USC Facilities Department

Confined Space Program

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1. INTRODUCTION

Every year employees are killed as a result of hazardous conditions in confined spaces. Approximately 60% of these fatalities are would-be rescuers who enter these spaces in an attempt to retrieve the fallen individual(s), only to be overcome and become victims themselves.

As part of routine maintenance activities many University of South Carolina (USC) employees and contractors are required to enter potentially hazardous confined spaces.

According to the U.S. Department of Labor, Occupational Safety and Health Administration's (OSHA) regulations, 29 CFR 1910.146 and 29 CFR 1926.1200, "Permit-Required Confined Spaces", a confined space is defined as any location that is large enough and so configured that an employee can bodily enter, has limited openings for entry and egress, and is not intended for continuous employee occupancy.
Confined spaces may have atmospheric conditions and/or physical hazards present and include: manholes, stacks, pipes, storage tanks, trailers, tank cars, pits, sumps, see, storm water bas, vaults, hoppers, and bins. In addition, limited access to these locations complicates the retrieval of anyone incapacitated.

This program is written in accordance with the Occupational Safety and Health Administration's (OSHA) regulations, 29 CFR 1910.146 and 29 CFR 1926.1200, "Permit-Required Confined Spaces."

2. POLICY

It is the policy of the University of South Carolina (USC) to take every reasonable precaution to provide a work environment free from recognized hazards for its employees.

Entry into a permit-required or non-permit-required confined space will be in conformance with all OSHA requirements.

Whenever possible, work that can be performed without entering a confined space is considered the preferred method.

Permit-Required Confined spaces have been previously identified and properly classified as either a permit-required or non-permit-required. If a change in conditions occur within a non-permit required confined space (e.g. flooding, reconfiguration, contamination) it automatically becomes a permit-required confined space and all proper precautions must be taken.

A permit system has been established for all entries into permit-required confined spaces. All completed confined space permit forms must be submitted to the USC Occupational Safety Manager and will be kept on file for a minimum of 1 year.

Atmospheric testing is required before entering any permit-required space. If a hazardous atmosphere is present, employees shall not enter the space until ventilation and all atmospheric hazards are eliminated before entry.

USC will provide all equipment required for entry for USC employees in accordance with 29 CFR 1910.146 and 29 CFR 1926.1200 and will ensure that all affected USC employees are trained and use the equipment properly. All required equipment will be maintained according to the manufacturer's recommendations by the USC Occupational Safety Manager or by department designee.

Effective communication procedures will be established between the entry team and to the rescue service prior to entry. All entries into USC's tunnels will require the entry supervisor to notify the affected Energy Plant prior to entry and when exiting the tunnel. This is for all entries though the Energy Plant, manhole, vault cover, or etc.

All contractors who will be entering permit-required confined spaces within USC will submit for approval their confined space entry program, employee training documentation to the Project Manager at their Pre-con meeting and will be required to adhere to the requirements of 29 CFR 1910.146, 29 CFR 1926.1200, and USC's written program.

This program shall be evaluated annually as well as on an as needed basis if any situation warrants the task.

3. DEFINITIONS

Acceptable Entry Conditions: 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, and work within the space.

Affected Employee: Any employee that performs any work related to confined space entry.

Attendant: An individual stationed outside one or more permit spaces who monitors the authorized entrant(s) and who performs all attendant duties assigned in our program.

Authorized Entrant: An individual who is trained and authorized (by our facility) to enter permit required spaces.

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.

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 of entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, sewers, storm water basins and pits and spaces that may have limited means of entry); and
- Is not designed for continuous human occupancy

Contractor/Vendor: A non-employee being paid to perform work in our facility.

Entry: The act by which a person intentionally 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 facility to allow and control entry into a permit space and that contains information specified in the confined space program.

Entry Supervisor: The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for

authorizing entry and overseeing entry operations, and for terminating entry as required. The entry supervisor can also serve as an attendant.

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

1. Flammable gas, vapor, or mist in excess of 10% of the Lower Flammable Level (LFL)
2. Airborne combustible dust at a concentration that meets or exceeds its LFL (Can be approximated where the dust obscures vision at a distance of 5 feet or less)
3. Atmospheric oxygen concentration below 19.5% or above 23.5%
4. Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in 29 CFR 1910 Subpart G, Occupational Health and Environmental Control or in Subpart Z, Toxic and Hazardous Substances.
5. Any other atmospheric condition that is Immediately Dangerous to Life or Health (IDLH)

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, mis- aligning or removing sections of lines, pipes, or ducts, lock out or tag out of all sources of energy or mechanical linkages.

