

CONFINED SPACE PROGRAM



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CONFINED SPACE PROGRAM



1.0 Purpose/Policy:

- 1.1 The Confined Spaces Program establishes the entry and permitting requirements for the protection of Facilities and Administrative Services' employees and Contractors from the hazards associated with confined spaces (i.e. being overcome by toxic gases and/or oxygen deficient atmospheres). These procedures are to be utilized by Facilities and Administrative Services' employees before and during entry into a confined space.
- 1.2 The program establishes safe operating procedures to protect both employees and contractors from the hazards associated with entry into confined spaces on The University's campus. This written program is available for inspection by employees and their authorized representatives at the Assistant Director of Central Plant Operation's Office, the Facilities Resource Center, Public Safety, The Risk Management Office, and Boiler Room.
- 1.3 A confined space is a space that has limited or restricted means of entry or egress, is large enough for an employee to enter and perform work assignments, and is not designed for human occupancy. These spaces may include, but are not limited to, elevator pits, cooling towers, boilers, underground vaults, tanks, storage bins, pits, vessels, crawl spaces and access areas above fixed ceilings. Employees who work in confined spaces face a risk of exposure to serious physical injury from hazards of engulfment, entrapment, and hazardous atmospheric conditions.
- 1.4 Reference: *OSHA- Permit-Required Confined Spaces* (29 CFR 1910.146).



2.0 Responsibilities:



- 2.1 The FAS Safety Managers are responsible for ensuring proper conduct of the program through periodic audits and an annual review. FAS Safety Managers will maintain an accurate confined spaces inventory, inspections, and forward copies to the Risk Management Office. The Risk Management Office and the FAS Training and Development Manager will maintain all training documentation. Additionally, FAS Safety Managers are responsible for:
 - 2.1.1 Ensuring that the proper training is conducted for all employees involved in confined space entry and/or operations.
 - 2.1.2 Ensuring that confined space assessments have been conducted.
 - 2.1.3 Providing proper equipment for safe entry including atmospheric monitoring equipment, respiratory protection, personal fall arrest system, and other personal protective equipment as may be required.
 - 2.1.4 Ensuring that all permit required confined spaces are properly posted. Each permit-required confined space will be marked "**Danger Confined Space - Entry Permit Required**".
 - 2.1.5 Annually reviewing this program and all Entry Permits.
- 2.2 Supervisors are responsible for promoting the practices and procedures of the program, and ensuring compliance by each employee within their department.
- 2.3 Employees are responsible for following program requirements, and reporting any previously unidentified hazards associated with confined spaces to their supervisor.

3.0 Scope:

- 3.1 This program applies to all operations involving confined spaces at American University. The procedures specified in this program are required when employees or contractor personnel are involved with entry into confined spaces. The Assistant Director for Central Plant Operations and the Director for Physical Plant Operations must first approve any changes in this procedure.

4.0 Definitions:



- 4.1 ***Acceptable Entry Conditions*** - means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.
- 4.2 ***Attendant*** - means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.
- 4.3 ***Authorized Entrant*** - means an employee who is authorized by the employer to enter a permit space.
- 4.4 ***Confined Space*** - means a space that:
- 4.4.1 Is large enough and so configured that an employee can bodily enter and perform assigned work; and
 - 4.4.2 Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
 - 4.4.3 Is not designed for continuous employee occupancy.
- 4.5 ***Emergency*** - means any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.
- 4.6 ***Entry*** - means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.
- 4.7 ***Entry permit (Permit)*** - means the written or printed document that is provided by the employer to allow and control entry into a permit space.
- 4.8 ***Entry Supervisor*** - means the person (such as the supervisor, Chief Engineers, Assistant Chiefs, or project manager) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section. NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation provided each responsible person has been adequately trained to perform in that capacity.

