

# Confined Space Program

February - 2023

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## OVERVIEW

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A confined space is defined as any location that is large enough that an employee can bodily enter and perform work, has limited openings for entry and egress, and is not intended for continuous employee occupancy. Examples of confined spaces include: manholes, lift stations, pipes, storage tanks, trailers, tank cars, pits, sumps, hoppers, and bins. Entry into a confined space without proper precautions could result in injury, impairment, or death due to:

- An atmosphere that is flammable or explosive
- Lack of sufficient oxygen to support life
- Contact with or inhalation of toxic materials
- Work area hazards such as steam or high pressure materials.
- General safety

This confined space program is to protect all personnel from injury upon entry, exit, or operations near a confined space.

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## POLICY

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All staff, faculty, students, and contractors whose work is under the supervision of Abilene Christian University (ACU) shall comply with this program. Failure to comply with this program or the laws and regulations referenced within this program may result in disciplinary action up to and including termination. Any deviations from this confined space program must be reported to the Office of Institutional Compliance & Risk Management at [risk@acu.edu](mailto:risk@acu.edu) or 325-674-2424.

## References

29 CFR 1910.146

29 CFR 1926.1203

ANSI/ASSE Z117.1

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## DEFINITIONS

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

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

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

Bump Test - A very brief exposure of a monitor to a gas to help verify that the sensors respond and the alarms are functioning.

Confined Space - A space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
- Is not designed for continuous employee occupancy.

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

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

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

Entrant - An employee who is authorized by the employer to enter a permit space

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 paragraph (f) of this section.

Entry Supervisor - The person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry.

***NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant (no person shall perform both functions of an attendant and an authorized entrant). There must be at least one attendant along with one authorized entrant, as long as that person is trained and equipped as required by this confined space 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 as long as the other individual is trained and equipped as required by this confined space program.***

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

- Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL).
- Airborne combustible dust at a concentration that meets or exceeds its LFL.
- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.
- 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 which could result in employee exposure in excess of its dose or permissible exposure limit.
- Any other atmospheric condition that is immediately dangerous to life or health.

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

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

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

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

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

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

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

Management - For the purpose of this confined space program, management shall include owners, contractors, educators, directors, or designated agents, who are responsible for operations inside or near a confined space.

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

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

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

Permit-Required Confined Space - A confined space that has one or more of the following characteristics:

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

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

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

Qualified Person - An individual who, by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated their ability to solve or resolve problems relating to the subject matter.

Rescue Team - The personnel designated to rescue employees from permit spaces.

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

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



# ROLES & RESPONSIBILITIES

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## Faculty/Staff

ACU employees shall adhere to the procedures and guidelines of this confined space program. Employees shall report any violation of this program to their immediate supervisor, management, or to the office of Institutional Compliance & Risk Management at [risk@acu.edu](mailto:risk@acu.edu) or 325-674-2424.

***NOTE: Faculty must notify the Environmental Health & Safety Manager (325-674-2424) if any off-campus or research requires the use of a confined space as described within this program.***

## Management

Management shall be responsible for the safe operations inside or near confined spaces and for ensuring that the procedures and guidelines of this confined space program are adhered to within their departments. Management responsibilities include, but are not limited to:

- Providing affected employees with information contained within this confined space program
- Reporting any known concerns to the Environmental Health and Safety Manager
- Work with affected employees and the Environmental Health & Safety Manager in the development and implementation of this confined space program
- Identify employees who will be responsible in the roles of Entrants, Attendants, and Entry Supervisors

## Divisions/Departments

All ACU divisions/departments that perform inside or near a confined space shall follow the procedures and guidelines of this confined space program. Adherence to this program is of the utmost importance to the safety and well being of our students, faculty, and staff.

## Contractors

All contractors who perform work on the ACU campus are required to follow their own confined space policies and procedures. Any work that is to be performed in or near confined spaces shall be in accordance with all applicable state, federal and local laws and regulations.

ACU will provide the following to all applicable contractors when working in or near a permit-required confined space:

- Inform the contractor that the workplace contains permit-required confined spaces



- Provide the contractor of the elements, including hazards identified and any experience with the confined space
- Provide the contractor of any precautions or procedures that have been implemented for the protection of employees in or near the permit-required confined space
- Coordinate entry operations with the Contractor

In the event that ACU is the general contractor, all work performed near or inside of a confined space shall be in accordance with the procedures and guidelines found in this confined space program.

ACU will provide applicable information to contractors with the identification of any known confined space that may be included in or near the scope of work the contractor is to perform.

The contractor must inform ACU immediately of any hazards encountered or created during the course of entry or exit.

At the conclusion of all entry operations, a debriefing will be held with the Environmental Health & Safety Manager (325-674-2424) to discuss any additional hazards or problems encountered and corrective measures to be taken prior to future entry.

## **Environmental Health and Safety Manager**

The Environmental Health and Safety Manager is responsible for the review and maintenance of this program. The Environmental Health and Safety Manager's additional responsibilities include, but are not limited to:

- Conducts initial survey of the premises and operations to identify confined spaces
- Establishes a process to identify the addition or deletion of confined spaces
- Maintains a record of known confined spaces
- Classifies the confined space as permit-required or non-permit required
- Provides information of the existence, locations, and hazards of any permit-required confined space. This includes the posting of signs to correctly identify the hazards.
- Conducts confined space air monitoring when applicable, or for recording information
- Reviews permitting processes
- Develops and maintains rescue plans for all permit-required confined spaces
- Arranges rescue team simulations in all permit required spaces annually, if or when applicable
- Reviews this confined space program annually
- Assigns, conducts, documents, and assesses the effectiveness of safety training
- Has stop work authority

## Confined Space Entry Team

### Entry Team: Entry Supervisor

- Knows the requirements and responsibilities of this confined space program
- Conducts initial visual inspection of the confined space entry point prior to entry
- Completes entry permits (Appendix D)
- Determines entrance requirements
- Posts the permit in a conspicuous location near the entry point of the confined space
- Determines the number of Attendants/Entrants needed for safe completion of the work
- Verifies rescue teams are readily available prior to and during the entry and the means for summoning a rescue team are readily available
- Verifies all required preliminary actions have been taken prior to endorsing the permit and authorizing entry to begin
- Ensures the Attendant(s) has no additional responsibilities other than the observation of the Entrant(s)
- Ensures acceptable conditions are maintained for the duration of entry
- Communicates all relative and required information of the entry to any other Entry Supervisor if a role has been assigned or changed
- Terminates entry, revokes, or cancels permit when necessary or required
- Assures employees and equipment has been removed upon any termination, cancellation, or revocation of permit
- Has stop work authority

