CONFINED SPACE ENTRY PROGRAM

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USC University of Southern California
Office of Environmental Health and Safety
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1.0 Purpose and Scope

The University of Southern California Confined Space Entry Program (CSEP) is designed to protect the health and safety of workers entering confined spaces to perform maintenance, cleaning, or other types of work. The program provides information and guidelines for working with all classifications of confined spaces. This Confined Space Program has been designed to comply with California Code of Regulations (CCR), Title 8, Section 5157. Also, telecommunication utility manholes/vaults are regulated under 8 CCR, Section 8616.

The objectives of the CSEP are to:

1. Identify all campus confined spaces and maintaining a current confined space inventory.
2. Determine which spaces are permit-required confined spaces.
3. Post appropriate signage and providing training so individuals will recognize confined spaces and will not enter unless authorized.
4. Authorize individuals to work in confined spaces and ensure they have received proper training.
5. Implement a permit system to ensure safe and legal entry into permit-required confined spaces.

Additionally, through the requirements described in this document, it establishes procedures and responsibilities for USC employees, students, volunteers, and contractors while engaged in USC-related activities.

USC’s Confined Space Entry Program:

- Identifies and classifies the known confined spaces at USC and discusses the reclassification of work areas or the implementation of alternate entry procedures.
- Identifies the necessary components for entry into confined spaces including, but not limited to, equipment and supplies which may be required.
- Identifies rescue and emergency procedures for confined space entries and the responsibilities of authorized employees in such instances.
- Identifies USC’s Confined Space Permit System including preparation, use, and cancellation of entry permits. The Confined Space Permit System includes work performed by contractors.
- Provides training to employees involved with confined space work and identifies their duties.
- Provides for a review of individual operations involving confined spaces and an annual program review.
2.0 Regulations and Policies

State
Cal/OSHA
Group 16. Control of Hazardous Substances
Article 108. Confined Spaces

University Policies and Standards
The following university policies and standards have been established to create a safe and productive working and learning environment and to assure compliance with all applicable regulatory requirements. Questions or concerns about individual policies should be directed to the “Responsible Office” listed at the end of each policy. The university reserves the right to revise the following policies at any time:

• Injury and Illness Prevention https://policy.usc.edu/injury-prevention/
• Confined Space Entry Program
• Training Requirements and Opportunities https://policy.usc.edu/training-requirements-and-opportunities/
• Smoke Free https://policy.usc.edu/smoke-free/
• USC Drug-Free https://policy.usc.edu/drug-free/
• Personal Protective Equipment Standard https://ehs.usc.edu/research/manage/ppe/
### Definitions and Acronyms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACCEPTABLE ENTRY CONDITIONS</strong></td>
<td>The conditions that must exist in a permit space to allow entry so that employees involved with a permit-required confined space entry can safely enter into and work within the space.</td>
</tr>
<tr>
<td><strong>ADJACENT SPACES</strong></td>
<td>Any space in all directions from the permit required confined space including all points of contact, corners, diagonals, and bulkheads.</td>
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<tr>
<td><strong>ALTERNATE ENTRY PROCEDURE</strong></td>
<td>A procedure that may be used to enter a Permit-Required Confined Space if the only hazard present in the space is atmospheric and is controllable by mechanical ventilation alone, and the atmosphere will not become immediately dangerous to life and health if the mechanical ventilation fails.</td>
</tr>
<tr>
<td><strong>ATTENDANT</strong></td>
<td>A person who remains outside the confined space, verifies safe entry conditions, maintains constant communication with those inside the space, and whose primary duty is to summon help should there be any indication of endangerment to those inside the space (see Confined Space Entry Procedures).</td>
</tr>
<tr>
<td><strong>BLANKING OR BLINDING</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>CHEMICAL</strong></td>
<td>Any compound, mixture, or solution in the form of a solid, liquid, or gas that may be hazardous by virtue of its properties (e.g., flammable, toxic, reactive, corrosive, and radioactive) or by virtue of the properties of compounds that might be evolved from hot/cold work.</td>
</tr>
<tr>
<td><strong>COLD WORK</strong></td>
<td>Any activity that does not involve heat, fire, or spark-producing operations.</td>
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<tr>
<td><strong>CONFINED SPACE</strong></td>
<td>A space that meets the following criteria:</td>
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<tr>
<td></td>
<td>- Is large enough and so configured that an employee can bodily enter and perform assigned work; and</td>
</tr>
<tr>
<td></td>
<td>- Has limited or restricted means for entry or exit (e.g., tanks, vessels, storage bins, vaults, pits, and excavations are spaces that may have limited means of entry); and</td>
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<tr>
<td></td>
<td>- Is not designed for continuous employee occupancy.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
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</tr>
<tr>
<td>CONTINUOUS HUMAN OCCUPANCY</td>
<td>Intended as a place of regular work and supplied with ventilation and other conditions necessary to support life. Regular work means the building meets minimum ventilation and lighting requirements for factory work as described in the Uniform Building Code.</td>
</tr>
<tr>
<td>DOUBLE BLOCK AND BLEED</td>
<td>Closure of a line, duct or pipe by locking closed two in-line valves, and tagging or locking open a drain or vent valve in the line between the two closed valves.</td>
</tr>
<tr>
<td>EMERGENCY</td>
<td>Any occurrence (including any failure of hazard control or monitoring equipment) or event, internal or external, to the permit space that could endanger entrants.</td>
</tr>
<tr>
<td>EMERGENCY RESPONSE TEAM</td>
<td>Group of individuals trained to perform emergency rescue operations who are designated by USC as the Emergency Response Team.</td>
</tr>
<tr>
<td>ENGULFMENT</td>
<td>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.</td>
</tr>
<tr>
<td>ENTRANT</td>
<td>Employee who is authorized to enter a permit space.</td>
</tr>
<tr>
<td>ENTRY</td>
<td>Action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and occurs as soon as any part of the entrant’s body breaks the plane of the opening of the space.</td>
</tr>
<tr>
<td>ENTRY PERMIT</td>
<td>The written or printed document giving authorization for entry into a Permit-Required Confined Space under established conditions for a stated purpose during a specified work shift.</td>
</tr>
<tr>
<td>ENTRY SUPERVISOR</td>
<td>The person responsible for determining whether entry conditions are acceptable at the confined space immediately prior to entry, for authorizing the entry and specific entry operations, and for terminating the entry as described in this program. (Not necessarily an actual supervisor; this is a confined space term only.)</td>
</tr>
</tbody>
</table>
### Hazardous Atmosphere

An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist in excess of 10 percent of its lower explosive limit (LEL);
- Airborne combustible dust at a concentration that meets or exceeds its LEL;
- Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
- Atmospheric concentration of any substance for which a dose or a published exposure guideline is available and which could result in employee exposure in excess of its dose or permissible exposure limit.

<table>
<thead>
<tr>
<th>HAZARDOUS ATMOSPHERE ONLY SPACE</th>
<th>A confined space in which the only hazard posed is an actual or potential hazardous atmosphere which can be controlled by continuous forced ventilation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH)</td>
<td>Any condition that poses an immediate or delayed threat to life or what would cause irreversible adverse health effects or that would interfere with an individual’s ability to escape unaided from a permit space.</td>
</tr>
<tr>
<td>ISOLATION</td>
<td>The process of removing from service a hazard source associated with a Permit-Required Confined Space and completely protecting the space from inadvertent release of energy or material into the space. Means of isolation include: blanking (skillet-type metal blank between flanges); blinding; misaligning or removing sections of pipes, lines or ducts; a double block and bleed system; lock-out/tag-out of all sources of power; and blocking or disconnecting all mechanical linkages.</td>
</tr>
<tr>
<td>JOB SAFETY ANALYSIS (JSA)</td>
<td>An analysis/form completed prior to entering any permit-required confined space.</td>
</tr>
<tr>
<td>LIQUID, COMBUSTIBLE</td>
<td>A liquid having a flash point greater than 199.4°F (93°C) - (formerly designated Class IIIB Combustible liquids).</td>
</tr>
<tr>
<td>LINE BREAKING</td>
<td>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.</td>
</tr>
<tr>
<td>NON-PERMIT CONFINED SPACE</td>
<td>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.</td>
</tr>
</tbody>
</table>
### Permit Required Confined Space (PRCS)

A confined space that has one or more of the following characteristics:
- Contains or has the 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; or
- Contains any other recognized serious safety or health hazard.

### Posting

A danger sign or other equally effective means to inform employees who work in an area that contains a permit-required confined space, of the existence, location and danger posed by the permit space. Note: A sign reading “DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER” or using other similar language would satisfy the requirement for a sign.

### Retrieval System

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 a person from a permit space.

