\_\_\_

Will warning signs or barriers be needed? \_\_\_\_\_

If yes, describe what type and where they must be placed: \_\_\_\_\_

List the names and job assignments for every individual who will be involved in the entry.

Name	Job Assignment
_____	_____
_____	_____

List all equipment that will be needed.

Type of Equipment	Quantity
_____	_____
_____	_____

## ANNEX D. CONFINED SPACE INVENTORY

The following is an accounting of the confined spaces throughout the Institution. The list is maintained and updated periodically by EH&S. The list will be updated immediately when new confined spaces are brought to the attention of the EH&S department. A listing and description of confined spaces is below, and a map of the spaces is included in Annex C.

No.	Permit Required?	Location	Description, including hazards identified & permit reasoning
AUX1	No	Attic Crawl Spaces at SFA	<p>Each building of the Student Faculty Apartments has attic access through the upper level apartments. Access is through the ceiling in the walk in closet in one of the upper level apartments at each end of the building. The spaces are relatively well ventilated, with large louvers at either end of the building and vents under the roof overhang. However, the spaces are not well insulated or air conditioned, and can be extremely hot when they bake in the sun throughout the summer.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Ventilation: The space is relatively well ventilated because of the large louvers at either end of the building as well as the vents under the roof overhang. However, air exchange in the space is limited, and caution should be taken to ensure air quality is maintained throughout the time the space is occupied, particularly if the space will be occupied for a long period.</li> <li>2. The air quality in the space was tested and was generally good, though VOC's were above the recommended levels. The air in the space was tested while the apartment below was being prepared for a new occupant to move in and had been freshly painted. As fresh paint and carpet can release VOC's, the work being done in the apartment may explain the high VOC levels in the attic space. Until further testing can be done to ensure the VOC levels can be explained by the refurbishing work, Exposure to the air in the space should be limited.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. High temperatures that increase the risk of heat stroke are the primary hazard. Temperatures in the space can be much higher than the air outdoors, and are impossible to control. Workers should be sure to hydrate properly before and during entry, and should review the signs and symptoms of heat stress prior to entry when outdoor temperatures are predicted to be above 80 degrees. Workers should limit time spent in the attic crawl spaces under the same conditions, saving extensive and time consuming projects in the crawl spaces for cooler times of day and cooler times of the year.</li> </ol>
AUX2	Yes	Fire Water Break Tank	<p>Large maroon cylindrical water tank used to store water that supplies the sprinkler system in New Student Housing. The tank is in the Fire Pump room at New Student Housing, in building 9, which is at the north end of the garage. The tank is at the west end of a room accessed through a set of double doors at ground level from the garage side of the building. A key is required for entry to the space, and can be attained from the staff in the leasing office. Access to the tank is through a hatch on top of the tank at the southwest end of the tank. A ladder is required to reach the top of the tank.</p> <p>Air Quality:</p>

			<ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>2. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</li> </ol>
AUX 3	Yes	Fire Water Tank	<p>Large cylindrical water tank used to store water that supplies the sprinkler system in Phase III Student Housing. The tank is in the Fire Pump room at Phase III student housing, in parking garage, which is in the center of the garage. The tank is at the west end of a room accessed through a set of double doors at ground level. A key is required for entry to the space, and can be attained from the staff in the leasing office. Access to the tank is through a hatch on top of the tank at the southwest end of the tank. A ladder is required to reach the top of the tank.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>2. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</li> </ol>
BBS 1	Yes	Sump pump pit Missing sign	<p>Location: Stairwell 1 Tunnel Level underneath stairs.</p> <p>Air Quality: test atmosphere before entering</p> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Metal hatch can close abruptly if not tied off</li> <li>2. Pit is 9 feet deep</li> <li>3. Flooding can occur unexpectedly</li> </ol>