### Entry Team: Attendant

- Observes the permit-required confined space from a station outside the point of entry/exit
- Remains at the entry point while observing operation until the entry has been completed or terminated by the Entry Supervisor
- Maintains two-way communication with Entrant(s) during the entry of the confined space
- Maintains the sign-in/sign-out log (Appendix E) of all Entrants who enter the confined space
- Provides assistance to Entrants entering/exiting the confined space
- Directs Entrants to exit the confined space when any irregularities are observed or discovered
- Initiates evacuation and emergency procedures when necessary or required
- Monitors the operation inside and near the confined space that could adversely affect the entry/exit
- Prevents any unauthorized entry of the confined space
- Has stop work authority

### Entry Team: Entrant

- Understands the entry permit requirements



- Maintains two-way communication with the Attendant
- Recognizes current or potential hazards prior to and during entry of the confined space
- Understands the proper use of equipment for controlling hazards
- Inspects hazards not identified by atmospheric monitoring during entry activities
- Responds to emergencies, which may include self-rescue or evacuation
- Recognizes symptoms and warning signs of exposure to potential hazards or prohibited conditions
- Notifies the Attendant of any symptoms of exposure, any emergency, or any unacceptable condition in the confined space
- Exits the confined space immediately if any symptom, warning sign, or unacceptable conditions occur, or if directed by the Attendant or Entry Supervisor
- Inspects for hazards during entry of the confined space
- Has stop work authority

***NOTE: Each member of the Confined Space Entry Team has the responsibility and authority to stop operations inside or near a Confined Space if any member has determined the site or operation has become unsafe.***

# PROCEDURES

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The following procedures shall be reviewed and adhered to prior to any operation inside or near a confined space.

## Identification and Evaluation of Confined Spaces

### Identification of Confined Spaces

The Environmental Health & Safety Manager will perform an initial survey of properties and worksites. These surveys will be completed upon request, from site observations, building blueprints, or job hazard analysis. This survey will include the completion of the Inventory and Hazard Assessment of Confined Spaces found in Appendix E of this program if there has been any confined spaces identified. All completed Inventory and Hazard Assessment of Confined Spaces forms will be kept on file and maintained by the Environmental Health & Safety Manager.

### Inventory of Confined Spaces

The Environmental Health & Safety Manager will keep an inventory of all confined spaces that have been identified. This inventory will include any hazard that has been identified at each confined space. This is to ensure proper precautions are taken prior to any operation to be performed in or near a confined space. Identified hazards may include, but is not limited to:

- Engulfment
- Entrapment
- Hazardous energy
- Hazardous atmospheres
  - Flammable or explosive potential
  - Oxygen deficiency
- Presence of toxic or corrosive materials

This inventory and information will be communicated to all affected personnel and be readily available upon request. The information provided by the documented inventory must be reviewed prior to any entry of an identified permit-required confined space.

The Environmental Health & Safety Manager will determine, based on the identified hazards, which confined spaces will be permit-required for entry and which confined spaces shall not be entered.

### Reevaluation of Confined Spaces

The Environmental Health & Safety Manager will reevaluate each identified confined space at least annually or upon request. This reevaluation is to identify any changes in activities or environmental conditions that may adversely affect the operation in or near the confined space. Any changes to the documented inventory will be communicated to Management.

# Hazard Controls and Written Plan

## Hazard Controls

Abilene Christian University utilizes the hierarchy of hazard control techniques to eliminate, or when elimination is not possible, mitigate the identified hazards. The following is the hierarchy of hazard controls:

- **Elimination**
  - Physically remove the hazard.
    - Can the hazard be eliminated from the confined space?
- **Substitution**
  - Replace the hazard.
    - Can the identified hazard be substituted with something non-hazardous?
- **Engineering**
  - Isolate the hazard
    - Can the hazard be isolated from people? (Example: machine guarding)
- **Administrative**
  - Control people's behavior around the hazard
    - Can the work practice be changed? (Examples of administrative controls: Training, procedures, processes, etc.)
- **Personal Protective Equipment(PPE)**
  - Protect the worker with personal protective equipment(PPE).
    - Determine what PPE will be required for the operation.

## Written Plan

Each permit-required confined space will have a written plan for the mitigation of all identified hazards. This written plan must be reviewed prior to entry of a permit-required confined space. The written plan will have hazard mitigation strategies that include:

- Atmospheric Hazards: Purging, inerting, flushing, or ventilating
- External Hazards: Barricading from pedestrians, vehicles, or any individual that may become near the confined space
- Internal Hazards: PPE, communication, lighting, barriers, shields ladders, rescue equipment

The written plan will be documented on the Permit-Required Confined Space Hazard Mitigation form found in Appendix G of this program. All written plans will be maintained by the Environmental Health & Safety Manager ([risk@acu.edu](mailto:risk@acu.edu)) and will be readily available upon request.

## Permit-Required Confined Spaces

Permit-required confined spaces must have one of the following characteristics to be classified as a permit-required confined space:

- Contain, or have the potential to contain, a hazardous atmosphere
- Contain a material that has a potential to engulf an Entrant



- The confined space has a configuration that may cause an entrant to become trapped or asphyxiated by downward sloped floors or inwardly converging walls
- Contain any other serious safety or health hazard

If any of the above characteristics is present in a confined space, the confined space shall be classified as a permit-required confined space. Please notify the Environmental Health & Safety Manager concerning potential confined spaces at [risk@acu.edu](mailto:risk@acu.edu) or 325-674-2424.

## Permit-Required Confined Space Labeling and Security

Any confined space that has been classified as a permit-required confined space must have a sign on or in a conspicuous location near the confined space entrance(s). This sign is to identify the confined space as a permit-required confined space.

All required signs will be determined and issued by the Office of Institutional Compliance & Risk Management. Signs are to be maintained and legible. If a sign has become illegible due to damage, weathering, or any other cause, please notify Risk Management at [risk@acu.edu](mailto:risk@acu.edu).

All permit-required confined spaces must be secured at all times when it is not in use by authorized individuals. All entrance(s) of a permit-required confined space must be secured by an appropriate locking device or with mechanical fasteners that prohibit non-authorized entry.

## Entry Permits

This entry permit process for permit-required confined space entry shall be used to direct Entry Supervisors, Attendants, and Entrants during permit-required operations. This process includes the evaluation of entry conditions and the permitting process.