Non-Permit Confined Space: A space that does not contain or have the potential to contain any hazard capable of causing death or serious physical harm.

Permit Required Confined Space: 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;
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 contains any other recognized serious safety or health hazard.

Rescue Service: The personnel designated to rescue employees from confined spaces.
Retrieval System: Equipment used for non-entry rescue of persons from a confined space.

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

4. PURPOSE

The confined space written program outlines the practices and procedures to protect USC's employee and contractors/vendors from hazards associated with permit required confined space entry.
This program is written in accordance with the Occupational Safety and Health Administration's (OSHA) regulations, 29 CFR 1910.146 and CFR 1926.1200.
The provisions of this program require USC and Contractors to provide the means, procedures, training and equipment to mitigate hazard and verify compliance through the use of a written permit.
The confined space program will be available to all employees and their representatives for review.

5. SCOPE

This program pertains to all confined space locations required to be entered by any USC employee, contractor and all other individuals who enter confined spaces or permit-required confined space.

6. RESPONSABILITIES

USC is responsible for development and maintaining the confined space program. (see Appendix C) is a list of permit-required confined spaces and non-permit confined spaces identified and updated as necessary.

Department Managers and Supervisors must ensure that appropriate personnel receive and maintain required confined space training. The contracting department or project manager will furnish any contractor/vendor a written copy of this written program.

Employees All USC employees shall comply with all procedures outlined in this written program. All employees must complete training as required and follow the procedures as outlined in this program when entering a permit-required confined space. They should also assist in identifying potential permit-required confined space locations and hazards.

Contractors/ Vendors Any work for USC at any USC facility or off-site location must be conducted in accordance with all applicable regulations. Contractors must have a written confined space program that complies with all applicable regulations. All contractors must provide copies of their written program and employee training documentation. Contractors are also responsible to supply all needed equipment to perform safe entry and/or rescue.

7. Space evaluation, classification, and reclassification

USC permit-required spaces are identified (see Appendix C). This list will be reviewed and updated whenever there are changes affecting work conditions or when a new permit-required confined space is identified. If conditions change in a permit-required confined space causing the need for a reclassification, the entry supervisor must notify the USC Occupational Safety Manager to assess the space. If a permit-required space can be declassified to a non-permit-required confined space due to the elimination of all potential hazards, it must be documented and changed on appendix C.

8. NON-PERMIT REQUIRED CONFINED SPACES

Entry into non-permit required confined spaces is regulated. Employees are always required to evaluate the potential hazards of all jobs prior to beginning work. If any questions or concerns arise during the evaluation the employee should discuss the issue with their supervisor, department head or Safety Manager.

9. PREVENTION OF UNAUTHORIZED ENTRY

Unauthorized entry into permit spaces shall be prevented. Prevention measures include training, signs, and security measures. The entry supervisor will notify all affected employees in the area to not enter the permit required confined space.

10. PERMIT SYSTEM

The permit process guides the entry team through a systematic evaluation of the space to be entered. The permit should be used to establish and document appropriate entry conditions. A confined space entry permit must be completed before approval can be given to enter a permit-required confined space. All members of the entry team are entitled to review the permit. A permit shall be kept at the job site for the duration of the job. Permits are only good for the specified duration, or a work shift. Permits may not exceed the time required to complete a task. Once completed the entry supervisor must sign the permit to authorize entry. If a supervisor must be relieved of their duties, the permit shall be cancelled and a new permit must be filled out by new entry supervisor. All entrants must exit the space and conditions must be reassessed. If circumstances cause an interruption in the work or a change in the alarm conditions for which entry was approved, a new confined space entry permit must be completed. Permits must be kept for at least one year and will be kept on file with the Occupational Safety Manager. The entry supervisor shall terminate the permit when the operations are complete or if a condition arises that constitutes Any such condition shall be documented on the permit. All expired permits will be given to the Occupational Safety Manager. A copy of the permit can be found in Appendix B.