### Testing

The process by which hazards or potential hazards of a Permit-Required Confined Space are identified and evaluated.
Clearly defined roles and responsibilities for a group or organization: (a) minimize chaos and confusion especially during emergencies because everyone knows what to do, (b) maximize internal efficiency, and (c) facilitate management of internal risks. While the expectations are understandably different for every party involved, one that is shared by all is to Make Safety Your First Operational Thought!

**Department Heads and Chairs**

Department Heads and Chairs are responsible for:

- Providing the necessary resources to ensure the health and safety of their employees.
- Identifying individuals as supervisors and ensuring they are trained on their health and safety responsibilities.
- Ensuring departmental compliance with campus health and safety policies and procedures.
- Ensuring workplace hazards are identified and controlled.

**Confined Space Owners**

Confined Space owners (e.g., departments, principal investigators, or area management) have the responsibility to ensure that the confined spaces under their control are identified, evaluated, classified, and inventoried. Furthermore, they are responsible for contractor awareness of confined space hazards and EH&S notification prior to initiating confined space entry work.

**Confined Space Survey and Inventory**

Each department shall designate an individual (or individuals) to assist with the survey and inventory of confined spaces.

The survey shall be:

- Conducted by the space owner (department) in conjunction with EH&S.
- Include an assessment of any real or potential hazards within the space.
- Describe how hazards present will be mitigated prior to entry if entries are to take place.

A confined space inventory shall be maintained by each department with confined spaces. A master inventory for the campus will be maintained current by EH&S, with updates initiated by the Space Owner as needed.

**Labeling/Signage**

Signage for non-permit required confined spaces is not required, however it is recommended for spaces that may be accessed by untrained personnel. Recommended signage is as follows:
Permit-Required Confined Space, which could be inadvertently entered, shall be labeled as such using the following language:

**DANGER**
**PERMIT-REQUIRED**
**CONFINED SPACE**
**DO NOT ENTER**

**Contractor Awareness**

In the event that a contractor needs to enter a confined space, the contracting department shall:

- Provide the contractor with a completed [Contractor Pre-Entry Information Form](#) prior to initiating confined space entry work. The form will detail the following:
  - Known/anticipated hazards associated with the space, past experience with the space, and whether it is a Permit-Required Confined Space;
  - Precautions and procedures that must be implemented for the protection of employees in or near the confined space area; and
  - Available methods to activate the emergency notification system.
- Coordinate entry operations with the contractor when both campus personnel and contractor personnel will be working in or near confined spaces.
- Consult with the contractor at the conclusion of each confined space entry operation regarding any hazards confronted or created in confined spaces during entry operations.
- Instruct the contractor to complete and submit the [Contractor Debriefing Form](#) to the contracting department within 48-hours of termination of entry.
EH&S Notification
Departments shall notify EH&S immediately if the following occurs:

- Unauthorized entry of a permit space.
- The occurrence of an injury or near-miss during a confined space entry.
- A change in the use or configuration of a permit space.

Managers, Supervisors, and Principal Investigators
Managers, Supervisors, and Principal Investigators have the primary responsibility of ensuring the health and safety of those they supervise and working in partnership with EH&S.

Specific confined space responsibilities include:

- Identifying confined spaces that their employees may enter and ensuring they have been classified correctly.
- Designating persons who are to have active roles as confined space entry team members (i.e., authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations and identifying the duties of each such employee and providing each with the required training.
- Ensuring their employees are appropriately trained and training is documented.
- Ensuring all hot work is authorized through the Fire Safety & Emergency Planning on a separate Hotwork Permit form and attached and noted on the entry permit.
- Ensuring a copy of all entry permits and related support documents (e.g., hot work permit and air monitoring data) is retained by the department and a copy is also submitted to injuryprevention@usc.edu.
- Developing and implementing special procedures for confined space entry as needed.

Project Managers
The Project Manager’s responsibilities in a Permit-Required Confined Space (PRCS) are the following:

- Inform the contractor that PRCS entry is allowed only in compliance with applicable Cal/OSHA regulations.
- Ensure that contractors:
  - Provide the University with their confined space program and associated safety documents prior to commencing contract work.
  - Have available, current training records in compliance with Title 8 CCR5157(g) for their employees working in and around the confined space.
  - Complete corresponding forms before entering the confined space.
- Coordinate with USC personnel if the contractor will be conducting dual entry in a multi-employer setting.
- Communicate hazards with contractors hired to perform work on/off campus property. Consult with the Office of Environmental Health & Safety for hazards identified at USC.
- Request and follow the Hot Work Permit program.
• When malodorous or hazardous materials must be used, employ strict exposure control methods, work during off hours/weekends, shut off the HVAC (if applicable), consider filtration methods for operational HVAC.
• Consult with EH&S to use less hazardous materials wherever possible.
• Where applicable, notify all persons in advance of all projects that the persons may be impacted by.

**Contractors**

Each contractor who is retained to perform work that will require entry into a PRCS shall:

• Provide a written Confined Space Entry Program that complies with Cal-OSHA regulations and must meet or exceed USC’s Confined Space Entry Program requirements. This must be approved in writing by the designated USC representative(s) prior to approval to perform confined space entry work.
• Obtain any available information regarding permit space hazards and entry operations from the Department Space Owner.
• Coordinate entry operations with the Department Space Owner when both the contractor and USC personnel will be working in or near permit spaces.
• Inform the Department Space Owner prior to entry operations, the procedures the contractor will follow and any hazards confronted or created during entry into permit spaces.
• The contractor must conduct their own testing with their own equipment, and use their own confined space entry permits and other applicable permits (e.g., hot work permit).
• The contractor must complete and submit the [Contractor Debriefing Form](mailto:ContractorDebriefingForm) to the contracting department within 48-hours of termination of entry.
• The contracting department scans and emails a copy of the [Contractor Debriefing Form](mailto:ContractorDebriefingForm) to EH&S at injuryprevention@usc.edu.

**Employees, Students, and Volunteers**

Employees, Students, and Volunteers responsibilities:

• Understand and comply with USC health and safety policies and procedures.
• Annually attend Confined Space Entry training provided by EH&S, or equivalent. Entry team personnel (entrant, attendant, and supervisor) are required to attend Confined Space Entrant and Attendant training or Confined Space Entry Supervisor training.
• Perform assigned duties according to the procedures listed in this Program.
• Maintain confined space safety equipment in ready-to-use condition, keeping it clean and functional per manufacturer’s directions.
• Never perform a confined space entry unless all provisions of this Program are observed.
• Immediately notify their supervisor of any problems or questions regarding confined space work.
“The Entry Supervisor”

The Entry Supervisor responsibilities in a Permit-Required Confined Space (PRCS):

- Know space hazards, including information on the mode of exposure (e.g., inhalation or dermal absorption), signs or symptoms, and consequences of the exposure.
- Ensure that:
  - Atmospheric testing and proper preparation is performed prior to entry.
  - Safe conditions have been attained.
  - Acceptable entry conditions are maintained.
  - Proper equipment is onsite and operational.
- Make sure the site is clear of unauthorized personnel.
- Ensure the entry permit and emergency plan are accurate prior to entry.
- Confirm rescue team availability.
- Sign Confined Space Entry Permit prior to entry.
- Cancel the permit once the operation is completed.
- Assure that persons assigned to be Attendant(s) and Entrants have received Confined Space Entry Team Training and understand confined space hazards and standby procedures.
- Minimize the number of employees permitted to enter confined spaces, and list every entry team member on the Confined Space Entry Permit.
- Review the job duties and entry permit requirements for the permit-required confined space prior to entry.
- Assure that all safety equipment and job tools necessary to safely complete the assigned work in the confined space are present and in good working condition prior to entry.
- Ensure the functionality of the communication method between Entrants and Attendants.
- Assure that the entry conditions are acceptable.
  - Ensure that the confined space has been decontaminated of hazardous materials to the extent feasible before entry.
  - Where potential exists for electrical shock, ensure that:
    - Appropriate electrical equipment is used, including protections such as GFCI (ground fault circuit interrupters), assured grounding systems, double insulated tools, and low voltage systems; and
    - Any electrical equipment used in hazardous locations meets appropriate requirements of Article 500 of the National Electrical Code (NFPA-70).
  - Specify, and include on the entry permit, any pre-entry procedures necessary to eliminate or isolate hazardous energy sources that could be expected to cause injury or illness to entrants if not isolated, including electrical, mechanical, hydraulic, pneumatic chemical, thermal, radioactive and gravitational sources:
    - Isolation methods may include securing, relieving pressure, blinding, blanking, double block and bleed, and lockout/tagout.
    - In confined spaces where complete isolation is not possible, specify as rigorous isolation as practical, and assure that a hazard evaluation is conducted prior to entry.
• Specify on the entry permit the air monitoring necessary to ensure a continued safe work environment, and assure that the Attendant understands the monitoring requirements.

• Assure that all entrants review the air monitoring results prior to entry and if a respirator is required, that all entrants have appropriate respiratory equipment and current USC Certification to wear the respirator that they intend to use.