The following process shall be followed in the sequential order as shown below:

1. The Entry Supervisor shall contact the Environmental Health & Safety Manager ([risk@acu.edu](mailto:risk@acu.edu) or 325-674-2424) to request the current written plan for the applicable permit-required space and a confined space permit form.
2. The Entry Supervisor shall perform an evaluation of the permit-required space using the Permit-Required Confined Space Hazard Mitigation form found in Appendix G of this program.
  - a. This evaluation will be completed in conjunction with the written plan on record.
3. The Entry Supervisor will then complete the entry permit located in Appendix D of this program.
  - a. Atmospheric testing must be conducted with recorded results within the acceptable limits. If the test results are not within acceptable limits, mitigation controls must be used to provide acceptable limits or entry must not be permitted.
  - b. The Environmental Health & Safety Manager must be contacted if there is required mitigation for non-acceptable results in atmospheric testing.

- c. Mitigation controls must be reviewed and authorized by the Environmental Health & Safety Manager, the Director of Institutional Compliance & Risk Management, Department Management, and the Entry Supervisor prior to a permit being authorized.
4. Only operations that were in the original scope of work described in the Entry Permit shall be performed.
  - a. Any additional work must be reviewed and another Entry Permit must be completed.
5. Upon the completion of the scope of work, the entry permit shall be given to the Environmental Health & Safety Manager. The permit will be filed and maintained by the 12 months from the date of completion, or until the annual review is completed.

***NOTE: The Entry Permit will only be valid and authorized for one shift of work. If a new shift begins or different personnel is required, a new permit must be completed prior to entry.***

### **Cancellation of Entry Permit**

If an entry permit is canceled due to changing conditions, introduction of new hazards, or any other issue that may occur, the Entry Supervisor will notify the Environmental Health & Safety Manager to discuss and review.

The Environmental Health & Safety Manager will file each canceled entry permit with the written plan of the applicable confined space. Any issues encountered during an entry operation will be noted on the entry permit and documented on the written plan for the applicable confined space so that appropriate mitigations, revisions, or precautions are made.

### **Entry Procedures**

When entering a confined space is necessary, the Entry Supervisor will initiate entry procedures, including the completion of a confined space entry permit. Entry into a confined space will follow the standard entry procedure below:

#### **Pre-Entry Hazard Assessment**

A hazard assessment will be completed by the Entry Supervisor prior to any entry into a confined space. The hazard assessment should identify:

- The sequence of work to be performed in the confined space
- The specific hazards known or anticipated
- The control measures to be implemented to eliminate or reduce each of the hazards to an acceptable level

No entry will be permitted until the hazard assessment has been reviewed and discussed by all persons engaged in the activity. Personnel who are to enter the permit-required confined space will be informed of known or potential hazards associated with it.

## Before Entry

The confined space entry permit must be completed and authorized before a standard entry. All requirements of the permit must be met, reviewed, and signed by an Entry Supervisor.

Additionally, the following conditions must be met before standard entry:

- Train affected personnel to establish proficiency in the duties these employees will perform within the confined space
- Test the internal atmosphere within the confined space with a calibrated, direct-reading instrument
- Provide personnel with necessary PPE as determined by the Entry Supervisor
- Conduct atmospheric monitoring during the entry

***Note: If a hazardous atmosphere is detected during entry, personnel within the confined space will be evacuated by the attendant(s) or Entry Supervisor until the space can be evaluated to determine how the hazardous atmosphere developed. Additionally, controls must be put in place to protect employees before reentry.***

## Permit-Required Standard Entry Precautions

The confined space entry permit must be completed and authorized prior to entry of any permit-required confined space. Entry into a permit-required confined space will only be authorized once all requirements of the permitting process have been met, the permit has been completed, the permit has been reviewed by all members of the confined space team, and the permit has been signed by the Entry Supervisor. The following conditions must be met prior to a standard entry into a permit-required confined space:

- Affected employees will be proficient in the duties that will be performed within the confined space
- The internal atmosphere within the confined space will be tested by the Environmental Health & Safety Manager or a qualified person with a calibrated, direct-reading instrument
- Employees will be provided with necessary PPE as determined by the Entry Supervisor
- Atmospheric monitoring will take place during the entry. If a hazardous atmosphere is detected during entry:
  - Employees within the confined space will be evacuated by the Attendant(s) or Entry Supervisor until the space can be evaluated by the Environmental Health & Safety Manager, or other qualified person, to determine how the hazardous atmosphere developed
  - Controls will be put in place to protect Entrants before reentry
- Hazards will be isolated from the confined space
- All Entrants will sign an entry log (Appendix E) prior to entering the confined space

***Note: Isolation is the protection against the release of active or stored energy and/or material into the space.***



- Isolation will be achieved by the appropriate means as determined by the Environmental Health & Safety Manager or Entry Supervisor. Options for isolation will include:
  - Blanking or blinding
  - Misaligning or removing sections of lines, pipes or ducts
  - A double block and bleed system
  - Lockout or tagout of all sources of energy
  - Blocking or disconnecting all mechanical linkages

If isolation of the space is infeasible, pre-entry testing will be performed to the extent feasible before entry is authorized. If entry is authorized, entry conditions will be continuously monitored in the areas where authorized Entrants are working.

### **Opening a Confined Space**

Eliminate any conditions that make it unsafe to remove an entrance cover before the cover is removed. When entrance covers are removed, promptly guard the opening by a railing, temporary cover, or another temporary barrier that will prevent anyone from falling through the opening. This barrier or cover shall protect each Entrant working in the space from a foreign object entering into the confined space (Example: a falling object into the confined space). If the confined space is in a traffic area, pedestrian or vehicular, adequate barriers must be put in place to control the work area from access by non-confined space team members and to maintain a safe environment. Selected barriers must be capable of diverting and deflecting vehicle or pedestrian traffic.

The Entry Supervisor will ensure that necessary measures are put in place to prevent unauthorized entry into the open confined space. These measures include, but are not limited to:

- Posting signs to direct unauthorized persons away from the confined space area
- Setting up barriers or barricades to direct unauthorized persons away from the confined space area
- Warning unauthorized persons they must stay away from the confined space area
- Advising unauthorized persons that they must exit immediately if they have entered into the confined space area
- Inform all members of the confined space team that unauthorized persons are prohibited from the confined space area
- Inform all members of the confined space team if an unauthorized person(s) have entered the confined space area

### **Atmospheric Testing**

Atmospheric test data is required before entry into a confined space for evaluation of the hazards of the permit space and verification that acceptable conditions exist for entry.

If a person must go into a permit-required confined space, atmospheric testing data will be needed before entry will be permitted. All testing data will be maintained indefinitely by the Environmental Health & Safety manager with the confined space written plan.

Before entering into a confined space, the Environmental Health & Safety Manager or a qualified person will conduct testing for hazardous atmospheres. The internal atmosphere will be tested with a calibrated, direct reading instrument for the following in the sequential order as listed below:

1. Oxygen
2. Flammable gasses
3. Vapors
4. Potential toxic air contaminants

The monitor will be verified by a “bump” test prior to use.