			<ul style="list-style-type: none"> <li>4. Drowning</li> <li>5. Individuals can fall in to pit</li> <li>6. Access pit by climbing over metal barricade</li> </ul> <p>Rescue equipment should be worn as a precautionary measure.</p>
HCPC1	Yes	FDC valve in manhole <b>Missing sign</b>	<p>FDC valve is located in an underground sewer drain that is in the front of the HCPC building. Air Quality:</p> <ul style="list-style-type: none"> <li>1. Sewer has been tested without any signs or lack of oxygen.</li> </ul> <p>Physical Hazards:</p> <ul style="list-style-type: none"> <li>1. Fall to a lower level. 10ft drop. Any entrant will require a tripod stand for protective equipment</li> </ul>
HCPC2	Yes	FDC valve in manhole	<p>FDC valve is located in an underground sewer drain that is in the of the HCPC Hospital Wide building. Air Quality:</p> <ul style="list-style-type: none"> <li>1. Sewer has been tested without any signs or lack of oxygen.</li> </ul> <p>Physical Hazards:</p> <ul style="list-style-type: none"> <li>1. Fall to a lower level. 10ft drop. Any entrant will require a tripod stand for protective equipment</li> </ul>
HCPC3	Yes	Boiler #1	<p>Location: Boiler Room inside of Mechanical Room 1-A74</p> <p>Air Quality:</p> <ul style="list-style-type: none"> <li>1. Air sampling must be conducted prior to entrance.</li> </ul> <p>Physical Hazards:</p> <ul style="list-style-type: none"> <li>1. LOTO shall be performed prior to entrance</li> <li>2. Heat exhaustion</li> <li>3. Entrapment</li> </ul>
HCPC4	Yes	Boiler #2	<p>Location: Boiler Room inside of Mechanical Room 1-A74</p> <p>Air Quality:</p> <ul style="list-style-type: none"> <li>1. Air sampling must be conducted prior to entrance.</li> </ul> <p>Physical Hazards:</p> <ul style="list-style-type: none"> <li>1. LOTO shall be performed prior to entrance</li> <li>2. Heat exhaustion</li> <li>3. Entrapment</li> </ul>
HCPC5	Yes	Water Heater #1	<p>Location: Boiler Room inside of Mechanical Room 1-A74</p> <p>Air Quality:</p> <ul style="list-style-type: none"> <li>1. Air sampling must be conducted prior to entrance.</li> </ul> <p>Physical Hazards:</p> <ul style="list-style-type: none"> <li>1. LOTO shall be performed prior to entrance</li> <li>2. Fall, slips, trips</li> <li>3. Lacerations, contusions</li> </ul>
HCPC6	Yes	Water Heater #2	<p>Location: Boiler Room inside of Mechanical Room 1-A74</p> <p>Air Quality:</p> <ul style="list-style-type: none"> <li>1. Air sampling must be conducted prior to entrance.</li> </ul> <p>Physical Hazards:</p> <ul style="list-style-type: none"> <li>1. LOTO shall be performed prior to entrance</li> <li>2. Fall, slips, trips</li> </ul>

			3. Lacerations, contusions
HCPC7	Yes	Water Heater #3	Location: Boiler Room inside of Mechanical Room 1-A74 Air Quality: 1. Air sampling must be conducted prior to entrance. Physical Hazards: 1. LOTO shall be performed prior to entrance 2. Fall, slips, trips 3. Lacerations, contusions
HCPC8	Yes	Water Heater #4	Location: Boiler Room inside of Mechanical Room 1-A74 Air Quality: 1. Air sampling must be conducted prior to entrance. Physical Hazards: 1. LOTO shall be performed prior to entrance 2. Fall, slips, trips 3. Lacerations, contusions
HCPC9	Yes	Cooling Tower #1	The confined space is accessed by a fixed ladder and is entered by removing a 3'x3' hatch atop of the ladder. The confined space is entered in order to gain access to the cooling tower fans. Location: Loading Dock Air Quality: 1. Air quality was not tested Physical Hazards: 1. The cooling tower must be locked out tagged out to prevent the fans from engaging while someone is working in the confined space. 2. Fall protection should be used because a worker will be exposed to a lower surface that is more than 4 feet below.
HCPC10	No	Cooling Tower #2	The confined space is accessed by a fixed ladder and is entered by removing a 3'x3' hatch atop of the ladder. The confined space is entered in order to gain access to the cooling tower fans. Location: Loading Dock Air Quality: 1. Air quality was not tested Physical Hazards: 1. The cooling tower must be locked out tagged out to prevent the fans from engaging while someone is working in the confined space. 2. Fall protection should be used because a worker will be exposed to a lower surface that is more than 4 feet below.
HCPC11	Yes	Fire/Domestic Water Break Tank	The cylindrical white break tank is used for domestic and fire water. The tank holds 4,700 gallons of water. A fixed ladder is used to gain access to the 2'x3' metal hatch atop the break tank. Location: Mechanical Room 1-A74 Air Quality:

			<ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>2. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</li> </ol>
HCPC 12	Yes	Manhole Missing sign	<p>Location: near cooling towers</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. The air quality was not sampled in the confined space.</li> <li>2. Air sampling must be conducted prior to entrance. Ventilation shall be supplied whether natural or mechanical due to the possibility of insufficient air quality.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Fall to a lower level, slip, trip, hazardous atmosphere; Area shall be barricaded. Warning signs shall be placed around work area.</li> </ol>
HCPC 13	Yes	Manhole Missing sign	<p>Location: Loading dock entrance by gates</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. The air quality was not sampled in the confined space.</li> <li>2. Air sampling must be conducted prior to entrance. Ventilation shall be supplied whether natural or mechanical due to the possibility of insufficient air quality.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Fall to a lower level, slip, trip, hazardous atmosphere; Area shall be barricaded. Warning signs shall be placed around work area.</li> </ol>
HCPC 14	Yes	Manhole Missing sign	<p>Location: behind Unit B</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. The air quality was not sampled in the confined space.</li> <li>2. Air sampling must be conducted prior to entrance. Ventilation shall be supplied whether natural or mechanical due to the possibility of insufficient air quality.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Fall to a lower level, slip, trip, hazardous atmosphere; Area shall be barricaded. Warning signs shall be placed around work area.</li> </ol>

HCPC 15	Yes	Manhole Missing sign	Location: behind Unit C Air Quality: <ol style="list-style-type: none"> <li>1. The air quality was not sampled in the confined space.</li> <li>2. Air sampling must be conducted prior to entrance. Ventilation shall be supplied whether natural or mechanical due to the possibility of insufficient air quality.</li> </ol> Physical Hazards: <ol style="list-style-type: none"> <li>1. Fall to a lower level, slip, trip, hazardous atmosphere; Area shall be barricaded. Warning signs shall be placed around work area.</li> </ol>
HCPC	YES	4 Grease trap manholes	Location: Loading dock outside of mechanical room
HCPC 16	Yes	Manhole	Location: Near walking track behind Hospital Wide (southwest of cooling towers) Air Quality: <ol style="list-style-type: none"> <li>1. The air quality was not sampled in the confined space.</li> <li>2. Air sampling must be conducted prior to entrance. Ventilation shall be supplied whether natural or mechanical due to the possibility of insufficient air quality.</li> </ol> Physical Hazards: <ol style="list-style-type: none"> <li>1. Fall to a lower level, slip, trip, hazardous atmosphere;</li> <li>2. Area shall be barricaded.</li> <li>3. Warning signs shall be placed around work area.</li> </ol>
MSB1	Yes	Sump Pit in MSB Loading Dock Stencil missing sign	Open air pit, approximately 15 feet deep, covered with a large metal grate with a large metal access door. An access ladder enables descent into the pit. The pit contains a sump pump to remove water from inside the berm and check valves to control the water flow and associated piping. The metal access hatch to the space is normally bolted down to prevent unauthorized access. Air Quality: <ol style="list-style-type: none"> <li>1. Ventilation: Space has adequate natural ventilation as the large space is covered with open grating which allows adequate air flow. Air quality was tested and was the same as natural air.</li> <li>2. Exhaust fumes from idling heavy machinery could settle in the space.</li> </ol> Physical Hazards: <ol style="list-style-type: none"> <li>1. Heavy traffic in the loading dock presents a struck-by hazard to people entering or exiting the space and should be controlled and monitored prior to entry.</li> <li>2. Water will accumulate in the space due to the nature of the space. Water should be drained prior to entry. Weather should be checked to ensure water level will not rise suddenly due to flash flooding.</li> </ol>
MSB2	Yes	Sump Pit outside Cyclotron	Open air pit, approximately 15 feet deep, covered with a large metal grate with a large metal access door. An access ladder enables descent into the pit. The pit contains a sump pump to remove water from inside the berm and check valves to control the water flow and associated piping. The metal access hatch to the space is normally bolted down to prevent unauthorized access. Air Quality:

			<p>1. Ventilation: Space has adequate natural ventilation as the large space is covered with open grating which allows adequate air flow. Air quality was tested and was the same as natural air.</p> <p>Physical Hazards:</p> <p>1. Water will accumulate in the space due to the nature of the space. Water should be drained prior to entry. Weather should be checked to ensure water level will not rise suddenly due to flash flooding.</p>
MSB3	Yes.	Sump Pit in vault off the North Mechanical Room (B.2M2)	<p>Narrow pit, approximately 5 feet deep, covered with a metal plate with a small access hatch. Descent into the pit should not be necessary as the pump can be lifted into the space for any maintenance work. The pit contains a sump pump to remove water from inside the berm. Check valves to control the water flow and associated piping are not in the sump pit, but in the large, well ventilated space under Ross Sterling that is easily accessed through a standard door off the west side of the North Mechanical Room. The pit is considered permit required if a person is going to enter the narrow pit. The vault space that provides access to the pit is not a confined space.</p> <p>Air Quality:</p> <p>1. Vault Ventilation: The vault space has adequate natural ventilation due to the open air grate that serves as a roof of the space. Air quality was tested and was the same as natural air. Because this space sits below Ross Sterling, attention should be paid to traffic on the road above to ensure high levels of exhaust do not accumulate.</p> <p>2. Pit Ventilation: The pit that contains the pump was tested for air quality and the Oxygen, Particulates, and CO levels were normal.</p> <p>Physical Hazards:</p> <p>1. Water will accumulate in the space due to the nature of the space. Water should be drained prior to entry.</p>
MSB4	Yes	Sump Pit outside MSB at NE stairwell	<p>Open air pit, approximately 15 feet deep, covered with a large metal grate with a large metal access door. An access ladder enables descent into the pit. The pit contains a sump pump to remove water from inside the berm and check valves to control the water flow and associated piping.</p> <p>Air Quality:</p> <p>1. Ventilation: Space has adequate natural ventilation as the large space is covered with open grating which allows adequate air flow. Air quality was tested and was the same as natural air.</p> <p>Physical Hazards:</p> <p>1. Water will accumulate in the space due to the nature of the space. Water should be drained prior to entry. Weather should be checked to ensure water level will not rise suddenly due to flash flooding.</p>
MSB5	Yes	Sump Pit outside MSB, just north of stairwell E Missing signage, location is outside near Starbucks/French corner	<p>Open air pit, approximately 15 feet deep, covered with a large metal grate with a large metal access door. An access ladder enables descent into the pit. The pit contains a sump pump to remove water from inside the berm and check valves to control the water flow and associated piping. The metal access hatch to the space is normally bolted down to prevent unauthorized access.</p> <p>Air Quality:</p> <p>1. Ventilation: Space has adequate natural ventilation as the large space is covered with open grating which allows adequate air flow. Air quality was tested and was the same as natural air.</p> <p>Physical Hazards:</p> <p>1. Water will accumulate in the space due to the nature of the space. Water should be drained prior to entry. Weather should be checked to ensure water level will not rise suddenly due to flash flooding.</p>

MSB6	Yes	Sump Pit outside MSB at SE stairwell Add zip ties	<p>Open air pit, approximately 15 feet deep, covered with a large metal grate with a large metal access door. An access ladder enables descent into the pit. The pit contains a sump pump to remove water from inside the berm and check valves to control the water flow and associated piping. The metal access hatch to the space is normally bolted down to prevent unauthorized access.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Ventilation: Space has adequate natural ventilation as the large space is covered with open grating which allows adequate air flow. Air quality was tested and was the same as natural air.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Water will accumulate in the space due to the nature of the space. Water should be drained prior to entry. Weather should be checked to ensure water level will not rise suddenly due to flash flooding.</li> </ol>
MSB7	Yes	Fire Water Break Tank in North Mechanical Room (B.2M2)	<p>Large maroon box-shaped water tank used to store water that supplies the sprinkler system. The tank is toward the Northwest of the entrance once inside the north mechanical room (B.2M2). Access to the tank is through a hatch on top of the tank at the northwest end of the tank. A ladder on the west end of the tank that provides access to the top of the tank, the access hatch is at the top of the ladder.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>3. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>4. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>3. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>4. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</li> </ol>
MSB8	Yes	Domestic Water Break Tank in North mechanical Room.	<p>A large white cylindrical water tank used to store water that supplies the general water supply in the building. The tank is located against the south wall of the north mechanical room, towards the west side of the room. Access to the tank is through one of two access hatches, one at the top of the tank, one near the base of the tank. The hatches are bolted shut when the tank is in use.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Both hatches should be opened prior to entry to maximize air circulation while the tank is occupied. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol>