Definitions Continued



- 4.9 ***Hazardous Atmosphere*** - means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:
- 4.9.1 Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL).
 - 4.9.2 Airborne combustible dust at a concentration that meets or exceeds its LFL.
 - 4.9.3 Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.
 - 4.9.4 Any other atmospheric condition that is immediately dangerous to life or health.
- 4.10 ***Immediately Dangerous To Life Or Health (IDLH)*** - means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.
- 4.11 ***Isolation*** - means the process by which a permit space is removed from service and completely protected against the release of energy into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.
- 4.12 ***Lower Flammable Limit*** – means the lowest concentration of a material in air at which ignition will occur.
- 4.13 ***Oxygen Deficient Atmosphere*** - means an atmosphere containing less than 19.5 percent oxygen by volume.
- 4.14 ***Oxygen Enriched Atmosphere*** - means an atmosphere containing more than 23.5 percent oxygen by volume.
- 4.15 ***Permit-Required Confined Space (Permit Space)*** - means a confined space that has one or more of the following characteristics:
- 4.15.1 Contains or has a potential to contain a hazardous atmosphere;
 - 4.15.2 Contains a material that has the potential for engulfing an entrant;
 - 4.15.3 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
 - 4.15.4 Contains any other recognized serious safety or health hazard.
- 4.16 ***Permit-Required Confined Space Program (Permit Space Program)*** - means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.
- 4.17 ***Rescue Service*** - means the personnel or local emergency service provider designated to rescue employees from permit spaces.

Definitions Continued



- 4.18 **Retrieval System** - means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.
- 4.19 **Testing** - means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space. NOTE: Testing enables the University both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

5.0 General Requirements:

- 5.1 All confined spaces have been identified and classified as “permit-required” or “non-permit-required confined spaces,” and marked accordingly.
- 5.2 The Assistant Director for Central Plant Operations is responsible for initially evaluating all confined spaces to determine if each space is a permit-required space or a non-permit space.
- 5.3 The Assistant Director for Central Plant Operations is responsible for reevaluating non-permit spaces whenever there are changes in the use or configuration of a non-permit space that might increase the hazard to entrants, thereby, making the space a permit-required space.
- 5.4 Each permit-required confined space shall be initially evaluated to identify, to the extent feasible, specific entry instructions and procedures specific for the space and the hazards identified. Specific monitoring methods and record keeping procedures will be developed where necessary.

6.0 Posting of permit-required Confined Spaces:

- 6.1 A sign shall be posted at or near the entrance to each permit-required confined space to inform employees of the existence and location of the hazards of the space. The sign shall also alert employees that only authorized entrants may enter the space. Additional instructions may also be posted. All signs shall be maintained in legible condition.





7.0 Reclassification of Spaces:

- 7.1 The Assistant Director for Central Plant Operations shall certify all reclassifications of permit-required spaces into non-permit-required spaces. A permit-required space shall not be reclassified unless all actual hazards have been eliminated.

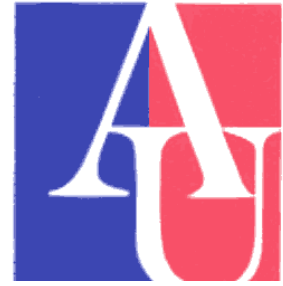
8.0 Procedure Review:

- 8.1 FAS Safety Managers, Chief Engineer, Supervisors and those responsible shall review entry operations responsible for space evaluations when there is reason to believe that protective measures taken under the permit-required space program may not protect employees.
- 8.2 The program shall be revised to correct the deficiencies found prior to the authorization of subsequent entries: i.e. – discovery of a space hazard not covered by the Permit; detection of prohibited condition; occurrence of injury/near-miss incident; change in the configuration or use of a permit space; employee complaints concerning the program effectiveness.

9.0 Annual Review:

- 9.1 The Assistant Director for Central Plant Operations, the Chief Engineer, Assistant Chief Engineers, and FAS Safety Managers shall conduct a single annual review of the Permit Space Entry Program. Evaluation of the Entry Permits from the previous 12-month period and random inspections of permit-required entries shall be used in the evaluation process. Detection of any deficiencies in the program and procedures warrant immediate response by not allowing any entry into permit-required spaces until the deficiencies have been corrected.
- 9.2 Similar procedures mentioned above shall be used to ensure that outside contractors working on the campus are compliant with the criteria in this program.

10.0 Entry Procedures:



10.1 Duties of Authorized Entrants

- 10.1.1 Recognize hazards they may face, the signs and symptoms of hazard exposure, understand the hazard exposure consequences and thoroughly review the permit prior to entering the space.
- 10.1.2 Properly use required equipment for ventilation, communication, lighting, rescue, personal protective equipment, and personal monitoring systems and emergency scenarios needed for safe entry and exit into permit-required spaces.
- 10.1.3 Maintain continuous contact with the attendant and notify the attendant of self-initiated evacuation from the space.
- 10.1.4 Alert the attendant whenever the entrant perceives that he/she is in danger or the entrant detects a hazardous/prohibited condition.
- 10.1.5 Exit the space as quickly as possible when the attendant or entry supervisor orders evacuation of the space and/or automatic alarm on air monitoring equipment is activated.