1. Evaluation testing

The atmosphere of a confined space should be analyzed using equipment of adequate sensitivity and specificity. The analysis will identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures and conditions can be developed for that space. A technically qualified professional, such as a consultant, certified industrial hygienist, registered safety engineer, or certified safety professional should evaluate and interpret this data and use it to develop the entry procedure.

2. Verification testing

A confined space that might contain a hazardous atmosphere will be tested for residues of all identified or suspected contaminants. The evaluation testing should be conducted with specified equipment to determine that residual concentrations at the time of testing and entry are within acceptable limits. The person performing the tests will record the test results on the permit. The atmosphere will be periodically retested (to verify that atmospheric conditions remain within acceptable entry parameters.) A record of all testing(s) shall be maintained indefinitely by the Environmental Health & Safety Manager.

3. Acceptable limits

The atmosphere of the confined space(s) is within acceptable limits when the following conditions are maintained:

- Oxygen: 19.5 percent to 23.5 percent
- Flammability: less than 10 percent of the lower flammable limit (LFL)
- Toxicity: less than recognized American Conference of Governmental Industrial Hygienists (ACGIH) exposure limits or other published exposure levels, including

OSHA permissible exposure limits (PEL) or National Institute of Occupational Safety and Health (NIOSH) recommended exposure limits (REL).

Each member of the confined space team will be provided with the results of all testing conducted. Each member of the confined space team will be provided the opportunity to observe any monitoring or testing of confined spaces.

If any member of the confined space team requests for a reevaluation, based on the reason to believe that the evaluation of the confined space may not have been adequate, the request will be made to the Environmental Health & Safety Manager. Reevaluations will be performed as soon as reasonably possible by the Environmental Health & Safety Manager or a qualified person and all members of the confined space team will be given the opportunity to witness the testing.

### **Forced Air Ventilation**

When conditions can accommodate continuous forced air ventilation as a means of abatement for atmospheric conditions, the following precautions shall be followed:

- Entrants will not enter the space until the forced air ventilation has eliminated any hazardous atmosphere
- Forced air ventilation will be directed so as to ventilate the immediate areas where an Entrant is or will be present within the space
- Continuous ventilation will be maintained until all Entrants have left the space
- Air supply or forced air ventilation will originate from a clean source

*If a confined space does not have acceptable entry conditions, entry must NOT be permitted.*

### **Closing a Confined Space**

Upon completion of the scope of work as described within the confined space permit, the confined space entrance must be closed. The confined space entrance must be secured in a way to prevent entrance from unauthorized personnel.

Once the confined space entrance has been secured, proper housekeeping must be completed around the confined space to ensure all hazards, such as trip hazards, are eliminated from the area of operation.

The Entry Supervisor will sign off on the completed confined space entry permit and give the completed permit to the Environmental Health & Safety Manager for recordkeeping (risk@acu.edu).

## Equipment

The following is a list of equipment that is required for for entry in any permit-required confined space:

- Testing and monitoring equipment
- Ventilation equipment
- Communication equipment
- Lighting equipment
- Barriers or shields
- Equipment needed for safe ingress and egress
- Any other needed equipment

All testing equipment must be approved by a nationally recognized laboratory, such as Underwriters Laboratories or Factory Mutual Systems.

All testing equipment must be calibrated monthly. All testing equipment must be sent to the manufacturer for recertification annually. The Environmental Health & Safety Manager will maintain instrument maintenance and recertification records for all testing equipment.

## Isolation and Lockout/Tagout

All energy sources that are potentially hazardous to confined space entrants must be secured, relieved, disconnected, or restrained before personnel can enter the confined space. All energy sources that pose a hazard to a confined space shall be locked out/tagged out as required by this program and Abilene Christian University's Lockout/Tagout Program (which complies with OSHA's 29 CFR 1910.147 and American National Standards Institute (ANSI) Z244.1-1982, Lockout/Tagout of Energy Sources) before permitting entry into the confined space.

All Entrants must exit the confined space prior to any activation or testing of an energized source.

Any removal of locks, tags, or any other protective devices will be done in accordance with Abilene Christian University's Lockout/Tagout Program.

## Emergency Response, Evacuation, Retrieval and Rescue

### Emergency Response

An emergency response plan will be developed for each identified permit-required confined space. Each emergency response plan will determine the protocol(s) for each permit-required confined space in case of an emergency situation. The emergency response plan shall be made readily available onsite at the permit-required space prior to entry. All affected employees must review and be trained in the emergency response plan.

The Environmental Health & Safety Manager will complete and maintain the emergency response plan for each permit-required confined space.

## **Evacuation**

Evacuations may be ordered or necessary during work inside or near a permit-required confined space. Although it is not possible to list all the possible reasons for the determination of an evacuation, here are some reasons why an evacuation is necessary or required:

- An order to evacuate is given by the Attendant or the Entry Supervisor
- Recognition of any warning sign or symptom of exposure to a dangerous situation
- Detection of a prohibited condition
- An Evacuation alarm is activated

The Attendant or Entry Supervisor must order an evacuation if they detect a situation outside the permit-required confined space that could endanger the authorized entrants.

## **Retrieval**

Non-entry rescues may be performed by using retrieval systems or methods, unless the retrieval equipment would increase the overall risk or create additional hazards to the entry or exit of the permit-required confined space. Retrieval systems shall meet the following requirements:

- Entrants shall wear a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the Entrant's head
- Wristlets may be used in lieu of a chest or full body harness if these types of harnesses are infeasible or creates a greater risk of injury or hazard
- The other end of the retrieval line shall be attached to a mechanical device or to a fixed point outside of the permit-required confined space.
- Mechanical retrieval devices must be made available to retrieve personnel from a vertical type permit-required confined space more than 5 feet (1.52 m) deep
- SDS's must be made available at the operation if there is a potential for exposure

## **Rescue**

The Attendant(s) or Entry Supervisor must summon rescue personnel or activate emergency services as soon as it has been determined that authorized Entrants may need assistance to escape from a permit-required confined space. Do NOT hesitate to contact emergency services.

If non-entry rescue systems (retrieval) are set up, Attendants must immediately initiate the retrieval process and contact emergency services as soon as possible.

## **Rescue Team**

Rescue Teams are qualified individuals who are highly trained in the skills and techniques that are necessary in providing emergency rescue in a confined space. Only the Office of Institutional Compliance & Risk Management or a governmental organization having jurisdiction

has the authority to select a Rescue Team to provide emergency services for a permit-required space.