			<p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>2. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</li> </ol>
MSB9	No	HVAC Units	<p>Numerous HVAC units are located throughout the building in the basement and the penthouse. Locations include the following:</p> <ol style="list-style-type: none"> <li>1. North Mechanical Room, Northwest end of room</li> <li>2. Penthouse</li> </ol> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Air quality in the basement HVAC unit was tested and the air quality was good.</li> <li>2. Ventilation: Ventilation is not likely to be a concern as the air handlers are designed to aid in air flow.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Unguarded rotating machinery inside the units is a concern. All Air handlers should be locked out and tagged out prior to entry.</li> </ol>
MSB10	No	Space located under Stairwell B landing	<p>There is a narrow opening in the cinder block wall on the west wall of North Mechanical room behind some fire water piping. There is no machinery or equipment in the space.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Ventilation: Space is not well ventilated as there is only one opening to the main mechanical room space. However, air quality was tested just inside the entrance and the quality of the air was good. Any introduction of harsh chemicals to the space would necessitate the use of ventilation and air monitoring.</li> <li>2. Air quality in the space should be tested prior to entry to ensure storage of materials in the space has not negatively impacted air quality.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. There are slip and trip hazards due to debris that has piled up on the floor. The area should be tidied to create a clear walkway and to allow easy access and egress to and from the area prior to beginning any work.</li> </ol>
MSB11	No	Valve Pit under Ross Sterling	<p>There is a door off the west wall of North Mechanical room that leads to a narrow shaft containing steam pipes and a steam valve. There is no other machinery or equipment in the space. The space, as currently configured, is not a confined space as entry to the space is in no way constricted.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Ventilation: the space is well ventilated, with grating open to the outside air above the space and open to the mechanical room. Air Quality was tested and was good.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. None.</li> </ol>
MSE1	Yes	MSE Subfloor accessed through hatch in R1M05	<p>Mechanical space under the whole MSE building. Access is through a hatch at the northwest corner of the room near the door to R1M06. Entry to the space is via fixed ladder inside the hatch. The hatch is barricaded by caution barricades to prevent accidental entry. Despite the enormity of the space, the hatch in R1M05 is the only viable entry or exit from the space.</p>

			<p><b>Air Quality:</b></p> <ol style="list-style-type: none"> <li>1. Ventilation: Air Quality inside the space was tested and was good. The size of the space works to the advantage of entrants, as the quantity of air in the space makes the composition of the air comparatively difficult to alter. Caution should still be used when bringing harsh or dangerous chemicals into the space.</li> </ol> <p><b>Physical Hazards:</b></p> <ol style="list-style-type: none"> <li>1. Entry and Exit into the space create fall hazards, as the only way to enter or exit is by fixed ladder through a hatch in the floor. Care should be taken when entering or exiting the space.</li> </ol>
MSE2	Yes	Sub floor to access steam pipes	<p>The steam pipes are coming in from TECO through an open narrow vault that can be accessed in the MSE1 confined space.</p> <p><b>Air Quality:</b></p> <ol style="list-style-type: none"> <li>1. Ventilation: the space is well ventilated.</li> </ol> <p><b>Physical Hazards:</b></p> <ol style="list-style-type: none"> <li>1. Steam</li> <li>2. Burns</li> <li>3. Limited lighting</li> <li>4. Walking elevation changes</li> </ol>
MSE3	Yes	Combination Domestic/Fire Water Break Tank	<p>Large maroon square water tank used to store water that supplies the sprinkler system and the domestic water for the building. The tank is to the west of the entrance to basement mechanical room W-34. Access to the tank is through a hatch on top of the tank at the northeast corner of the tank. A ladder on the east end of the tank that provides access to the top of the tank, the access hatch is at the top of the ladder.</p> <p><b>Air Quality:</b></p> <ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol> <p><b>Physical Hazards:</b></p> <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> </ol> <p>There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</p>
MSE4	Yes	TECO Pit/ Vault	<p>3' x 3' white metal hatch in front of MSE main entrance.</p> <p><b>Air quality:</b></p> <p><b>Physical hazards:</b></p>
MSE5	Yes	Metal Door	3' x 4' rectangular metal door in wall closer to Weber Plaza between MSE and MSB