• Complete and sign the entry permit prior to entry, but only after all entry requirements are fully understood and completed, including:
  ◦ Ventilation requirements as specified on the permit
  ◦ Procedures to isolate all hazardous energy sources

• Assure that all employees entering the confined space know and understand their duties, the potential hazards that the space presents, the time required to do the work, the equipment and tools required, and the methods of communication with a standby employee.

• Post a copy of the entry permit at the entry site.

• Terminate the entry permit after assuring that all entrants have safety exited the space, and the space is secured.

• Scan and email a copy of the Confined Space Entry Permit to EH&S at injuryprevention@usc.edu.

“The Attendant”

Attendant responsibilities include the following:

• Do not enter the confined space.

• Remain outside the confined space until relieved by another Attendant.

• Prepare to initiate non-entry rescue plan.

• Prepare to call the entry rescue team.

• Be aware of the known and potential hazards.

• Maintain an accurate count of the authorized entrants in the space.

• Is alert to possible behavior changes of entrants.

• Monitor inside/outside confined space to ensure entrants’ safety.

• Prevent unauthorized entry into the space.

• Communicate with the Entrants.

• Order evacuation if any conditions change from those detailed in the entry permit.

• Conduct air monitoring and hazard assessment as specified on the Confined Space Entry Permit.

• Prohibit entry whenever monitoring indicates that oxygen, flammability or toxicity are not within acceptable limits or until appropriate controls are implemented or appropriate personal protective equipment is provided. Acceptable limits are as follows (in order of testing):
  ◦ Oxygen: 19.5% to 23.5% by volume
  ◦ Flammability: Less than or equal to 10% of the lower explosive limit (LEL)
  ◦ Hydrogen Sulfide: Less than 5 ppm
  ◦ Carbon Monoxide: Less than 10 ppm
  ◦ Toxicity (substances listed on Entry Permit under “other”): Less than 50% of the Cal-OSHA Permissible Exposure Limit (PEL) or ACGIH TLV (Threshold Limit Value)

• Monitor ventilation when implemented.
• Assure that ventilation is drawn from a clean source and will not increase the hazards in the space. When utilizing forced ventilation, periodically test the atmosphere to ensure that the ventilation is preventing the accumulation of a hazardous atmosphere.
• When ventilation is not feasible, work with the Entry Team to establish alternate protective measures prior to authorizing entry.
• Terminate the entry whenever a safety concern arises or an unauthorized person enters the area.

“The Authorized Entrant”
Authorized Entrant responsibilities include the following:
• Know the space hazards, including information on the route of exposure (e.g., inhalation or dermal absorption) for the anticipated space contaminants, signs or symptoms, and consequences of the exposure.
• Review and verify the accuracy of the entry permit, with the Attendant and Entry Supervisor, prior to entry.
• Use appropriate PPE (personal protective equipment - e.g., eye and face protection and other forms of barrier protection such as gloves, coveralls, and safety boots) consistent with the manufacturer’s requirements.
• Ensure the proper use of entry equipment.
• Performs assigned job safely.
• As necessary, maintain communication (i.e., telephone, radio, visual observation) with attendant to enable the attendant to monitor the entrant’s status as well as to alert the Entrant to evacuate.
• Alert the Attendant when a prohibited condition exists or when warning signs or symptoms of exposure exist.
• Evacuate immediately when ordered by an authorized person, when the entrant recognizes the warning signs or symptoms of exposure exist, when a prohibited condition exists, or when an automatic alarm is activated.

Environmental Health and Safety (EH&S)
The Office of Environmental Health and Safety (EH&S) will oversee the administration of the Confined Space Entry Program, but the ultimate responsibility for its implementation is with each department that conducts confined space entry or hires a contractor who enters a confined space.

EH&S responsibilities include the following:
• Develop and maintain the USC Confined Space Program, and ensuring it meets all applicable regulatory requirements.
• Assist departments in identifying and classifying confined spaces.
• Assist with atmospheric testing and equipment selection as needed.
• Develop and provide confined space entry training.
• Review all entry permits on an annual basis.
• Maintain a master list of campus confined spaces.
• Assess the effectiveness of the program as described in this document.
Fire Safety and Emergency Planning (FSEP)

FSEP is responsible for the administration of the USC Hot Work Permit program. This program is to prevent injury or loss to property while ensuring safe work conditions during welding, cutting, brazing, and grinding operations.
Confined spaces can be below or above ground, and can be found in almost any workplace. A confined space, despite its name, is not necessarily small. Examples of confined spaces include silos, vats, hoppers, utility vaults, tanks, sewers, pipes, access shafts, truck or rail tank cars, aircraft wings, boilers, manholes, manure pits, storage bins, etc.

**Confined Space Classification**

All confined space must be evaluated and classified as a non-permit or permit-required confined space.

A non-permit required confined space meets the definition of a confined space but does not have any additional known or potential hazards. A permit-required confined space is a confined space with one or more actual or potential hazards. Below are the legal definitions of the two classifications of confined spaces:

A "**Confined Space**" is a space which has all three of the following characteristics:

1. Large enough for an employee to enter and perform assigned work; and
2. Has limited or restricted means for entry or exit; and
3. Is not designed for continuous employee occupancy.

A simple assessment of limited or restricted means for entry or exit is determining whether entry/exit or rescue is slowed down or impeded by:

- Use of hands (crawling, climbing)
- Contort body
- Physical obstructions
- Posture

A "**Permit-Required Confined Space**" (PRCS) is a confined space that has one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant (e.g., water, sand, dirt);
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or,
4. Contains any other recognized serious safety or health (such as electricity, biological hazards, radiation hazards, or moving parts of machinery).
Work Space Classification Flow Chart

Do I have a confined space?

**CONFINED SPACE CRITERIA**

1. Space is large enough for an employee to enter and perform the assigned work, **AND**
2. Space has limited or restricted means of entry or exit, **AND**
3. Space is not designed for continuous employee occupancy.

**Space meets criteria?**

- **YES**
  - Not a Confined Space.
- **NO**
  - Not a Confined Space.

Do I need a permit for my confined space?

**A CONFINED SPACE REQUIRES A PERMIT WHEN:**

1. The confined space contains or has the potential to contain a hazardous atmosphere, **OR**
2. Material (or materials) in the space has the potential to engulf an entrant, **OR**
3. The internal configuration of the space is such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, **OR**
4. The confined space contains any other recognized serious safety or health hazard.

**Space meets criteria?**

- **YES**
  - No permit required.
- **NO**
  - No permit required.

How do I get a permit?

**PARTICIPATE IN THE PERMIT-REQUIRED CONFINED SPACE PROGRAM:**

The program entails the following:

- Permit system - Written procedures for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.
- Prohibited Condition – Conditions that are not allowed in a permitted confined space during the period of authorized entry.
- Rescue Services – Personnel designated to rescue entrants from permitted confined spaces.
- Retrieval System – Equipment used for non-entry rescue of entrants from permitted confined space.
- Testing – Includes specifying the tests that are to be performed in the permitted confined spaces to identify and evaluate the hazards that may confront entrants.
Confined Space Hazards

Hazardous atmospheres are atmospheres presenting a potential for death, disablement, impairment of ability to self-rescue, injury, or acute illness. These may occur when the lack of adequate mechanical or natural ventilation or the presence of stored or introduced materials (such as chemicals), or the work process being performed in a confined space causes, or has the potential to cause, one or more of the following:

- **Oxygen-Deficient Atmospheres**: An oxygen-deficient atmosphere has less than 19.5% available oxygen. Any atmosphere with less than 19.5% oxygen by volume shall not be entered unless personnel have been properly trained and have an approved supplied air respirator (e.g., self-contained breathing apparatus (SCBA) or an airline system). This is an atmosphere that is Immediately Dangerous to Life and Health (IDLH). Oxygen deficient atmospheres may develop in the following situations:
  ◦ Ambient oxygen is consumed by the work being performed, such as welding, cutting or brazing, or it can be decreased by certain chemical reactions (for example, the rusting of metal) or through bacterial action.
  ◦ Ambient oxygen is displaced by another gas, such as carbon dioxide or nitrogen (inerting).
- **Oxygen-Enriched Atmospheres**: Oxygen enrichment refers to air containing more than 23.5 % oxygen. This dangerous condition is an extreme fire hazard in which static electricity from materials such as hair or clothing can provide the ignition source needed to start a fire. This environment also allows any fire to burn more readily. Oxygen enrichment does not occur naturally and should be investigated.
- **Flammable Atmospheres**: Different gases have different flammable ranges. An atmosphere is considered hazardous if the concentration of any substance is equal to or greater than 10% of its lower explosive limit (LEL). If a source of ignition (such as a sparking or electrical tool) is introduced into a space with a flammable atmosphere, an explosion will result. For an atmosphere to be flammable there must be:
  ◦ A sufficient amount of oxygen, or other oxidizing gases, in the air; and
  ◦ A flammable gas, vapor, or dust present in the proper proportion.
- **Toxic Atmospheres**: Most substances (liquids, vapors, gases, mists, solid materials, and particulates) can present a hazard in a confined space. Toxic atmosphere contain an atmospheric concentration of one or more substances above their Permissible Exposure Limit (PEL), and include any other atmospheric condition that are IDLH. Toxic substances can come from the following:
  ◦ A product stored in the space.
  ◦ The work being performed in the space. Examples include welding, cutting, brazing, painting, scraping, sanding, degreasing, use of solvents, etc.
  ◦ Toxic materials stored in areas adjacent to the confined space. Examples include chemicals or fuel stored in leaking underground storage tanks, or sections of the steam tunnels that may overlay or lie adjacent to a leaking sewer system.
Additional Hazards