Rescue Teams are required and must be readily available prior to entry of a permit-required confined space. A permit must not be authorized until a Rescue Team has been identified, authorized, and notified of the proposed entry.

**NOTE: Calling 911 is not a substitute for a Rescue Team**

## **Declassifying a Permit-Required Confined Space**

The Environmental Health & Safety Manager is the only person that is authorized to declassify a permit-required confined space. The declassifying of a permit-required confined space consists of the following:

- All known characteristics that require a permit for entry has been removed from the confined space (please review the “Permit-Required Confined Spaces” section of this program)
- The Environmental Health & Safety Manager performs an inspection and evaluation of the permit-required confined space to determine if the declassification is authorized
- The Environmental Health & Safety Manager will document any declassification of a permit-required confined space using the Confined Space Declassification form located in Appendix F of this program

If at any point a new or existing hazard becomes observed or becomes active within a declassified confined space, the confined space shall be evacuated immediately, notify the Environmental Health & Safety Manager, and immediately default the declassified confined space back to a permit-required confined space.

# GENERAL SAFETY

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The following precautions shall be used as general safety guidelines during any operation in or near a confined space:

## **Beware of Other Hazards**

- Hazards of uncontrolled release of energy (e.g. electricity, high pressure fluids and gasses, or mechanical energy) often occur in confined spaces. These hazards are addressed by the OSHA Lock-out Tag-out standard at [29 CFR 1910.147](#).

## **Temperature(s)**

- Temperature extremes can be harmful to employees. For example, if a space has been steam-cleaned, it must cool before any employees enter.

## **Engulfment**

- Engulfment hazards such as loose material (grain, sand, coal, etc.) can crust over in a bin, break loose under an employee's weight, and trap employees during entry.

## **Post signs**

- Signs should be posted to identify permit-required confined spaces

## **Working surfaces**

- Slick or wet surfaces can cause slips and falls and increase the chances of electric shock in a confined space.

## **Noise**

- Noise can become excessive in a confined space and can not only damage hearing, but also affect communication and cause warnings to go unheeded.

## **Falling Objects**

- Falling objects are a danger if work is being done above the entrant in a confined space.

## **Fall Protection**

- Fall protection is needed when employees are working at 4 feet or more above a lower level.

# TRAINING

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Confined space training will provide understanding, knowledge, and skills necessary to safely perform required work in or near a confined space. Training will be required:

- Upon initial assignment of duties involving a confined space
- When there is a change in an affected employee's assigned duties
- When there is a change in a permit-required confined space operation (new hazards, new entry procedure, etc.)
- Upon request by Departmental Management
- When Abilene Christian University has reason to believe that there are deviations from the confined space entry procedures required in this program, or when there are inadequacies in the employee's knowledge or use of these procedures.

Refresher training will be conducted as needed or upon request.

For information regarding training requirements, please contact Risk Management at [risk@acu.edu](mailto:risk@acu.edu) or contact the Environmental Health & Safety Manager, 325-674-2424.

## General Training Requirements

All affected personnel whose duties involve confined spaces will have a general knowledge of this program and the following information:

- Specific hazards associated with each confined space to be entered
- Where to find information on each identified confined space
- Personal protective equipment selected for the hazard(s), including proper use, inspection, care and maintenance, limitations and other applicable safety instructions
- The permit system as described within this program and any other procedural requirements for conducting a confined space entry
- How to respond to emergencies
- Duties and responsibilities of confined space entry team members
- How to recognize possible air contaminant exposure symptoms in themselves or co-workers, and methods for alerting assigned Attendants

## Environmental Health & Safety Training

All individuals who are involved in operations in or near a confined space or are responsible for areas where there are confined spaces are required to complete confined space training. These individuals may include, but are not limited to:

- Staff





- Faculty
- Supervisors
- Management
- Entrants
- Attendants
- Entry Supervisors

The Director of the applicable department will make contact with the Environmental Health & Safety Manager at [risk@acu.edu](mailto:risk@acu.edu), or call 325-674-2424, to schedule training.

These training requirements will be developed, maintained, and reviewed by the Environmental Health & Safety Manager.

## **Personnel Specific Training**

### **Attendant Training**

Attendants require specific training that helps prepare them to initiate emergency response and understand the proper use of equipment to communicate with Entrants and emergency rescue personnel. This training includes the following:

- Duties, responsibilities and procedures for both routine and emergency operations
- Hazards that may be encountered by Entrants and the signs and symptoms of overexposure
- Procedures for summoning rescue or other emergency services
- Proper use of the equipment used for communicating with Entry and Rescue Personnel
- Performance of non-entry retrievals

These training requirements will be developed, maintained, and reviewed by the Environmental Health & Safety Manager.

### **Departmental Training**

Supervisors and management are responsible for training their employees in confined space procedures as described within this program and any departmental safety procedures that are specific to their department or work area. This training shall be completed upon initial assignment of a position that is exposed to a confined space. This training shall include, but is not limited to:

- Required personal protective equipment
- Safety procedures for the equipment to be used
- How to properly use and maintain required confined space equipment

- Chain of command during confined space entry
- Contact information for emergency services (Appendix K)
- Locations of confined spaces
- Where to find and file copies of completed confined space permits

The Environmental Health & Safety Manager may be used as a resource to help provide training or training resources.

## PROGRAM REVIEW

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This confined space program and the procedures within this program shall be reviewed annually by the Office of Institutional Compliance & Risk Management. All retained confined space permits, which includes canceled confined space permits, shall be used during the annual review of this program.