10.2 Duties of Attendants

- 10.2.1 Recognize hazards and the signs and symptoms of hazard exposure, understand the hazard exposure consequences and thoroughly review the permit prior to permitting entry into the space.
- 10.2.2 Know and recognize the behavior effects of hazard exposure in authorized entrants. Examples include slurred speech, dizziness, incoherence and loss of consciousness.
- 10.2.3 Constantly maintain an accurate account of all entrants into the space.
- 10.2.4 Remain outside the space during the entry operations until relieved by another authorized attendant and refrain from engaging in activities that may hinder attending duties.
- 10.2.5 Maintain continuous contact with authorized entrants and alert the entrants of the need to evacuate the space.
- 10.2.6 Monitor the activities inside and outside the space to determine if it is safe for the entrants to continue in the operations.
- 10.2.7 Order authorized entrants to evacuate the space immediately when:
 - 10.2.7.1 Prohibited conditions are observed or detected
 - 10.2.7.2 Entrant behavioral effects are detected
 - 10.2.7.3 A situation outside the permit-required space which could endanger or hinder the entrants is detected
 - 10.2.7.4 The attendant cannot effectively and safely perform all the duties noted above.

- 10.2.8 Summon rescue and other emergency services as soon as the attendant determines that entrants may need assistance to escape from the space
- 10.2.9 Never enter the space to attempt to rescue of entrants or assist in operations taking place in the space.
- 10.2.10 Perform non-entry rescue to remove entrants by equipment, harness and retraction device, when required.
- 10.2.11 Take the following actions when authorized persons approach or enter a permit spaces while entry is underway:
 - 10.2.11.1 Warn unauthorized persons that they must stay away from the space and if necessary contact Public Safety for assistance with the unauthorized persons
 - 10.2.11.2 If unauthorized persons have entered the permit required space, advise them that they must exit immediately
 - 10.2.11.3 Inform authorized entrants and entry supervisor of unauthorized personnel and their actions
- 10.2.12 Performs no duties that may interfere with the primary duty to monitor and protect the entrants.



10.3 Duties of Entry Supervisor(s)

- 10.3.1 Know and recognize hazards they may face, the signs and symptoms of hazard exposure, understand the hazard exposure consequences and thoroughly review the permit prior to authorizing entry into the space
- 10.3.2 Evaluate the operations/work to be performed in the space before a job permit is issued
- 10.3.3 Verify that all hazards and potential hazards in the space have been properly identified
- 10.3.4 Verify that all information of the entry permit is correct.
- 10.3.5 Ensure that all pre-entry test and procedures are dutifully carried out prior to entry
- 10.3.6 Terminate entry and cancel the permit when:
 - 10.3.6.1 Operations are completed
 - 10.3.6.2 A hazard is identified
 - 10.3.6.3 A prohibited condition occurs
- 10.3.7 Verify that rescue services and a means for summoning them are available.
- 10.3.8 Remove unauthorized persons who enter or attempt to enter the work area and/or permit-required space.
- 10.3.9 Determine that acceptable entry conditions are maintained
- 10.3.10 Properly inform all affected personnel when responsibilities of the entry, supervisor, attendant etc. changes during an entry.



- 10.3.11 Ensure that all process piping, mechanical equipment, electrical equipment or any other source of energy in the space is isolated, by positive means, from the energy source and rendered inoperative prior to entry in the space. See Lockout/Tagout Program.
- 10.3.12 When necessary, ensure that the space is cleaned and decontaminated of hazardous materials to the extent feasible prior to entry. This shall be accomplished by methods including but not limited to draining, ventilating, cooling rinsing or purging.
- 10.3.13 Ensure that any and all compounds used in the space are compatible with the environment and conditions inside the space.
- 10.3.14 Ensure that entrants and attendants are familiar with their duties and the procedures specific for the entry permit.
- 10.3.15 Ensure that the entrant is provided all the necessary PPE and is familiar with the use and limitations of the equipment.
- 10.3.16 Ensure that the space is naturally or mechanically ventilated for 30 min. prior to the entry.
- 10.3.17 Ensure that any “hot work” that is conducted in the space shall not have an adverse affect on the entrants’ safety and well being.