Additional hazards which may require a confined space to be classified as a permit-required confined space:

- **Mechanical & Electrical Hazards**: Moving equipment or parts and energized or pressurized systems can be dangerous. Examples include shafts, couplings, gears, belts, conveyors, mixers, rotors, and compressing devices. A permit space must be isolated, or removed from service, and completely protected against the release of energy or materials into the space. This is accomplished by:
  - Blanking, blinding, misaligning or removing sections of lines, pipes or ducts.
  - A double block and bleed system.
  - Lockout or blockout of all sources of energy, including mechanical, electrical, chemical, pressurized systems, thermal (e.g. systems which operate at a temperature, either hot or cold, that could cause physical injury upon contact) or potential (for example, elevated platforms that could shift and then lower upon an entrant).
  - Blocking or disconnecting all mechanical linkages to prevent movement.

- **Entrapment Hazards**: Entrapment hazards in confined spaces include inwardly converging walls or floors that slope downward and taper to a smaller cross-section. Examples include hoppers for air pollution dust collectors (i.e., bag houses, electrostatic precipitators), bottom-mounted unloading chutes for railcars and trucks, cyclones and funnels.

- **Engulfment Hazards**: This refers to the surrounding or burial of the worker in a liquid or loose, finely divided solid material, such as sand or grain. Such materials can suffocate a worker (Ref: Dangers of Engulfment and Suffocation in Grain Bin: [https://www.osha.gov/Publications/hazard-alert_grain_bins.pdf](https://www.osha.gov/Publications/hazard-alert_grain_bins.pdf)). Examples include:
  - Accidental dumping of a product on a worker.
  - A worker walking on unstable material such as settled grain.

- **Thermal Hazards**: A thermal hazard is a dangerous condition caused by excessive heat or cold or a hot surface. Employees engaged in continuous heavy work while wearing PPE (e.g., body suit and respirator) in warm surroundings are particularly susceptible to thermal hazards. Heat stress may lead to heat exhaustion, heat cramps, heat stroke, loss of consciousness, or death. A confined space entry permit must address any hazards from heat or cold within confined spaces.

- **Other Hazards**: Snakes, rodents, spiders, poor lighting, noise, obstructions, falling objects, wet surfaces, trip/slip and fall hazards, and radioactive materials are examples of confined space hazards that may also need to be addressed and controlled.
Departments, Managers, and Supervisors are responsible for ensuring their employees are properly trained prior to entering or performing work in confined spaces. Training must be documented and training records shall be kept for as long as it is reasonably expected an employee will be working in confined spaces. The costs associated with any necessary equipment or training contracted shall be paid for by the Department.

Initial training and refresher are required every two years for all Confined Space Entry Supervisors, Authorized Entrants, and Attendants.

**NOTE:** All training records, inspections, JSA, and other supporting documentation must be maintained by the department for the duration of all workers’ employment. This requirement is consistent with **USC’s Record Management Policy**.

### Confined Space Work

All personnel involved in confined space work (i.e., Entry Team Members) shall receive appropriate training in hazard recognition, personal protective equipment, safety equipment, communications equipment, procedures for calling rescue services and proper use of non-entry rescue equipment as needed.

This training shall:

- Be conducted before the employee engages in confined space duties, when there is change in assigned duties, whenever there is a change in operations that presents a hazard about which an employee has not previously been trained and whenever the employer has reason to believe either that there are deviations from confined space entry procedures or that there are inadequacies in the employee’s knowledge or use of these procedures.
- Establish employee proficiency in their duties and introduce new or revised procedures as necessary.
- Be documented and contain each employee’s name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.
- Include conditions or work practices that may produce a hazard in a non-permit confined space that may require that the space be reevaluated by the entry supervisor prior to entry.
USC encourages the practice of non-entry techniques instead of entry into confined spaces. One of the options for entry may be No Entry. Determine if there is a safer/smarter method to accomplish the job task to avoid entry completely. Examples include using gauges, flow meters, remote cameras, or binoculars to monitor conditions from outside the confined space.

Non-Permit Confined Space Entry Procedures

Workers must notify their supervisor prior to entering and performing work in non-permit confined spaces and work in pairs. Assess the conditions of entry and evaluate it using the Confined Space Evaluation Form prior to opening any enclosed spaces. Anticipate the hazards and take proactive measures, e.g., utilize safety equipment, perform lockout/tagout. The following procedures shall be followed prior to entering any confined space:

• Any condition making it unsafe to remove an entrance cover will be eliminated before the cover is removed.
• When the entry access has been accomplished, the opening(s) shall be promptly guarded (if needed) to prevent an accidental fall into the opening and/or prevent objects from falling into the opening.
• Barriers shall be used to protect workers.
• All safety policies and procedures shall be followed.
• Metal ladders shall not be used when working around electrical equipment.
• There shall be no smoking in a confined space.
• Any use of chemicals must be pre-approved by the Supervisor, in consultation with EH&S.
• Safety Data Sheets (SDSs) shall be available for all hazardous materials used or may be encountered during the entry.
• Welding, soldering, cutting, or other hot work requires a Hot Work Permit approved by Fire Safety & Emergency Planning.
• Adequate lighting must be provided and used.
• Personal protective equipment shall be provided and worn by workers as necessary for safe entry into confined spaces.
• Contractors who send their employees into confined spaces under the control of USC will be informed of the potential hazards, safety rules, and emergency procedures by the USC department contracting the project or specific job.
• When there are changes in the use of a non-permit confined space or if hazards are introduced to the space, the space shall be exited immediately and reevaluated and classified as a permit-required space, if necessary. The entry supervisor and/or EH&S shall be consulted to reevaluate and reclassify confined spaces as necessary depending upon the work activities to be performed in spaces. Reclassification would be required if hazards are introduced. Examples include but are not limited to:
  ◦ Application of solvents, paints, chemicals or other materials that could potentially create a hazardous atmosphere in a confined space.
  ◦ Welding, cutting, brazing or soldering in some confined spaces with limited ventilation.
  ◦ Any other actual or potential hazards introduced into the space.

**Permit Confined Space Entry Procedures**

Permit-required confined spaces (PRCS) shall only be entered after all reasonably anticipated hazards have been identified and mitigated. In order for safety controls to be implemented, the hazards must be determined. The [JSA (Job Safety Analysis) Form](#) is an excellent document to use in conjunction with the [Confined Space Evaluation Form](#) and the confined space entry permit. A JSA is a procedure, which integrates accepted safety and health practices into a particular job operation. In a JSA, each basic step of the job is listed, potential hazards identified, and the safest way to do the job is described.

**Hot Work Preparation**

For the purposes of PRCS entry, hot work can involve grinding, cutting, welding, brazing or soldering, heating or other operations that generate heat, flames, arcs, sparks or other sources of ignition. When identifying hazards associated with hot work in confined spaces, it is important to evaluate the following: type of hot work to be performed, site preparation, atmospheric conditions, and fire fighting equipment.

Evaluating the type of hot work to be performed ahead of time will assist in identifying the specific hazards relative to the type of hot work performed and the use of the appropriate personal protective equipment. Site preparation should include a survey for the following: combustible materials; hazards posed by heat transfer; flammable, corrosive, or toxic residues; equipment linings; appropriate lockout/tagout application; and, housekeeping.

As part of the standard practice for a PRCS entry, the atmosphere is monitored for Lower Explosive Limits (LEL). LEL must be maintained below 10% for confined space entry to occur or continue. The same is true for hot work performed in, around, or adjacent to a permit-required confined spaces. The hot work shall not be performed if the LEL is not maintained below 10%.

Appropriate fire fighting equipment must also be available at the job site. Consider the need for personnel to perform fire watch.
Prior to the performance of hot work in any confined space located within USC facilities, a Hot Work Permit form must be completed online by the contractor conducting the hot work (see USC Hot Work Permit program for details). The completed Hot Work Permit form will be routed to USC Fire Safety for review and approval. Once approved, the contractor will receive Hot Work Permit and Emergency Procedures reference sheet via email. The contractor will then issue a copy of the permit to the entry supervisor. NOTE: The permit must be displayed outside the confined space for inspection by USC Fire Safety.