## RECORDKEEPING

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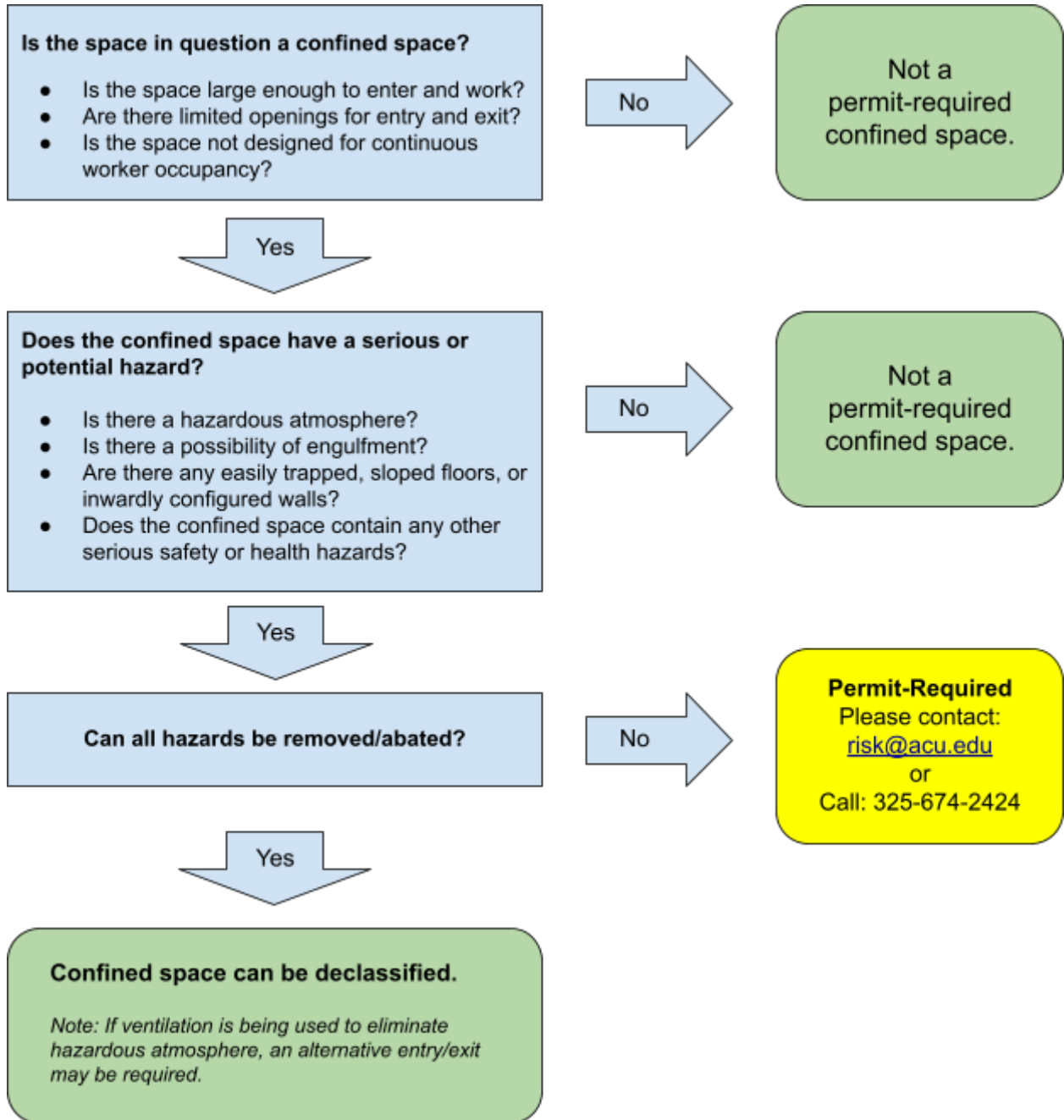
The Environmental Health & Safety Manager shall retain all authorized confined space permits for 12 months or until the annual review has been completed. This includes all canceled confined space permits.

# APPENDIX

# Appendix A

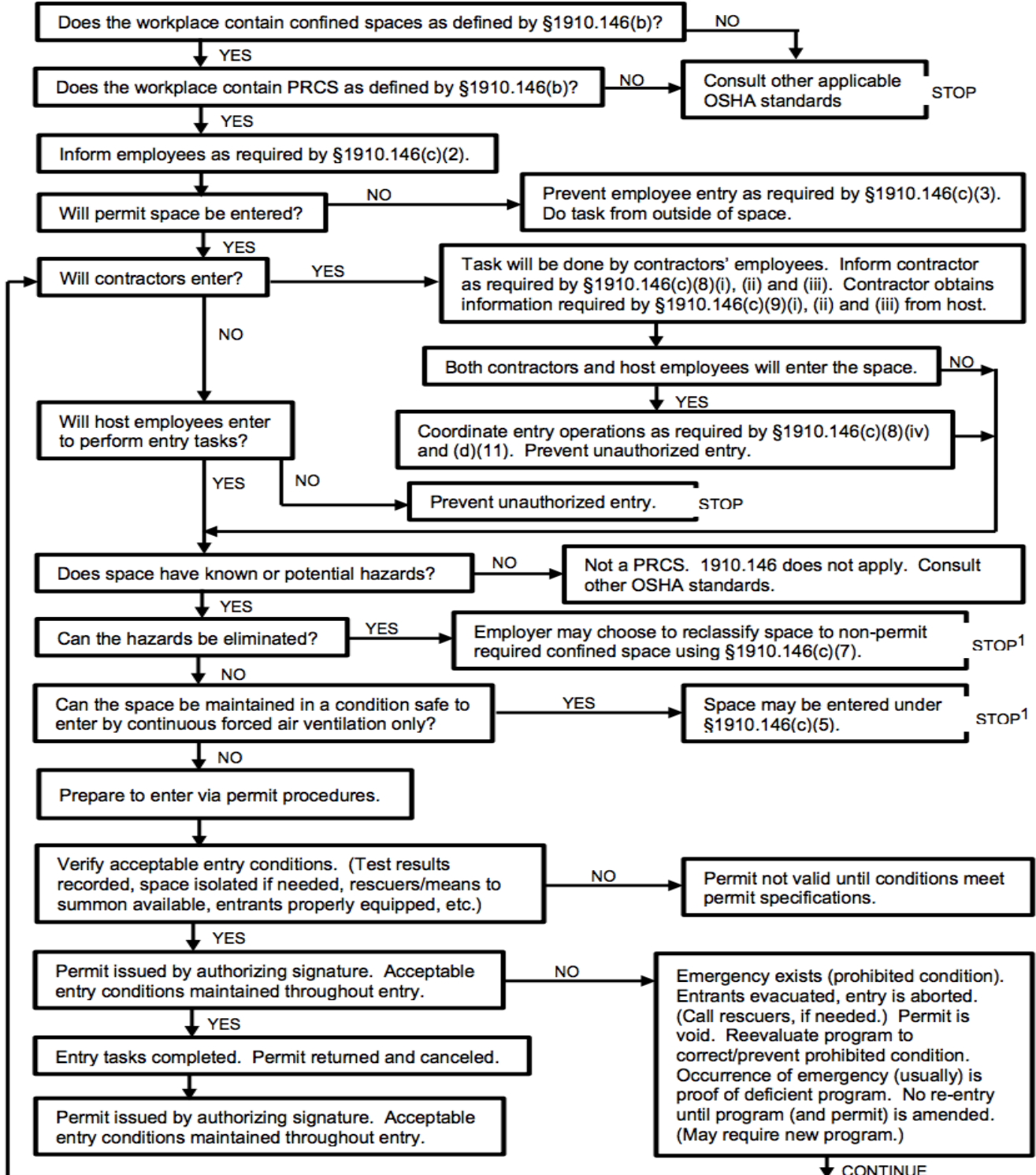
## Confined Space Identification Flow Chart

(if any question is answered with a yes, then follow the “Yes” decision path.)