			Air quality: Physical hazards:
MSE6	Yes	Metal Door	4'x 4' white diamond plated double hinge hatch in front of MSE main entrance( flowerbed) Air quality: Not tested Physical hazards: Space not analyzed
RAS1	Yes	Combination Domestic/Fire Water Break Tank	Large grey box-shaped water tank used to store water that supplies the sprinkler system and the domestic water for the building. The tank is to the west of the entrance to basement mechanical room W-34. Access to the tank is through a hatch on top of the tank at the northeast corner of the tank. A ladder on the east end of the tank that provides access to the top of the tank, the access hatch is at the top of the ladder. Air Quality: <ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol> Physical Hazards: <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>2. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</li> </ol>
RAS2	No	Lobby Hatches for Above Ceiling Access	Small (~ 2 foot by 2 foot) access hatches in the lobbies and near the restrooms of each floor in the building provide access to the spaces above the ceilings. The spaces primarily contain HVAC ducting and equipment, and are occasionally accessed to service this equipment. There is no storage of hazardous chemicals in the spaces. To access the spaces, a screwdriver is required to loosen screws that hold the access panels in the ceiling. A ladder is also required to physically enter the space. Ladders are typically available on each floor of SPH inside the mechanical rooms. Air Quality: <ol style="list-style-type: none"> <li>1. Air quality was tested just inside the west basement above ceiling access hatch. Air in the space had appropriate air quality for occupancy.</li> <li>2. Ventilation: due to the nature of the space, ventilation was excellent, and does not present an additional air quality concern.</li> </ol> Physical Hazards: <ol style="list-style-type: none"> <li>1. The primary physical hazard in the space is a fall hazard related to entry and exit from the space. Because the space is accessed via a freestanding ladder, the entry and particularly the exit could cause the ladder to tip over. Maintenance staff should work in pairs when entering or exiting the space so</li> </ol>

			that one person can hold the ladder steady while the other person enters the space to reduce the risk of the ladder tipping when subjected to lateral forces at the top of the ladder.
SOD1	No	Floor entrance for the basement	Location: Floor entry door with ladder beyond opening. The height from the above ground surface to the floor of the basement is about 7 feet deep. The door is a 2ft X 2ft metal hinged door that is horizontal with the floor. Allows for access into the sub-basement and is located in Room 1J01 on the first floor (B 9-16). Air Quality: 1. Space is a non-permit required space due to the sufficient amount of oxygen levels. Physical Hazards: 1. Small entry way with a 7 feet drop.
SOD2	No	Floor entrance for the basement	Location: Floor entry door with ladder beyond opening. The height from the above ground surface to the floor of the basement is about 9 feet deep. The door is a 2ft X 2ft metal hinged door that is horizontal with the floor. Allows for access into the sub-basement and is located in Room 1J02 on the first floor (B 9-16). Air Quality: 1. Space is a non-permit required space due to the sufficient amount of oxygen levels. Physical Hazards: 1. Small entry way with a 9 feet drop.
SOD3	No	Floor entrance for the basement	Location: Floor entry door with ladder beyond opening. The height from the above ground surface to the floor of the basement is about 7 feet deep. The door is a 2ft X 2ft metal hinged door that is horizontal with the floor. Allows for access into the sub-basement and is located in Room 1432 on the first floor (B 9-16). Air Quality: 1. Space is a non-permit required space due to the sufficient amount of oxygen levels. Physical Hazards: 1. Small entry way with a 7 feet drop.
SOD4	No	Rear dock basement access	Location: Accessible entrance at the base of the loading dock that is located on the east side of the building. The door is a metal 2ft X 2ft, hinged, vertical outward swinging opening. Door leads to the basement area and allows passage to SOD 1, 2, 3 confined space doors. Air Quality: 1. Area is sufficient with oxygen and has no TLV or IDLH gases present. Physical Hazards: 1. Vehicle traffic and the movement of equipment and machinery will cause a potential hazard.
SOD5	Yes	Sump Pit	Location: Room 1262 Air Quality: test air quality before entry. Physical Hazards: 1. Metal stair with alternating treads 2. Area requires lighting. 3. Flooding
SOD6	Yes	Sump Pit	Location: Room 1M01