**Reclassification of a Permit-Required Confined Space to a Non-Permit Required Confined Space**

All permit-required confined spaces can be reclassified to non-permit required confined spaces prior to entry. If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are mitigated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as all hazards remain controlled. Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards. The department performing the designated job shall document the basis for determining that all hazards in a permit space have been mitigated on the entry permit. If it is necessary to enter the space to remove any residual hazards, then the entry cannot be classified as no-permit space. If hazards arise within a permit space that has been declassified to a non-permit space, employees shall exit the space immediately. The entry supervisor and EH&S shall then be notified and the space must be reevaluated prior to reentry. The permit space may be reclassified as a non-permit confined space for as long as all hazards are mitigated. Examples of hazard elimination are as follows:

- Lockout/Tagout of all hazardous energy in a space.
- Emptying tanks/vessels to remove engulfment hazards.
- Shutting boilers down, opening all access ports to allow for temperature reduction and natural ventilation, and by taking all appropriate measures to lockout/tagout, blank, block, etc. to isolate the space.

**Alternate Entry Procedures: Atmosphere-Controlled Permit-Required Confined Space Entry**

If the only hazard posed by the permit space is an actual or potential hazardous atmosphere that can be controlled by continuous forced air ventilation alone, then the space may be entered following the procedures outlined below. The program administrator (i.e., EH&S) must review and approve this type of entry. Upon approval, the entry supervisor must ensure the following:

- Atmospheric testing is performed and documented consistent with the requirements of this written program.
- Ambient oxygen levels are between 20% and 21% by volume.
- Flammable/combustible air contaminants are less than 5% of the LEL (Lower Explosive Limit).
- Toxic air contaminants are less than 50% of a Cal-OSHA PEL (Permissible Exposure Limit).
- There are no other known/anticipated hazardous atmospheres within the space.
- Personnel do not enter the space until the conditions above are met.
- Continuous air monitoring is performed.
- Monitoring results are documented on the reclassification form (Confined Space Entry Permit) every fifteen (15) minutes.
• Forced air ventilation is directed to ventilate the immediate areas where personnel is or will be present within the space and continues until all personnel have left the space.
• The air supply for the forced air ventilation is from a clean source and may not increase the hazards in the space.
• There are no hazardous atmospheres within the confined space whenever personnel are inside of the confined space. If a hazardous atmosphere is identified during entry:
  ◦ Personnel must leave the space immediately.
  ◦ The space is reevaluated by the program administrator to determine how the hazardous atmosphere developed; and
  ◦ Measures are implemented to protect personnel from the hazardous atmosphere before any subsequent entry takes place.
• The space is acceptable for entry and pre-entry safety precautions and air monitoring results are documented on the permit space reclassification form;
• All other applicable confined space and PRCS entry procedures are followed.

**Additional PRCS Entry Requirements**

In addition to the items listed in the Non-Permit Confined Space Entry Procedures section, the following procedures shall be followed prior to entering any permit-required confined space:

• The entry supervisor shall designate the entry team’s role (i.e., authorized entrants, attendants, and atmospheric testing personnel) in entry operations and ensure they have received adequate training.
• An entry permit must be completed by a qualified person and signed by the entry supervisor. The entry permit shall be kept outside of the confined space and made available to the authorized entrants for review.
• Pre-entry atmospheric testing is completed and documented.

**During the entry:**

• At least one attendant shall be stationed outside the permit space into which entry is authorized for the duration of entry operations.
• Continuous atmospheric testing is performed and documented.
• Entry supervisors shall notify EH&S if either of the following occur during entry:
  ◦ Detection of a permit space hazard not covered by the permit, or
  ◦ Detection of a condition prohibited by the permit.

**Equipment and Supplies**

The following equipment is required to perform permit-required confined space entry:

• Combustible Gas Indicator (CGI).
• Volatile Organic Compound (VOC) detector, or Photoionization Detector (PID) if organic vapors are reasonable to expect.
• Any other device(s) necessary to monitor a hazardous environment, as appropriate for hazards identified on permit.
• Non-entry rescue equipment (e.g., extraction harness, tripod and wench).
• Means of communication between Attendant and Authorized Entrant(s), e.g., handheld radio in areas without explosion hazard, rope and tug signal system, and verbal/hand signals.
• Means of communication to immediately summon emergency rescue personnel.
• Barriers for traffic control.

**Explosion-Proof/Specialized Equipment**

Flammable gases and vapors can exist in a PRCS. The following are examples of ways in which this can occur: through threaded connections and gaps between mated surfaces, as a result of expansion and contraction due to temperature changes, by taking hazardous materials into spaces, and through the degradation of organic materials.

To prevent the ignition of these gases and vapors, explosion-proof equipment may be used as a precautionary measure. In addition to explosion-proof equipment, intrinsically safe equipment and spark-proof tools can be used as precautionary measures.

A variety of other different types of specialized equipment are available to ensure safe entry into a PRCS. Examples include, but are not limited to:

- Atmospheric monitoring equipment
- Personnel protective equipment
- Communications equipment (e.g., radios)
- Ground Fault Circuit Interrupters (GFCI)
- Low-voltage lighting
- Rescue equipment like a mechanical retrieval device
- Mechanical ventilation units

In any case, the need for this type of equipment should be identified in the confined space entry procedure. Furthermore, the entry team shall receive training on the proper use of any specialized equipment prior to entry.

**Control of Hazardous Energy**

During a PRCS entry, entrants may be exposed to the following forms of hazardous energy: electrical, mechanical, chemical, hydraulic, pneumatic, thermal, gravity, and/or radiation. It is important to identify these hazards in the confined space entry permit. To protect employees from these potential hazards, the elements of the Hazardous Energy Control Program must be implemented as part of the entry.

When it is determined that the Hazardous Energy Control Program must be applied for the safety of the entrants, a procedure must be developed to ensure that the hazardous energy is either eliminated or controlled. Attach the hazardous energy control procedure to the written job plan.
**Protective Barriers**

When a PRCS entry requires removal of any kind of access hatch to facilitate entry, the opening shall be guarded by railing, temporary cover, or other temporary barrier. This will prevent an accidental fall through the opening and will protect the entrant from foreign objects entering the space.

**Traffic/Pedestrian Control**

Protection from traffic/pedestrian hazards can be provided through the use of effective traffic control devices. Traffic control devices can control the hazards posed by vehicular traffic, but they cannot eliminate them. It is important to pre-plan the work site for traffic control device placement and use work vehicles and natural barriers as protective devices to the fullest extent possible. Use recommended traffic control references like the one from the California Department of Transportation (Cal Trans).

**Atmospheric Testing Procedures**

Atmospheric testing is required prior to entering all permit-required confined spaces. It is also recommended prior to entering a non-permit required confined spaces, and is required if a potential atmospheric hazard is introduced into the space during entry. Properly calibrated direct reading gas monitors shall be used for all atmospheric testing. Additionally, direct reading gas detector tubes or other acceptable means may also be used to test potentially toxic atmospheres as needed. Only personnel who have successfully completed training, provided or approved by EH&S, may perform atmosphere testing. Atmospheric testing instruments shall be calibrated on a schedule and in the manner recommended by the manufacturer, and be field checked immediately prior to use to ensure that it is operating properly. Any atmospheric testing instrument that has not been calibrated within thirty (30) days shall be recalibrated or bump tested prior to a confined space entry.

**Non-Entry Conditions**

If any of the following atmospheric conditions are encountered before or during the entry, the permit shall be canceled and entry shall not take place:

- Oxygen levels below 19.5% or greater than 23.5% by volume.
- Combustible gas levels greater than 10% of the lower explosive limit (LEL).
- Hazardous substance levels exceeding 50% of Cal/OSHA or American Conference of Governmental Industrial Hygienists (ACGIH) limits, or where exposure could result in death, acute illness or impairment of ability to self-rescue. (Department to consult with EH&S in identifying these substances.)
- Airborne combustible dust or other particulates obscures vision to five feet or less, or
- Any atmospheric condition recognized as immediately dangerous to life or health (IDLH) is present.

The Entry Team must consult with EH&S in identifying any of these conditions or substances.
Pre-Entry Atmospheric Testing
The atmosphere in all permit-required confined space atmospheres shall be tested for oxygen concentration, combustible gases, carbon monoxide, hydrogen sulfide and any known or suspected toxic or hazardous substances prior to entry. Pre-entry atmospheric sampling shall be conducted from outside of the space and cover various levels within the space (i.e., at least top, middle and bottom), and around all conduits, pipes, or cables. Intrinsically safe equipment shall be used if a flammable atmosphere is present, or is suspected of being present. All atmospheric testing results shall be recorded in the Air Monitoring Readings section of the Confined Space Entry Permit. If more than 15 minutes have elapsed between pre-entry atmospheric testing and the actual entry, all tests shall be repeated prior to entry.