11. DUTIES OF THE ENTRY TEAM

Entry teams must be established prior to entry and consist of at least one attendant, one entrant and an entry supervisor.

a. ENTRY SUPERVISOR

The entry supervisor will:

1. Know and understand the hazards that may be faced during entry, including information on the signs or symptoms, and consequences of the exposure.
2. Verify by checking that the appropriate notations have been made on the permit; that all tests specified by the permit have been conducted; and that all procedures and equipment specified by the permit are in place **before** endorsing the permit and allowing entry to begin.
3. Terminate the entry and cancel the permit when reasons for entering the space have been completed or when an unacceptable condition within the space or outside the space is detected.
4. Verify that rescue services are available and that the means of calling the rescue service is operable. The entry supervisor will ensure that the attendant knows the method for summoning help if rescue is required.
5. Enforce this policy to ensure safe entry into any space identified as a permit-required confined space.
6. Determine that throughout the entry process, all responsibilities and functions remain consistent with safety, regardless of production requirements, time or cost.
7. Have the authority to stop work if they feel that the entry is unsafe for any reason.
8. Be trained to the proper level of responsibility.

If an Entry Supervisor must be relieved at any point during the entry, the permit must be cancelled by said entry supervisor. All entrants must evacuate the space and the new Entry Supervisor must assess the space and conditions with the entry team and a new permit.

b. ENTRANT

All entrants will know the following:

1. Verify that rescue services are available and that the means of calling the rescue service is operable.
2. Hazards that may be faced during entry, including information on the mode, signs, or symptoms, and consequences of the exposure.
3. Proper use of equipment.
4. Means and methods of communication with the attendant.
5. Warning signs or symptoms of exposure to a dangerous situation, or the entrant detects a condition that would warrant immediate evacuation.
6. When self-rescue must occur by means of an order by the attendant or entry supervisor, when signs or symptoms of exposure are detected, when any prohibited condition is recognized or evacuation alarm is activated.

All entrants must be qualified for the task assigned, (electrical, welding etc.)

c. ATTENDANT

All attendants will:

1. Know the hazards that may be faced during entry or while in the space, including information on the mode, signs or symptoms, and consequences of the exposure to suspected hazards.
2. Be aware of possible behavioral effects of hazard exposure in authorized entrants.
3. Continuously maintain an accurate count of authorized entrants in the permit space and ensure that the means used to identify authorized entrants is precise at all times.
4. Remain outside the permit space during entry operations until relieved by another authorized attendant(s).
5. Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space when conditions warrant an immediate evacuation.

6. Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:
    1. If the attendant detects a hazardous condition.
    2. If the attendant detects a change in the behavior of any authorized entrant which would suggest an exposure to a hazard.
    3. If the attendant detects a situation outside the space that could endanger the authorized entrants.
    4. If the attendant cannot effectively and safely perform all the duties required as outlined in this policy.
7. Summon rescue and other emergency services as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
8. Do the following when unauthorized person(s) approach or enter a permit space while entry is underway:
    1. Warn the unauthorized person(s) that they must stay away from the permit space.
    2. Advise the unauthorized persons they must exit immediately if they have entered the permit space.
    3. Inform the authorized entrants and the entry supervisor, if unauthorized person has entered the permit space.
    4. Perform non-entry rescue (rescue attempts that do not cause the attendant to break the plane of the entry to the space).

12. PERMIT REQUIRED CONFINED SPACE ENTRY

a. PREPARATION OF THE SPACE

1. An entry supervisor, attendant (s) and entrant (s) will be assigned. All
    a. personnel involved with the entry and their representative, can observe
    b. all aspects of the preparation.
2. The entry supervisor will brief the entrant(s) and attendant(s) on all aspects of the job.
3. At any time, the entry supervisor, the entrant and/or the attendant can either postpone or stop the entry due to a safety concern.
4. The entry team will be provided and will wear all appropriate personal
    i. protective equipment based upon the hazards present.
5. If the space is located on a roadway and will compromise traffic in any way, a temporary traffic control plan must be created and set up in accordance with the rules and regulations of the Manual of Uniform Traffic Control Devices (MUTCD).