			<p>Air Quality: test air quality before entry.</p> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Metal stair with alternating treads</li> <li>2. Area requires lighting.</li> <li>3. Flooding</li> </ol>
SON1	Yes	Domestic Water Tank	<p>The Domestic Water tank is located on the second floor of the SON Service Building, which sits between the main SON building and the loading dock area SON shares with RAS/SPH. The maroon, box-shaped tank is on the second floor in room S206, in the southwest corner of the room. Access to the tank is through a hatch on top of the tank at the northwest end of the tank. A fixed ladder on the north end of the tank provides access to the top of the tank; the access hatch is at the top of the ladder.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>2. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</li> </ol>
SON2	Yes	Gray Water Tanks	<p>The gray water tanks are located outside the School of Nursing, just to the west of the SON Service Building. The five large metal tanks are used to store gray water, which is water discharged from sink drains, for example, that has been used once but does not contain raw sewage. The water may contain particulates and/or detergents in higher levels than experienced in other tanks around campus. The tanks can be accessed through hatches on the Bertner side of the tanks, where small trees conceal large access hatches. There is an additional access point at the top of the tank, which would require a large ladder, and likely fall protection, to access.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted closed. Air in the tank at time of entry will be a combination of air that was already in the tank and air that comes in from the external air, which has appropriate air quality for occupancy. Because there is limited control of the chemicals entering the tank from the sink drain, there is no certainty that toxic chemicals will not be in the space. In addition, high temperatures are likely to occur inside the tank, as the tanks are outside and exposed to high external temperatures and strong sunlight. This may increase the volatility of any of the various chemicals in the water in the tank, increasing the risk of air-related exposure to workers. Air quality must be tested prior to tank entry.</li> </ol>

			<p>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</p> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>2. High temperatures that increase the risk of heat stroke are the primary hazard. Temperatures in the space can be much higher than the air outdoors, and are impossible to control. Workers should be sure to hydrate properly before and during entry, and should review the signs and symptoms of heat stress prior to entry when outdoor temperatures are predicted to be above 80 degrees. Workers should limit time spent in the tank under the same conditions, saving longer term occupancies for cooler times of day and cooler times of the year.</li> <li>3. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. The hazard is more pronounced than in other tanks due to the likelihood of detergents existing in the tank water. Rubber soled shoes should be worn.</li> </ol>
SRB1	Yes* (please see note to the right)	Pump House <b>Missing sign</b>	<p>A small freestanding building adjacent to the southwest stairwell of the SRB, just south of the stairwell. The small building provides access to the pump room, which is at the base of a fixed ladder extending approximately 15 feet below ground level. The room contains the pumps that circulate water in the water fountains as well as chemicals used to treat the water. There is a small ventilation system installed in the pump house to help air circulate through the space. The ventilation system must be activated upon entry to help maintain good air quality.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Air quality in the room was tested both at the entry level and at the bottom of the ladder. Air quality in the pump house was good, though there was a slightly higher chlorine concentration than in the outside air. Chlorine levels were not high enough to present immediate concern at the time of entry.</li> <li>2. Ventilation: Air in the space is not conditioned and does not circulate easily. Of particular concern in this space is the storage of the hazardous chemicals used to treat the water in the fountain. The chlorine levels could rise if the storage containers are left open. As chlorine gas is heavier than air, air quality problems may not be immediately evident upon entry in to the pump house. Air quality should be ensured as safe prior to any entry into the space.</li> </ol> <p>Physical hazards:</p> <ol style="list-style-type: none"> <li>1. The primary physical hazard in the space is the risk of falling when climbing up or down the ladder to access to the lower levels of the space. Care should be taken when climbing or descending, and any materials being raised from the space or lowered into the space should be raised with the rope provided rather than carried up the ladder.</li> </ol> <p>*Note: At the time of development of the Confined Space Program, the Pump House was not being used to store any chlorine tablets, as the automatic chlorination system housed at the base of the pit was broken and a contract to chlorinate the pool manually was obtained. At this time, no chlorine was present in the air in the</p>

			pump house because no chlorine was being stored in the building. When the automatic chlorination system is fixed, chlorine tablets will again be stored in the pump house and the potential for an atmospheric chlorine hazard will again exist. Until that time, this space can be considered non permit required.
SRB2	No	Roof Outside elevator access door <b>No sign</b>	A fire rated entry door located in the west elevator room on the roof. Access is only made by either using the maintenance elevator to the 7 <sup>th</sup> floor or east side fire escape stairwell. Once on the 7 <sup>th</sup> floor, a door exiting to the roof will lead to another building on the rooftop. Inside to the right of the stairwell there is a small door in the wall that is around 1 ½ ft from the floor.
UCT1	Yes	Combination Domestic/Fire Water Break Tank	<p>Large maroon cylindrical water tank used to store water that supplies the sprinkler system and the domestic water in UCT. The tank is in the Engine room at the east end of the mall level. The tank is at the north end of room M30. Access to the tank is through a hatch on top of the tank which can be accessed via a ladder at the south end of the tank. There is an additional hatch about two feet above ground level in the tank.</p> <p>Air Quality:</p> <ol style="list-style-type: none"> <li>1. Air quality was not tested as the tank was in use and the access was bolted down. Air in the tank at time of entry will be drawn in from the mechanical room, which has appropriate air quality for occupancy.</li> <li>2. Ventilation: ensuring air quality in the tank does not deteriorate while the tank is occupied is key safety measure when inside the space. Air should be monitored periodically if the tank is going to be occupied for a long duration to ensure that Oxygen levels remain safe. In addition, extreme caution should be used when introducing irritant or toxic chemicals into the space before or during occupancy due to the limited air circulation in the space.</li> </ol> <p>Physical Hazards:</p> <ol style="list-style-type: none"> <li>1. Engulfment from water entering the tank is the primary physical hazard in the space. The tank must be drained prior to entry and all valves leading to the tank must be locked out and tagged out to prevent accidental drowning.</li> <li>2. There may be slip/trip hazards within the tank due to the construction of the tank and the potential for sediment buildup. Rubber soled shoes should be worn.</li> </ol>
UTPB	No	Parking garage sub basement north stairwell room	