During/Post-Entry Atmospheric Testing
Continuous air monitoring shall be conducted for oxygen, combustible gases, carbon monoxide, hydrogen sulfide and any known or suspected toxic or hazardous substances during the entire duration of all permit-required confined space entries. All monitoring devices shall be equipped with an audible alarm. Testing results shall be recorded in the Air Monitoring Readings section of the Confined Space Entry Permit at least every fifteen (15) minutes during entry. Both the entry supervisor and EH&S shall be notified immediately if an unacceptable atmospheric condition is encountered during entry.

Completing the Entry Permit
An entry permit shall be properly completed, reviewed by the entry team, and signed by the Entry Supervisor prior to entry into all permit-required confined spaces. Additionally the entry supervisor shall ensure:

- The entry permit is kept outside of the confined space and made available to the authorized entrants for review.
- The duration of the permit does not exceed the time required to complete the assigned task of job identified on the permit.
- A permit may remain valid for the duration of the entry operation or a single work shift, not to exceed 8-hours. When the same entry team is used for overtime work, the permit may be extended for up to 4-hours if conditions are reassessed by the Entry Supervisor and air monitoring continues. The Confined Space Entry Supervisor must pay special attention to fatigue when assessing the ability of an entry team to continue work on overtime.
- The entry permit shall be terminated when:
  - The entry operations covered by the entry permit have been completed or
  - A condition that is not allowed under the entry permit arises in or near the permit space.
- A copy of all completed entry permits must be submitted to the departmental supervisor and EH&S.
- Scan and email a copy of the Confined Space Entry Permit to EH&S at injuryprevention@usc.edu.
This section applies to manholes and street openings, where telecommunications field work is performed on or with underground lines. If hazards exist that cannot be controlled, permit-required confined space procedures shall be followed. Before an employee enters a manhole or unvented vault, the following steps shall be taken:

- When covers of manholes or vaults are removed, a railing, temporary cover, or other suitable temporary barrier shall promptly guard the opening, which is appropriate to prevent an accidental fall through the opening and to protect employees working in the manhole from foreign objects entering the manhole.
- The internal atmosphere shall be tested for oxygen, combustible gases, carbon monoxide, hydrogen sulfide and any other known or suspected hazardous substances.
- While work is being performed in a manhole occupied jointly by an electric utility and a telecommunication utility, an employee with basic first-aid training shall be immediately available to render emergency assistance as may be required.
- Portable reinforced plastic ladders having non-skid rungs shall be used to enter and exit manholes exceeding 4 feet in depth. No metal ladders shall be used.
9.0 Rescue and Emergency Procedures

Rescue Plans

Rescue plans are the essential operating tool to save an individual’s life during an unexpected incident. The rescue plan reduces the time it takes to render rescue and first aid services when needed. The plan must be included at all Permitted Confined Space Entry procedures prior entry. “Call 911” is NOT considered to be a rescue plan.

Rescue plans are contingent on the configuration of the confined space. Configuration factors of the confined space include, but are not limited to, the entry access (vertical, horizontal, restricted/awkward entry), physical work being performed, existing hazards and hazards introduced, external environment, emergency access route, etc. Rescue methods practiced at the University are self-rescue, non-entry rescue, and entry rescue. Entry rescue shall be performed only by an authorized rescue team.

All areas must be assessed prior to entry.

Self-Rescue

Self-rescue is the process when an entrant has the ability to exit the confined space without the need of a retrieval system. It should be determined that there is no inherent hazard that poses a risk while exiting the space such as atmospheric hazards or obstructions in the pathway. Self-rescue is the preferred method in the rescue system.

When entering a PRCS, the need for an attendant remains a requirement and needs to be trained to initiate emergency procedures if needed.

Examples of where to implement the self-rescue methods are:

• Low to non-existent atmospheric hazard. Does not include alternate entry.
• Entrapment and engulfment are eliminated.
• Horizontal entries with no limitations while exiting (i.e., ability to walk freely, no utility lines, no floor openings, no overhead hazards, etc.).
• Constant communication with attendant and the ability of the entrant to be within the line of sight of the attendant.
• Heat illness risks are reduced or eliminated.
• All hazards are identified, recognized, and mitigated in order for the entrant to have the ability to exit without assistance when an evacuation is ordered.
Non-Entry Rescue

Non-entry rescue is the process of requiring the use of a mechanical retrieval system when entering a PRCS. The system is set in place when it is determined that it may be difficult for an entrant to exit by their own means and may potentially become incapacitated. Similar to self-rescue, non-entry rescue is implemented to not endanger additional personnel and will not require entry by the attendant.

It is required to establish a mechanical retrieval system when an entrant will be traveling more than 5 feet vertically inside a permitted confined space. The mechanical retrieval systems include equipment to remove an entrant through a vertical or horizontal access point. The entrant must always be attached to the retrieval system by a body harness. The non-entry rescue method is most practical when confined space configuration does not contain obstructions in the exit path when performing rescue as it may potentially add further injuries to the entrant.

Equipment for non-entry rescue includes, but are not limited to:
• Full body harness. Retrieval rescue belts are prohibited for use.
• Rescue wrist straps (padded wristlets) or anklets, when a full body harness is not feasible.
• Retrieval line
• Lifting device
• Anchor

Examples of where to implement the non-entry rescue are:
• Entry configurations which support the mechanical retrieval systems regardless of vertical or horizontal entries.
• Manholes where there is a clear path to exit.
• Horizontal entries where there is a clear path to exit (i.e., boiler tanks, crawlspaces, mechanical equipment, etc.).

Attendant must be trained to perform the following steps when executing the rescue plan:
1. Immediately call DPS (Department of Public Safety) if on campus, or 911 if off campus, to inform them that a confined space emergency has occurred.
   a. At UPC campus, call (213) 740-4321; or
   b. At HSC campus, call (323) 442-1000; or
   c. Off campus, call 911.
2. After notifying emergency services, the attendant will attempt to retrieve the worker using the retrieval line or other non-entry procedures, if applicable. Under no circumstance will the attendant or any other person enter the confined space until emergency services have arrived. All individuals participating in the rescue operation are to have received training in confined space entry rescue techniques.
3. If entry to perform the rescue is required, the attendant or entry supervisor shall inform rescue services of any hazards they may encounter during entry. Where practical, rescuers will be connected to a safety line attached to a point outside the confined space. An attendant shall always remain outside of the confined space while the rescue is being performed.

**Entry Rescue**

Entry rescue is the reserved method of rescue when there is a possibility of difficulties when retrieving the entrant from a space, such as, containing obstructions in the pathway, upwardly vertical entries, spaces seldom visited, and the space has not been thoroughly evaluated.

Entry rescue shall always be performed by an authorized rescue team that has the proper training with current certifications to perform rescue in spaces that contain existent/unexpectant hazards that includes Immediately Dangerous to Life Health (IDLH) environments.

The use of outside vendors may be contracted to be on standby and used to perform entry rescue.

Consult with the Office of Environment Health & Safety for guidance when implementing a rescue plan.
10.0 Recordkeeping

- Training must be documented and training records shall be kept for as long as it is reasonably expected an employee will be working in confined spaces.
- A Confined Space Entry Permit must be completed by the Entry Supervisor and Attendant before each entry into a Confined Space, and posted at the entry site for the duration of the entry operation. “The employer shall retain each canceled entry permit for at least 1 year to facilitate the review of the permit space program required.” [8 CCR, 5157(e)(6)]
- Each department that conducts confined space entries will keep every Confined Space Entry Permit generated until reviewed by the Office of Environmental Health & Safety (EH&S) Confined Space Entry Program representative.
- Each department that hires a contractor for any job in which a person will enter a confined space will provide the contractor with a completed Contractor Pre-Entry Information Form prior to confined space entry, and will assure that the contractor Entry Supervisor completes the Contractor Debriefing Form or equivalent within 48 hours of termination of the Entry Permit. Forward a copy of both forms to EH&S, and keep a copy of each in department files until reviewed by the EH&S Confined Space Entry Program representative.
- A copy of all completed entry permits must be submitted to the departmental supervisor and EH&S.
- Scan and email a copy of the Confined Space Entry Permit to EH&S at injuryprevention@usc.edu.