10.4 Entry Permit:

- 10.4.1 Entry shall not be permitted into permit-required spaces without a properly executed permit. This permit is used to verify that conditions in the space have been evaluated; appropriate PPE is required, trained entrants and attendants are assigned and that area is safe for the entrants to enter.
- 10.4.2 The Entry Supervisor is responsible for determining that acceptable entry conditions are met, and for signing the entry permit prior to entry.
- 10.4.3 The completed entry permit shall be posted at the entry to the space at all times during entry; shall be terminated at the completion of the work or shift, which ever comes first.
- 10.4.4 The entry permit shall be valid for only the performance of the permit space work specified and for the location and time/duration indicated on the permit with a one-shift maximum of duration.
- 10.4.5 A new permit shall be issued at the beginning of a work shift for continuance of the entry work and or whenever the personnel associated with the permit are changed.

- 10.4.6 For the entry permit to remain in effect, the following conditions shall be met prior to each reentry into the space:
- 10.4.6.1 Atmospheric testing must show that the atmosphere in the space is within the acceptable limits;
 - 10.4.6.2 The supervisor of the employees shall verify that all precautions and other measures specified on the permit or still in effect; and
 - 10.4.6.3 Only those operations or work processes originally approved on the entry permit shall be carried out in the space.
- 10.4.7 Copies of completed entry permits shall be maintained by the Assistant Director for Central Plant Operations for a period of three years to facilitate annual review and historical data purposes.
- 10.4.8 When any/each new hazard could be introduced into the permit-required space due to conditions or work activity that are different from those specified on the entry permit, the Permit shall be revoked immediately and all entrants must exit. A new permit meeting all the requirements specified above shall be issued including the changes in the activity or conditions. Example: welding must be performed when only bolt-connected couplings were initially expected.



11.0 Procedures For Completing a Confined Spaces Permit

- 11.1 Obtain a permit from the Assistant Director for Central Plant Operations, Chief Engineer or Assistant Chief Engineers.
- 11.2 If the space to be entered has already been identified, check the confined space inventory to verify that the space is permit required space., if so continue
- 11.3 Enter the date of entry.
- 11.4 The permit at the entry site must be signed and dated the same date as the entry date.
- 11.5 The permit must be given a singularly identifying number.
- 11.6 **Location and Description** - Enter a description and location of the space. The building name, Room number etc. will be needed.
- 11.7 Note the presence of pipes, conduit(s), containers, etc. which may relate to potential hazards for this space.
- 11.8 **Duration** – state the duration of time for which this permit is valid. The permit may not be valid for longer than one shift.
- 11.9 **Posting** – if the posting on/near the space is identified



as a confined space but not a permit-required space, a permit may not be required. This space may have not been evaluated or the sign may have been removed.

- 11.10 **Purpose and Description of Work** – record the purpose of the entry as reported by the employees requesting the permit and their supervisors. A brief description of the work in the space must be included with activities such as welding which may contribute to the hazards of the space.
- 11.11 **Potential Hazards** – Review the contents of the space and work performed to determine what actual and potential hazards exist. Circle the types of hazards and give a brief description of the hazards identified
- 11.12 **Alternative Procedure** – if the space is being certified *for Alternative Procedure*, verify that the only actual or potential hazard is atmospheric and that the space has continuous ventilation. NOTE: Atmospheric testing is required by certification and the procedures set forth under “Ventilation.” If not certifying for an Alternative Procedure complete the remainder of the permit.
- 11.13 **Ventilation Equipment** – list the type of ventilation equipment required for this entry. Make sure that the intake for the equipment is free from contaminants (including potential contaminants, such as, vehicle emissions etc.).
- 11.14 **Atmospheric Tests** – testing shall be performed in accordance with the confined space procedure. Use the combination oxygen-combustible gas meter to test the atmosphere in the space and record the results in the permit table. When/if oxygen is at acceptable levels, then test for combustible and other gases. Record the gasses and data results in the proper section of the atmospheric testing sheet.
- 11.15 **Other Permits** – attach a copy of any other permit required for entry into the space, for example a “Hot” permit for cutting and welding.
- 11.16 **Acceptable Entry Conditions** – record conditions which must be in place for this space before and during entry. Review the confined space entry procedure and previous permits for this space to identify past exposure records.
- 11.17 **Barriers** – determine and verify that applicable barriers and warning line system are available and delineate the appropriate settings on the permit.
- 11.18 **Control Methods** – review the confined spaces entry procedure to determine appropriate control methods needed prior to entry into the space.