# Appendix B

## Permit-Required Confined Space Decision Flow Chart



<sup>1</sup> Spaces may have to be evaluated and re-evaluated if hazards arise during entry.



## Appendix C

### Entry Procedure Checklist

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Complete the following steps before, during, and after a confined space entry:

- 1) Obtain a Permit-Confined Space Entry Form from the Environmental Health & Safety Manager
- 2) Notify the Entry Supervisor before the Confined Space Entry
- 3) Verify Confined Space Meter has been calibrated and is in working order
- 4) Ensure all rescue equipment (e.g. tripod, body-belt, lanyard) is in place prior to entry
- 5) Monitor the confined space with the MSA 4-Gas Detector prior to entry..
- 6) Entrants entering the confined space should wear the 4-Gas Detector after the pre-atmosphere test. The Entrant should also have a full body harness and lanyard attached to the rescue tripod. Entrants & Attendants shall have a radio and any other necessary personal protective equipment.
- 7) Entrants can enter the confined space once Step 6 is completed. The Entrant and Attendant should complete the Hazards Identification & Controls section of the Permit-Confined Space Entry Form once the employee is within the confined space. The Entrant should also gather the % Oxygen, % Explosive Gasses, Carbon Monoxide, and Hydrogen Sulfide readings and communicate them to the Attendant to place on the Permit Form.
- 8) The Attendant should maintain constant communication with the Entrant until the Entrant has exited the confined space.
- 9) The Attendant should contact the Entry Supervisor once the entrant has exited the confined space.
- 10) The Permit-Confined Space Entry Form should be given to the Environmental Health & Safety Manager, to file in the Confined Space Records



# Appendix D

## CONFINED SPACE ENTRY PERMIT

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<b>Confined Space Location</b>	
<b>Confined Space ID #</b>	
<b>Date</b>	

**Purpose of Entry**

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<b>Authorized Entrants</b>	<b>Authorized Attendants</b>

<b>Entry Supervisor (Print Name)</b>	
<b>Department</b>	
<b>Rescue Team (Company Name)</b>	

## Hazard Identification & Controls

Hazards of Confined Space	Yes	No	Special Requirements	Yes	No
Oxygen deficiency			Hot Work Permit Required		
Combustible gas/vapor			Lockout/Tagout		
Combustible dust			Lines broken, capped, or blanked		
Carbon Monoxide			Purge-flush and vent		
Hydrogen Sulfide			Secure Area-Post and Flag		
Toxic gas/vapor			Ventilation		
Toxic fumes			Other:		
Skin- chemical hazards			Special Equipment	Yes	No
Electrical hazard			Breathing apparatus- respirator		
Mechanical hazard			Escape harness required		
Engulfment hazard			Tripod emergency escape unit		
Entrapment hazard			Lifelines		
Thermal hazard			Lighting (explosive proof/low voltage)		
Slip or fall hazard			PPE- goggles, gloves, clothing, etc.		
			Fire Extinguisher		

### Communication Procedures:

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<u>CFM - Ventilation</u>	<u>Size - Cubic Feet</u> (if applicable)	<u>Pre-Entry Time</u>
<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		

### Atmospheric Testing



Testing Information	
Company Name	
Name(s) of Person(s) Performing Test	
Contact Information	
Test Instrument Information	
Instrument Name	
Model	
Serial Number	
Date Last Calibrated	

DO NOT ENTER IF PERMISSIBLE ENTRY LEVELS ARE EXCEEDED				
Test	Result	Permissible Entry Level	Test Start Time	Test Stop Time
% of Oxygen		19.5 % to 23.5 %		
% of LEL		Less than 10%		
Carbon Monoxide (PPM)		35 PPM (8 hr.)		
Hydrogen Sulfide (PPM)		10 PPM (8 hr.)		
Other				

## Permit Authorization

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<b>PERMIT AUTHORIZATION</b>	
I certify that all actions, precautions, and conditions necessary for safe entry and exit of the confined space that is listed on the confined space permit have been performed.	
Name (Print):	
Signature:	
Date:	Time:

<input type="checkbox"/> Entry Supervisor Notified <b>Before</b> Entry	<u><b>Time Notified</b></u>
<input type="checkbox"/> Entry Supervisor Notified <b>After</b> Entry	<u><b>Time Notified</b></u>

<b>TIME IN</b>		<b>PERMIT CANCELED TIME</b>	
<b>TIME OUT</b>		<b>REASON PERMIT CANCELED</b>	

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Entry Supervisor Print Name

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Entry Supervisor Signature

## Emergency Contact Information

(Must be maintained with Permit and readily available during entry)

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Emergency Contact Information:	
Emergency Services	911
ACU Police	(325) 674-2911 (325) 674-2305
Abilene Police	(325) 676-8331
Abilene Fire Department	(325) 676-6676
Hendrick Medical Center	(325) 670-2000
Environmental Health & Safety Manager	(325) 674-2424
*Rescue Team Representative	
*Entry Supervisor	
*Department Representative	

\*Contact information must be provided prior to entry being authorized.

# Appendix E

## Confined Space Entrant.Attendant Log

<b>Confined Space Location</b>	
<b>Confined Space ID #</b>	
<b>Date</b>	

### Attendant(s)

On-Duty Time	Signature	Off-Duty Time	Signature

### Entrant(s)

Entry Time	Signature	Exit Time	Signature



# Appendix G

## Confined Space Declassification Certification

<b>Confined Space #</b>	
<b>Location</b>	
<b>Date of Evaluation</b>	

I, \_\_\_\_\_, certify that the permit-required confined listed  
(print name)

above is free of all non-atmospheric hazards and has never, and does not currently contain,  
atmospheric hazards based on testing conducted on \_\_\_\_\_.  
(testing date)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Date)



## Appendix H

### Permit-Required Confined Space Hazard Mitigation

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This form is to be completed and maintained as part of the written plan for the applicable permit-required confined space.

Confined Space #	
Location	
Department	
Date Completed	
Completed By (Print)	
Signature	

Identified Hazard(s)	Mitigation Control(s)

\*If additional space is needed, please print an additional copy of this form.

Comments:
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# Appendix I

## Permit-Required Confined Space Extraction Plan

This form is to be completed and maintained as part of the written plan for the applicable permit-required confined space.