NOTE: All training records, inspections, JSA, and other supporting documentation must be maintained by the department for the duration of all workers’ employment. This requirement is consistent with USC’s Record Management Policy.
11.0 References

- Cal-OSHA regulations 8 CCR, 5157, “Permit-Required Confined Spaces” (includes general industries, manufacturing facilities): https://www.dir.ca.gov/title8/5157.html
- Cal-OSHA 8 CCR, 5158, “Other Confined Space Operations” (includes construction, agriculture, marine terminals, grain handling, telecommunications, natural gas and electric utilities, and shipyard operations): http://www.dir.ca.gov/Title8/5158.html
- Cal-OSHA 8 CCR, 8616, “Underground Lines” (provisions apply to the guarding of manholes and street openings, and to the ventilation and testing for gas in manholes and unvented vaults, where telecommunications field work is performed on or with underground lines): https://www.dir.ca.gov/title8/8616.html
Appendix A  Confined Space Entry Flow Chart

**SCOPE OF ENTRY & HAZARD ASSESSMENT**

Permit-required confined spaces shall only be entered after all hazards (e.g., atmospheric, LOTO, emptying tanks/vessels, shutting down boiler, opening all access points for temp reduction and natural ventilation) have been eliminated and the space has been reclassified into non-permit required confined space. If a space cannot be reclassified, the entry shall not take place.

**CONFINED SPACE ENTRY BY CONTRACTOR**

1. Inform the Contractor in writing the workplace contains permit spaces and entry is only allowed under a Cal-OSHA compliant PRCS program.
2. Verify Contractor PRCS program.
3. Apprise Contractor of space hazards and campus procedures for space entry.
4. Coordinate entry with Contractor.
5. Department consults with Contractor at end of PRCS Entry regarding hazards encountered or created during entry and communicates problems to EH&S.

**RECLASSIFIED NON-PERMIT REQUIRED ENTRY**

1. Prepare site for entry and check for hazards or unusual conditions.
2. Open access to space and guard as necessary.
3. Evaluate for acceptable entry conditions.
4. Perform atmospheric monitoring.
5. Document reclassification on permit.
6. Enter. NOTE: if hazards arise during entry, stop work immediately and exit space.
7. Return space to normal operating mode.
8. Submit completed permit to Supervisor and copy EH&S.

**NON-PERMIT CONFINED SPACE ENTRY**

1. Proceed with Non-Permit Required Entry.
2. Prepare site for entry.
3. Check for hazards or unusual conditions.

- **Are hazards or unusual conditions found?**
  - **NO**
  - **STOP! ELIMINATE HAZARDS BEFORE ENTRY**
  - **YES**
  - **STOP! ATMOSPHERE CONTROLLED ENTRY REQUIRES EH&S CONSULTATIONS/APPROVAL**
    - **YES**
    - Is the work within a PRCS?
      - **YES**
        - STOP! Entry not allowed into PRCS unless all hazards are eliminated prior to entry and space is reclassified as non-permit required entry
      - **NO**
        - Will work or change in use of the space create a hazard?
          - **YES**
            - STOP! DO NOT ENTER CONFINED SPACE
          - **NO**
            - Enter space and complete job

- **STOP!**
  - **DO NOT ENTER CONFINED SPACE**

**RETURN TO TOP OF FLOW CHART**

**Is the work in the confined space defined?**

**YES**

**Have all entrants completed Confined Space Entry Training?**

**YES**

**Was a hazard assessment performed?**

**YES**

**Is the work within a PRCS?**

**YES**

**Can all hazards be eliminated prior to entering space?**

**YES**

**STOP! ENTRY NOT ALLOWED INTO PRCS UNLESS ALL HAZARDS ARE ELIMINATED PRIOR TO ENTRY AND SPACE IS RECLASSIFIED AS NON-PERMIT REQUIRED ENTRY**

**NO**

**STOP! DO NOT ENTER CONFINED SPACE**

**NO**

**STOP! DO NOT ENTER CONFINED SPACE**

**NO**

**STOP! DO NOT ENTER CONFINED SPACE**

**NO**

**STOP!**

**DO NOT ENTER CONFINED SPACE**
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# Confined Space Evaluation Form

**Space Location and Characteristics**

Confined Space Location (area; building/room#):

Confined Space Owner: ____________________________

Department: ____________________________

NEW evaluation ☐ Re-evaluation of existing space ☐

<table>
<thead>
<tr>
<th>Opening Type</th>
<th>Portal Size (inches)</th>
<th>Configuration (round; oval; square; rectangle)</th>
<th>Accessibility (vertical top or bottom; horizontal)</th>
</tr>
</thead>
</table>

| Space | Identify type | Examples: boiler; bunker; degreaser; equipment housing; furnace; hopper; manhole; pipeline; pit; stack; tank; test chamber; trench; tunnel; vat; vault; or vessel |

Describe Past and Current Uses:

**Hazard Identification and Evaluation**

1. Space is large enough and so configured that an employee can bodily enter and perform assigned work. Yes ☐ No ☐

2. Space has limited or restricted means of entry or exit. Yes ☐ No ☐

3. Space is \textbf{NOT} designed for continuous employee occupancy. Yes ☐ No ☐

   \textbf{NOTE:} If answer Questions 1, 2, or 3 is “Yes”, then complete the remainder of this section. Otherwise, proceed to Classification.

4. Space contains or has the potential to contain a “hazardous atmosphere”. Yes ☐ No ☐

5. Space has internal configuration such that entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section. Yes ☐ No ☐

6. Space contains material(s) that can engulf entrant. Yes ☐ No ☐

7. Welding/burning will take place in confined space. Yes ☐ No ☐

8. Biological hazards are associated with the confined space. Yes ☐ No ☐

9. Space contains mechanical hazards. Yes ☐ No ☐

10. Space contains physical agents (e.g., electrical; thermal; radiological; or compression). Yes ☐ No ☐

11. Identify any other recognized serious safety and health.

**Classification**

| Permit Required ☐ | Non-Permit ☐ | Non-Confinned Space ☐ |

**Notes**

Evaluator Name ____________________________ Signature ____________________________ Date ____________________________

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INSTRUCTIONS

What is a Job Safety Analysis (JSA)? A JSA is a systematic process to identify potential hazards associated with a particular job/task and the proper controls needed to remove those potential hazards. It further defines relationships between worker, task, tools, and work environment, and establishes work rules and norms for the job/task.

1. Complete the sections on Page 1 of the JSA form including detailed information in Task Description.
   a. Fill in Assigned Employees.
   b. Check off all Body Positions.
   c. Check off all Required Personal Protective Equipment (PPE) that apply.
   d. Add NOTES if needed.

2. On Page 2, break job tasks into basic steps from start to finish.
   a. Begin each step with a verb, for example, ”Turn equipment on” or “Place material on equipment” and list sequentially in the Basic Job Steps (Column 1). Attach additional pages if more steps need to be added.
   b. Identify the potential hazard or hazards (e.g., rotating parts, fire) associated with each step in Potential Hazards (Column 2). Anticipate hazards for each step as well. Questions to ask: What could fail? What are the consequences? How could it happen? What are other contributing factors? How likely is it that the hazard will occur?
   c. Summarize control measures (e.g., post warning signs, work behind a protective shield) for each step in Control Measures (Column 3).

3. Review the completed JSA (i.e., steps, potential hazards, and control measures) with employees who perform the job/task.

4. Create a standard operating procedure (SOP) for the job/task and attach the JSA to it. Ensure that employees read, understand, and sign the SOP.

---

**Job Safety Analysis Form**

**USC University of Southern California**

**JOB SAFETY ANALYSIS**

**Office of Environmental Health & Safety**

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**INSTRUCTIONS**

**What is a Job Safety Analysis (JSA)?** A JSA is a systematic process to identify potential hazards associated with a particular job/task and the proper controls needed to remove those potential hazards. It further defines relationships between worker, task, tools, and work environment, and establishes work rules and norms for the job/task.

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4. Create a standard operating procedure (SOP) for the job/task and attach the JSA to it. Ensure that employees read, understand, and sign the SOP.
### Required Personal Protective Equipment (PPE)

<table>
<thead>
<tr>
<th>Gloves</th>
<th>Glasses/Goggles</th>
<th>Body</th>
<th>Other</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrile</td>
<td>☐</td>
<td>☐</td>
<td>Hearing Protection</td>
<td>Daily</td>
</tr>
<tr>
<td>Neoprene</td>
<td>☐</td>
<td>☐</td>
<td>Respiratory Protection</td>
<td>Weekly</td>
</tr>
<tr>
<td>Non-conductive</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Monthly</td>
</tr>
<tr>
<td>Leather/cut-resistant</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Other</td>
</tr>
</tbody>
</table>

**Gloves**  
- Nitrile: ☐  
- Neoprene: ☐  
- Non-conductive: ☐  
- Leather/cut-resistant: ☐

**Glasses/Goggles**  
- Splash: ☐  
- Safety: ☐  
- Face Shield: ☐

**Body**  
- Lab Coat, FR: ☐  
- Splash Apron: ☐  
- Apron, FR: ☐

**Other**  
- Hearing Protection: ☐  
- Respiratory Protection: ☐  
- Steel-toe shoes: ☐

**Frequency**  
- Daily: ☐  
- Weekly: ☐  
- Monthly: ☐  
- Other: ☐

### NOTES

1. Face shield must be worn with safety glasses or splash goggles.

### Additional Instructions

1. Complete sequence of job steps from start to finish (column 1 only).
2. For each job step, list the hazards and control measures (columns 2 and 3).
3. Get proper reviews & signoffs (can be electronic).
4. Send copy to supervisor and EH&S at injuryprevention@usc.edu.
This form is to be used by the USC Project Manager to inform the Contractor of the hazards of the space; precautions/procedures to be implemented for the protection of the employees; and methods for emergency notification.