- 11.19 **Lockout/tagout Procedures** – Indicate if Lockout/tagout procedures are required. If yes, the Lockout/tagout program and authorized employees shall be used in the permit entry. All processes and procedures of the Lockout/tagout program shall be in effect during the exposure.
- 11.20 **Respiratory Protection** – list the type of Respiratory protection required for this entry. All components of the Respiratory Protection Program shall be met.
- 11.21 **Retrieval Equipment** – list the types of rescue retrieval equipment used for this entry and check to make sure it is working properly.
- 11.22 **Communication Equipment**- list the method of communication to be used during entry and check to make sure the equipment is working.
- 11.23 **Authorized Entrants**- verify that each employee scheduled to enter the space has completed the confined space entry training course and has received specific instruction regarding this entry. Each authorized entrant must carry a card showing that he/she has completed the training course and is authorized for entry into confined spaces. Upon verification, enter the employee's name(s) on the appropriate line.
- 11.24 **Attendants**- if an attendant is required for this entry, verify that the employee acting in this capacity has received the proper training and enter his/her name on the permit.
- 11.25 **Location of Nearest Phone**- record the location of the phone nearest to this space that can be used to summon the rescue service if needed.
- 11.26 **Emergency Phone**- record the phone number of the rescue service to be summoned in the event of an emergency. Verify that rescue services are available by calling the number or making previous contact with the rescue service.
- 11.27 **Certification of Permit** - upon completion of the above information, review the permit with the authorized entrants and the attendant and have them initial the permit in the space provided next to their name. Then sign the permit and record the time.
- 11.28 **Posting** - post the permit at the entrance to the space.
- 11.29 **Cancellation**- the permit must be canceled upon completion of the entry and after all entrants have exited the space. The permit can also be canceled at anytime when a condition not allowed by the permit arises, causing a change that could result in a hazard to entrants. Sign in the appropriate space to cancel the permit. If the permit is canceled prior to normal completion of the entry, the reason for cancellation must also be recorded.



- 11.30 Give or send a copy of the canceled permit to the Assistant Director of Central Plant Operations.

12.0 Working in a Confined Space

- 12.1 Equipment: Equipment to be used at permit-required confined spaces at this facility may include:

- 12.1.1 Warning signs and barricades.
- 12.1.2 Ventilation equipment, capable of delivering 600 cubic feet of air per minute into the space.
- 12.1.3 Portable lighting- explosion proof
- 12.1.4 Non-sparking tools.
- 12.1.5 Air line or self-contained breathing apparatus.
- 12.1.6 Body harness and/or wristlets to which lifeline can be attached.
- 12.1.7 Life lines-5/8 inch diameter, corrosion resistant, with quick latch hook on one end, 50 and 100 feet long.
- 12.1.8 Mechanical lifting devices.
- 12.1.9 Fire extinguishing equipment.
- 12.1.10 Direct reading instruments for evaluating the atmosphere.
- 12.1.11 Communications equipment.

- 12.2 Specific equipment used at a permit-required confined space depends on the nature of the hazards and the work to be done in the space.

- 12.3 If flammable liquids or gases were previously present within the permit space, explosion-proof equipment shall be used. All equipment shall be positively grounded. Electric lighting not exceeding 12 volts shall be used.



- 12.4 If entrants are to use hand tools in a permit space, they shall be in good repair, properly grounded (if electrical), and selected according to intended use. Where possible, employees shall use pneumatic power tools. Certain circumstances may require the use of nonferrous, non-sparking tools.

- 12.5 Hand-held lights and other illumination means utilized in permit spaces shall be properly grounded and shall be equipped with guards to prevent contact with the bulb.

- 12.6 All electrical equipment taken into a wet/damp permit space shall be protected by a ground fault circuit interrupter. Battery operated equipment may also be used in such a permit space.