Confined Space #	
Location	
Department	
Date Completed	
Completed By	
Signature	

Extraction Plan(s)	
Extraction Equipment Needed	



## Appendix K

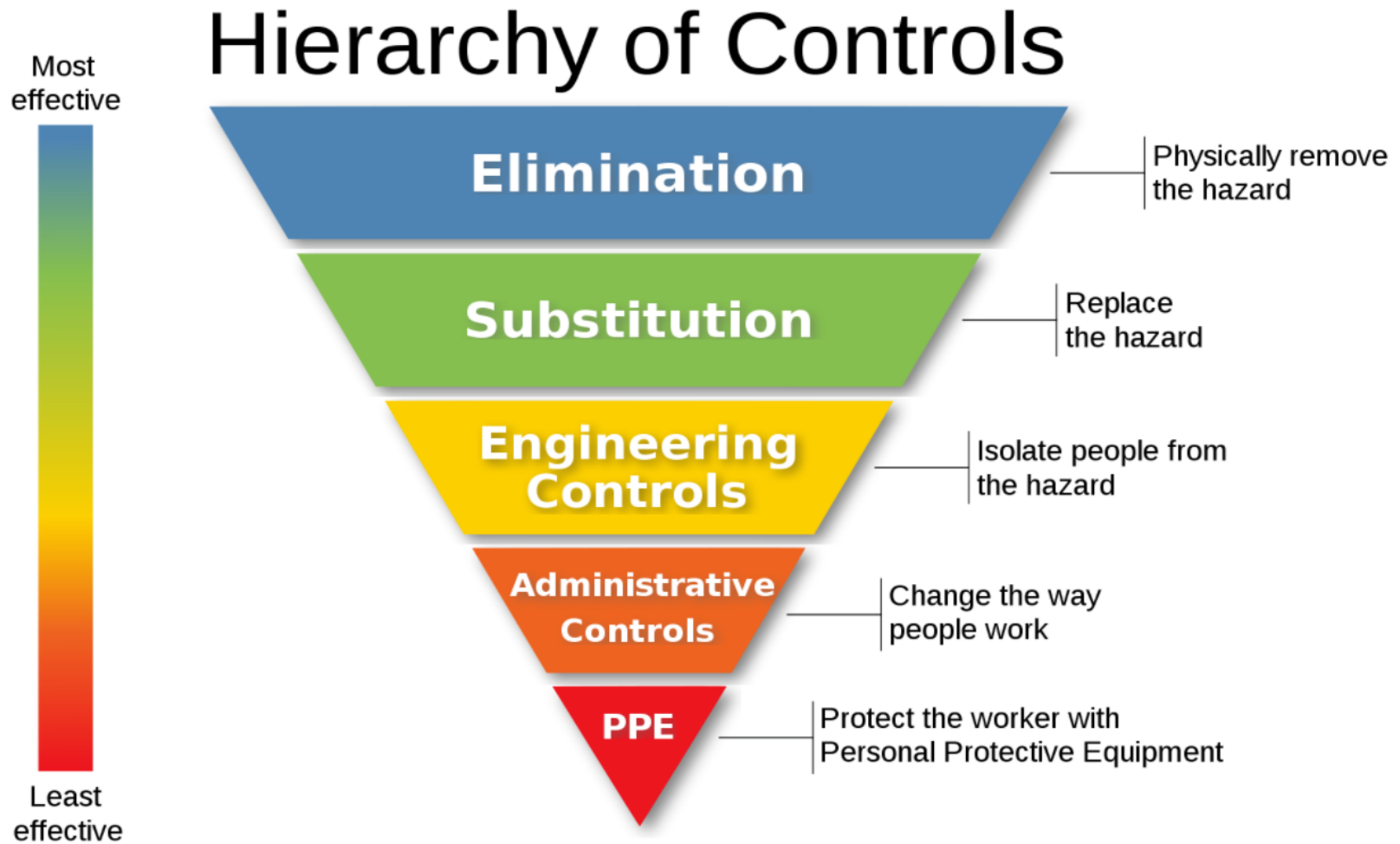
### Contact Information

<b>Emergency Services</b>	
<b>Name</b>	<b>Phone Number</b>
<u>Abilene Fire Department</u> Non-Emergency Emergency	(325) 676-6676 911
<u>Abilene Police Department</u> Non-Emergency Emergency	(325) 673-8331 911
ACU Medical Clinic	(325) 674-2625
Hendrick Medical Center	(325) 670-2000

<b>Abilene Christian University Employees</b>	
<b>Name</b>	<b>Phone Number</b>
ACU Police	(325) 674-2911 (325) 674-2305
<u>Environmental Health &amp; Safety Manager</u> Zach Harmon	(325) 674-2424

Appendix L

Hierarchy of Controls



## Appendix M

### Effects of Oxygen-Enriched and Oxygen Deficient Atmospheres

Oxygen Percent by Volume	Resulting Condition/Effect on Humans
23.5% and Above	Oxygen enriched, extreme fire hazard
21%	Normal oxygen concentration of air
19.5%	Minimum "Safe Level" (OSHA, NIOSH*)
15-19%	Decreased ability to work strenuously. May impair coordination and may induce early symptoms in persons with coronary, pulmonary, or circulatory problems
12-14%	Respiration increased in exertion, pulse up, impaired coordination, perception, judgment
10-12%	Respiration further increases in rate and depth, poor judgment, lips blue
8-10%	Mental failure, fainting, unconsciousness, ashen face, blueness of lips, nausea, and vomiting
6-8%	8 minutes, 100% fatal; 6 minutes, 50% fatal; 4-5 minutes, recovery with treatment
4-6%	Coma in 40 seconds, convulsions, respiration ceases, death

*These values are approximate, and effects can vary based on an individual's health and on physical activities performed. Source: \*National Institute of Occupational Safety and Health (NIOSH)*

## Appendix N

### Effects of Carbon Monoxide (CO) Levels

CO Level in PPM*	Resulting Condition/Effect on Humans
35	Permissible exposure level, 8 hours (OSHA)
200	Possible mild frontal headache in 2 to 3 hour
400	Frontal headache and nausea after 1 to 2 hours. Occipital (back of the head or skull) after 2-1/2 to 3-1/2 hours
800	Headache, dizziness, and nausea in 45 minutes. Collapse and possibly death in 2 hours
1600	Headache, dizziness, and nausea in 20 minutes. Collapse and possibly death in 2 hour
3200	Headache and dizziness in 5 to 10 minutes. Unconsciousness and danger of death in 30 minutes
6400	Headache and dizziness in 1 to 2 minutes. Unconsciousness and danger of death in 10-15 minutes
12800	Immediate effect is unconsciousness. Danger of death in 1 to 3 minutes

\* Parts per million, 10,000 PPM – 1 percent by volume

All values are approximate, and effects can vary based on an individual's health and physical activities performed. Source: American Industrial Hygiene Association