6. The air monitor shall be appropriately calibrated according to manufacturer's requirements and a bump test will occur prior to any entry. Battery life will be checked and must be at full capacity
7. Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
8. Prior to opening the space, any entrances that will be open must be appropriately blocked to prevent accidental entry.
9. Upon opening the space, the oxygen content, flammable gases and vapors, and potential toxic air contaminants will be monitored and documented on permit using the provided air monitors. If a hazardous atmosphere exists, continuous forced air ventilation is required until all potential hazards are eliminated.
   Entrants may not enter the space until acceptable entry conditions are confirmed. If acceptable entry conditions cannot be established and maintained, entry shall not be allowed.
10. Acceptable entry conditions are as follows:
    i. Oxygen content: >/= 19.5% and</=23.5%
    ii. LEL :0
    iii. H2S :0
    iv. CO2 :0
11. When feasible all connecting lines, ducts and pipes connected to chemical, gas and utility source will be broken and capped or blanked.
12. When feasible Heating devices (e.g. jackets, coils, mantels, etc.) will be rendered safe either through line breaking/blanking or electrical lockout/tag out.
13. When feasible all mechanical, hydraulic and electrical hazards (e.g. agitators, machine drives, electrical lines, etc.) will be controlled through lockout/tag out.
14. If water or sewage has collected in the space it shall be pumped out prior to entry if possible. If the source is a continuous flow, a pump will be required to continuously remove water or sewage and be watched closely by the entry supervisor or an attendant to be sure the pump is working properly throughout the duration of the entry.
15. When feasible the space will be rinsed and/or dried if there is a build-up of hazardous or slippery material on the walls of the space.
16. Safe access to the space will be provided.
17. Adequate lighting will be provided either through low voltage lighting or through 110 Volt plugged into a Ground Fault Circuit Interrupter (GFCI).
18. All tools and communication devices shall be checked to make sure that they are intrinsically safe if the potential exists for a flammable atmosphere.

19. Communication methods shall be established prior to entry between the entrant and attendant and will be selected based on the size, location and characteristics of the space.
20. The rescue service shall be notified prior to any entry. They must be informed of the time, location and hazards present.
21. All retrieval equipment must be inspected prior to entry. If there is a problem with any piece of equipment the entry supervisor must be notified and the equipment must be taken out of service.
22. For vertical entries the retrieval system will be set-up at the entry point and will include a tripod, winch with fall protection, and a full body harness. Each authorized entrant shall use a full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point which the employer can establish presents a profile small enough for the successful removal of the entrant.
23. If an entrant must unhook from the retrieval system for safety purposes, it has to be communicated to the attendant prior to disconnecting.
24. If any other items such as tools need to be lowered into a space, a separate winch will be attached to the tripod and used for such purposes.

b. PERMIT COMPLETION

1. The permit will be completed by the entry supervisor (See Appendix B**)**
2. All information requested on the permit will completed by the entry supervisor or NA (not applicable) will be written in.
3. The time of permit issuance will always be written in.
4. Expired permits will be returned to the Occupational Safety Manager. Contractors are also required to submit copies of all completed permits to the USC Occupational Safety Manager.

c. ENTRY

1. All required equipment for entry including: communication, lighting, access, safety and rescue as well as the tools needed to accomplish the job will be available at the entrance.
2. Continuous space atmosphere monitoring will be established either by the entry supervisor and will be documented on the permit.

3. The attendant will stay in the immediate area of the entrance to the space and will stay in contact with the entrant.
4. The entry supervisor will formally approve the entry to begin. At any time during the job the entry supervisor, entrant or the attendant can cancel the permit and cause the entry to be either postponed or stopped due to safety concerns.
5. The attendant will document meter readings at intervals decided upon by the entry supervisor.
6. The attendant will immediately communicate any exterior condition to the entrant that could affect her/his safety and the need to evacuate the space immediately (e.g. fire alarm, severe weather, etc.)

d. ENTRY COMPLETION

1. The completed entry permit and any other pertinent information will be submitted to the Occupational Safety Manager.
2. The Rescue Service will be notified that the entry is complete.
3. The entry supervisor will ensure all confined space entry point are closed and secured.

13. EQUIPMENT MAINTENANCE

A. All confined space equipment shall be maintained according to the manufacturer's requirements.

B. All equipment shall be inspected prior to each use and at the end of each use. Any equipment that does not pass inspection shall be taken out of service and repaired or replaced.

C. The equipment checklist found in Appendix C shall be used for each entry.

14. RESCUE SERVICE

The rescue service will be contacted by means of communication or process and can be reached at **911.**

Upon arrival the rescue team will be furnished with the permit and informed of any hazards present.

Regardless of the number of permit required confined space entries made, the **Rescue Service** will be contacted at least annually to review the following information.

1. List of permit-required confined spaces.
2. The hazards of the spaces.
3. Procedures for entry.
4. Equipment available on site.
5. Training programs

15. CONTRACTORS/VENDORS

Any work for USC at any USC facility or off-site location/s must be conducted in accordance with all applicable regulations. Contractors must have a written confined space program that complies with all applicable regulations. All contractors must provide copies of their written program and employee training documentation.