**General Information**
Name of Contractor: 
USC Project Manager: 
Department: 
Location(s) of Confined Space(s): 

**Type of Entry**
Permit Required [ ] Non-Permit Required [ ]
If Permit Required, explain why: 
Purpose of Entry: 

**Hazards (List all hazards associated with entry)**

**Problems Associated with this Confined Space**
No problems associated with this confined space [ ]

**Hazard Assessment**
Air Monitoring [ ] Other [ ]: 

**Equipment**
Identification [ ] LockOut/TagOut [ ] Other [ ]: 

**Line/Valve/Power Source**
Identification [ ] Disconnecting [ ] Blanking [ ] Blocking [ ] Bleeding [ ] Isolating [ ] Purging [ ] Inerting [ ] Draining [ ] Flushing [ ] 
Flagging [ ] Other [ ]: 

**Openings**
Barricading [ ] Guarding [ ] Flagging [ ] Other [ ]: 

**Other**

**Precautions and Procedures**

**Emergency Notification System Activation Method(s)**

USC Project Manager: Provide completed form to Contractor(s) and email a copy to EH&S at injuryprevention@usc.edu. File completed form with Entry Permits for annual EH&S review.
An Entry Permit is valid for the duration of the entry operation or a single work shift, not to exceed eight (8) hours. If the same team is used for overtime work, the permit may be extended up to four (4) hours provided conditions are reassessed by the Entry Supervisor and air monitoring continues. **Instructions:** See Page 2 for Description and Procedures.

### General Information
- **Confined Space Location:**
- **Date Issued:**
- **Time Issued:**
- **Permit Expiration Time:**

#### Purpose of Entry:
- **Hazards (check and describe):**
  - Atmospheric [ ]
  - Thermal (hot/cold) [ ]
  - Other [ ]

#### Preparation
- **Drained** [ ]
- **Flushed** [ ]
- **Inerted** [ ]
- **Purged** [ ]
- **Equipment**
- **Isolation**

#### OPENINGS
- **Barricaded** [ ]
- **Guarded** [ ]
- **Flagged** [ ]
- **Other** [ ]

#### Safety procedures:
- **Communications at Confined Space**
- **Other Permits** (e.g., Hot Work)
  - **Voice** [ ]
  - **Radio** [ ]
  - **Intercom** [ ]
  - **Rope Signals** [ ]

#### Emergency Rescue System Check:
- **FMS Dispatch** [ ]
- **DPS Dispatch** [ ]
- **System check completed (initials):**

#### Special Equipment Required
- **Safety harness/lifeline (if > 5')** [ ]
- **Hoist** [ ]
- **Other** [ ]

#### Personal Protective Equipment Required
- **Head:**
- **Eye:**
- **Respirator:**
- **Gloves:**
- **Hearing:**
- **Foot:**
- **Clothing:**
- **Other:**

#### Roster
- **Entry Personnel Supervisor:**
- **Entry Approved:**
- **Entry Terminated:**
- **Permit Transferred:**
- **Attendant:**
- **Init.:**
- **Dept/Shop:**
- **Entrant:**
- **Init.:**
- **Entrant:**
- **Init.:**

#### Air Monitoring Readings
<table>
<thead>
<tr>
<th>Test Sequence</th>
<th>Acceptable Conditions</th>
<th>Pre-Entry Check (at 4' intervals)</th>
<th>After Ventilating and/or Isolation</th>
<th>Periodic Checks</th>
<th>Time of Average Every 15 Minutes unless specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>19.5 – 23.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable gases</td>
<td>≤ 10% of LEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen sulfide</td>
<td>≤ 5 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>≤ 10 ppm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td>≤ 50% PEL/TLV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- **Time:**
- **Initials:**

### Notes/Additional comments/Problems during entry:

**NOTE:** Post this permit in a conspicuous place at job site. Return Permit to Entry Supervisor immediately after completion. Return permit in department files. Email a copy to EH&S at injuryprevention@usc.edu.
Description and Procedures

Confined Spaces have the following characteristics: a) large enough to enter and perform work; b) having limited or restricted means of entry and exit; and c) not designated for continuous worker occupancy.

Permit-Required Confined Spaces have one or more of the following characteristics:
1) Contains a known or has the potential to contain a hazardous atmosphere; or
2) Contains a material that has the potential to engulf entrants (e.g., soil); or
3) Has an internal configuration where the entrant could be entrapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section; or
4) Contains any other serious safety or health hazard.

Note: OSHA’s standard on permit-required confined spaces (PRCS) says entry occurs as soon as any part of the entrant’s body breaks the plane of the opening into the permit space. As clarified in an OSHA Letter of Interpretation (LOI) dated October 18, 1995, “When any part of the body of an entrant breaks the plane of the opening of a PRCS large enough to allow full entry, entry is considered to have occurred and a permit is required, regardless of whether there is intent to fully enter the space.”

Entering a Permit-Required Confined Space
1) Entry Supervisor physically inspects the space to determine potential hazards and if the entry is a “Permit-Required” or “Non-Permit” entry. Entry Supervisor then completes all items on this Confined Space Entry Permit.
2) At least one Attendant externally monitors the Permit Space being entered for the duration of the entry operation.
3) Maintain retrieval equipment and use all safety equipment as specified on the permit.
4) Attendant verifies acceptable entry conditions by identifying, and controlling or eliminating, any hazards; by testing the atmosphere with an oxygen/gas detector at 4’ intervals, and a PID if organic vapors are detected or expected, and other appropriate testing equipment for other known or expected contaminants; and by complying with all entry permit conditions.
5) Attendant directs the Entrant(s) to enter and exit the space, and conducts periodic checks of hazard controls.
6) Attendant orders immediate evacuation of the space if safety equipment fails or if the space becomes, or has the potential to become, immediately hazardous. If necessary, Attendant summons emergency responders, but NEVER ENTERS space.
7) When confined space operation is complete, Entry Supervisor accounts for all Entrants, and terminates entry by initialing in the appropriate section.

Entering a Non-Permit Confined Space
1) If no inherent hazard is associated with the space, or if all inherent hazards have been “ELIMINATED” (not just controlled, but eliminated), the space may be entered using the following guidelines.
   a) When entering the Non-Permit Confined Space, the Entrant(s) will:
      i) Survey the surrounding area for potential hazards and sources of drifting vapors and gases before entry;
      ii) Always test a Non-Permit Confined Space with an oxygen/explosive gas detector before and during entry; document pre-entry tests;
      iii) Follow USC safety rules and use generally acceptable safe work practices when entering and working in the space;
      iv) Never use paints, thinners, chemicals, or weld or create any other atmospheric hazard while working in the space;
      v) Never introduce any other atmospheric, mechanical, engulfing, or electrical hazard into the space.
   Note: introduction of a hazard (e.g., paint thinner) into a confined space requires that the full permit process be followed.
   b) No attendant or arrangement for rescue service is necessary when workers enter Non-Permit Spaces.
   c) All steps taken to reclassify a Permit-Required Space to a Non-Permit-Required Space must be written on the entry permit.
# Contractor Debriefing Form

**Name of Contractor:**

**USC Project Manager:**

**Location(s) of Confined Space(s):**

**Date entered:**

**Time entered:**

**Time completed:**

**Purpose of Entry:**

**Type of Entry**

- Permit Required  □
- Alternate Procedure  □
- Non-Permit Required  □

**Hazards** (List all hazards associated with entry)

**Problems Encountered**

- No problems encountered with this confined space  □

**Hazard Assessment**

- Air Monitoring  □
- Other  □:

**Equipment**

- Identification  □
- LockOut/TagOut  □
- Other  □:

**Line/Valve/Power Source**

- Identification  □
- Disconnecting  □
- Blanking  □
- Blocking  □
- Bleeding  □
- Isolating  □
- Purging  □
- Inerting  □
- Draining  □
- Flushing  □
- Flagging  □
- Other  □:

**Openings**

- Barricading  □
- Guarding  □
- Flagging  □
- Other  □:

**Other**

**Notes**

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The information above is accurate to the best of my knowledge.

**Contractor Supervisor Name**

**Signature**

**Date**

**Contractor:**

Return form to hiring department’s Supervisor within 48 hours of job termination.

**Dept. Supervisor:**

Notify EH&S of the entry by emailing form to injuryprevention@usc.edu. Fix identified problems and note completion. File completed form with Entry Permits for annual EH&S review.