## ANNEX E. CONFINED SPACE AIR QUALITY TEST RESULTS

ID #	% O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	VOC (ppm)	Cl (ppm)	Test Date	Notes
AUX1	20.3	3	0	0	16	n/a	8/25/09	Apartment that provided entry was recently painted, which may have contributed to high VOC levels. Only one of the spaces was tested, but it can be considered typical of all the attic spaces at SFA.
AUX2	-	-	-	-	-	n/a	-	Not tested, as tank was in use and bolted shut. Air must be tested prior to the next entry to ensure safety.
MSB1	20.5	0	0	0		n/a	8/19/09	(Loading dock sump pit)
MSB2	20.8	0	0	0	0	n/a	8/27/09	(Cyclotron sump pit)
MSB3	20.5	-	0	0	3	n/a	8/19/09	(Sump pit in vault off North Mechanical Room)
MSB4	20.8	0	0	0	0	n/a	8/31/09	(Sump Pit under NE stairwell)
MSB5	-	-	-	-	-	n/a	8/31/09	(Sump Pit at Stairwell E)
MSB6	20.5	-	0	0	-	n/a	8/31/09	(Sump Pit at SE corner of MSB)
MSB7	-	-	-	-	-	n/a	-	Not tested, as tank was in use and bolted shut. Air must be tested prior to the next entry to ensure safety.
MSB8	-	-	-	-	-	n/a	-	Not tested, as tank was in use and bolted shut. Air must be tested prior to the next entry to ensure safety.
MSB9	20.8	0	0	0	0	n/a	8/19/09	(HVAC Units)
MSB10	20.5	0	0	0	0	n/a	8/19/09	(Space under stairwell B)
MSB11	20.5	0	0	0	0	n/a	8/19/09	(Valve Pit under Ross Sterling with Steam Pipes)
MSE1	20.8	0	0	0	0	n/a	8/19/09	MSE Subfloor
ID #	% O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	VOC (ppm)	n/a	Test Date	Notes

RAS1	-	-	-	-	-	n/a	-	Not tested, as tank was in use and bolted shut. Air must be tested prior to the next entry to ensure safety.
RAS2	20.8	0	0	0	0	n/a	8/25/09	Access Hatch in West Basement was tested and can be considered typical of all the access hatched.
SON1	-	-	-	-	-	n/a	-	Not tested, as tank was in use and bolted shut. Air must be tested prior to the next entry to ensure safety.
SON2	-	-	-	-	-	n/a	-	Not tested, as tank was in use and bolted shut. Air must be tested prior to the next entry to ensure safety.
SRB1	20.3	1	0	0	2.7	0	8/25/09	Chlorine Tablets were not being stored in the pump house at the time of testing. Chlorine levels are expected to be higher if the Pump House is used for Chlorine Tablet storage, and will be tested again if the use of the space changes.
UCT1	-	-	-	-	-	n/a	-	Not tested, as tank was in use and bolted shut. Air must be tested prior to the next entry to ensure safety.

## **ANNEX F. CONFINED SPACE FLOW CHART**

Please see the following page for a flowchart detailing the confined space process.

The following flowchart is designed to summarize the Confined Space Program in a handy format. It should not be used in place of training. It is designed to help guide decision making about confined spaces, but it not intended to replace a full understanding of the policy.

Any questions that arise from the use of the flowchart can be directed to EH&S or to chapter 3 of the program.



## Confined Space Entry Flow Chart