Contractors are also responsible to supply all needed equipment to perform safe entry and/or rescue. When a contractor is required to enter or work in a permit required space, the Project Manager or contracting department will furnish a written copy of USC Confined Space Written Program to the contractor. All contractor/vendors who will need to work in a permit required confined space should follow their company procedures as well as USC requirements specified in the written program. Prior to entry the Occupational Safety Manager will inform the contractor if any hazards previously confronted in the space, apprise the contractor of any precautions or procedures that have been implemented for the protection of employees working near that space and coordinate any operations between the contractor and USC. At the conclusion of the entry the contractor will suit copies of the entry permit to the USC Occupational Safety Manager.

16. TRAINING

Training will be provided to all personnel who are attendants, entrants or entry supervisors as follows:

- Before the employee is assigned duties relating to permit required confined space entry;
- Before the employee's assigned duties change;
- Whenever there is a change in operations that presents a hazard that the employee has not been trained in previously;
- Whenever there is an indication that the procedure is not being followed safely and/or when there are indications that employee practices or knowledge do not meet the requirements.

Training shall establish proficiency in the duties required by the standard. All training will be certified in writing with the employee's name and the date of training in addition to an outline of material presented.

Annual refresher training shall be provided to all affected employees and will include a non-entry rescue practice drill.

All employees that work near confined spaces and are not allowed to enter, will be given a confined space awareness training in order to comply with part 29 CFR 1910.146(c)(2).

All training records will be maintained by the Occupational Safety Manager.

Appendix A
Confined Space Equipment

Manufacture	Type	Equipment #	Location
Miller	Self-Retracting System 100 ft.	807171	FS
Miller	Tripod		FS
Miller	Work Winch		FS
	8” Eclectic Blower		FS
	8” Duct / Case		FS
	8” Manhole Reducer		FS
	16” Electric Fan		FS
	16’ Duct / Holder		FS
	Gas Power Generator		FS

Appendix B

CONFINED SPACE ENTRY PERMIT
University of South Carolina
Version 07-13-07

Location & Description
of Confined Space _____

FAMIS CS ID _____ Date ____/____/____

Purpose of Entry _____

Time Permit Starts _____ AM/PM **Time Permit Ends _____ AM/PM**

Valid for One Shift Only (8.5 Hours)

Crew_____ Work Order # _____

	Crew	Cell Number
Job Supervisor:		
Attendant:		
Entrants:		

Special Requirements:	Yes	No	N/A		Yes	No	N/A
Lock Out – De-energize (LOCK, TAG, TEST)				Lighting			
Lines Broken, Capped or Blanked				Ladder			
Purge – Flush and Vent				Traffic Control Devices			
Mechanical Ventilation				Barricades for Opening			
Secure Area				Protective Clothing			
Breathing Apparatus				Hard Hats			
Resuscitator - Inhalator				Gloves			
Escape Harness – Full Body				Safety Glasses			
Mechanical Retrieval Device				Hearing Protection			
Retrieval Line				Hot Work Permit			
Fire Extinguishers				Other Required Equipment			

COMMUNICATION PROCEDURES:
Line of Sight ___ Radio ___ Verbal ___ Cell ___ (check all that apply)

Other: _____

Gases Tested P.E.L.	Date	Time	R/O	Time	R/O	Time	R/O	Time	R/O
Oxygen 19.5% - 23.5%									
L.E.L. over 0%									
Carbon Monoxide 0 ppm									
Hydrogen Sulfide 0 ppm									
Other Gas Hazards:									

Monitor Brand and Model _____ Serial # _____

Tester's Signature _____ Periodic Testing Yes/No

EMERGENCY RESCUE PROCEDURE:

1. Call 911
2. Call USCPD 777-9111
3. Notify Call Center 777-9276

Permit Prepared By: _____
(Print)

Date: ___/___/_____ _____
(Signature)

Permit Issued By: _____
(Print)

Date: ___/___/_____ _____
(Signature)

ALL COPIES OF THE PERMIT WILL REMAIN AT THE JOB SITE UNTIL THE JOB IS COMPLETED.

WHEN THE PERMIT HAS EXPIRED, SUBMIT A COPY TO THE SAFETY OFFICE.

Appendix C

Permit-Required Confined Space Locations Columbia Campus

- All Columbia Campus Tunnels.
- All Columbia Campus high voltage manholes.
- All Columbia Campus steam manholes.
- All Columbia Campus boilers located inside our energy facilities.
- All Columbia Campus chill water manholes.
- All Colombia Campus water treatment tanks (that allow entry) located inside our energy facilities.
- All Columbia Campus energy facility smoke stacks.
- All sump pumps that an employee can bodily enter (e.g. southeast corner of Thomas Copper Library).