- 12.7 Except for the gas cylinders used for self-contained breathing apparatus (SCBA), compressed gas cylinders shall not be taken into a permit space. Gas-

supplying hoses shall be removed from the space and the supply turned off at the cylinder valve prior to personnel leaving the permit space.

- 12.8 The entry supervisor must approve all chemicals taken into the confined space.

13.0 Ventilation

- 13.1 Positive/forced mechanical ventilation is required if atmospheric test results of the permit space indicate the presence of, or the potential for a hazardous atmosphere.
- 13.2 When mechanical ventilation is required, the permit space shall continue to be ventilated until the atmosphere is within the acceptable ranges and all entrants have left the space.
- 13.3 The forced ventilation shall be directed, so that, both the immediate areas where an entrant starts, as well as where the entrant will be within the permit space, is ventilated.
- 13.4 Compressed air shall not be used for ventilation.
- 13.5 The forced ventilation air supply shall be from a clean source and may not increase the hazards in the permit space.
- 13.6 All chemicals shall be removed from the vicinity of the permit space when air-moving units are needed to provide ventilation.
- 13.7 Vehicles shall not be left running near a permit space, before or during the entry procedure, or near air moving equipment being used to ventilate a permit space.



14.0 Personal Protective Equipment

- 14.1 Prior to wearing respiratory protection equipment, all employees must meet the requirements outlined in the University's Respiratory Protection Program. Only National Institute for Occupational Safety and Health (NIOSH) /Mine Safety and Health Administration (MSHA) approved self-contained breathing apparatus, or NIOSH/MSHA approved airline respirators, equipped with a 5-minute emergency egress bottle, shall be used in permit spaces during emergency situations, such as during hazardous atmospheres or IDLH conditions.
- 14.2 Required respiratory protection for entry into a permit space shall be determined by the entry supervisor, based upon the space conditions, the atmospheric sampling test results, the work to be performed, and any materials to be utilized. The employee's supervisor shall obtain this information prior to

authorizing space entry. This respiratory protection shall only be the type approved for non-IDLH atmospheres.

- 14.3 The type of work to be conducted in the permit space shall determine the requirements for the use of eye, face, and skin protection, and these shall be specified by the entry supervisor prior to entry.
- 14.4 Depending upon the permit space condition and the work to be performed, other personal protective equipment such as gloves, clothing, and hearing protection may be needed.
- 14.5 Respiratory protective equipment and protective clothing shall not be substituted for cleaning, decontamination and ventilation of the permit space.

15.0 Atmospheric Testing

- 15.1 Prior to entry into a permit space, and before validation/re-validation of an Entry Permit, a qualified person shall conduct environmental testing of the space to determine the presence of a hazardous atmosphere from outside of the space entrance (remote testing). Qualified personnel shall conduct the required environmental monitoring for all routine permit spaces. For those spaces that present special or unique hazards, Industrial Hygienist will be consulted and assistance given if professional judgment so indicates.
- 15.2 Equipment – Intrinsically safe gas detection monitors and approved calibration equipment/supplies will be used.
- 15.3 Procedures
 - 15.3.1 Calibration shall be performed.
 - 15.3.2 The person conducting the environmental monitoring of the permit space atmosphere shall remain at the site until all air monitoring is completed for the needed duration of the entry into the space.
 - 15.3.3 Testing of the atmosphere of permit spaces shall be conducted throughout the entire portion of the space to be occupied, especially at the lowest points in the space.
 - 15.3.4 The air monitoring sequence shall be **oxygen, flammability**, and then **toxicity**. (When the oxygen percent by volume is less than 16%, combustible gas sensors are not accurate).
 - 15.3.5 Initial monitoring of the atmospheric conditions of a permit space, and subsequent testing after work has been stopped for a significant period of time (greater than 30 minutes), shall be done with the ventilation systems shut down.



- 15.3.6 Additional testing shall be conducted with ventilation systems working to ensure that the contaminants are removed and that the ventilation system is not itself causing a hazardous atmosphere or condition.
- 15.3.7 The permit space atmosphere shall be retested prior to allowing re-entry after the space has been vacated for greater than 30 minutes.
- 15.3.8 The permit space atmosphere shall be considered to be hazardous whenever any of the following conditions occur :
- 15.3.8.1 Oxygen content is less than 19.5% or more than 23.5%
- 15.3.8.2 The concentration of a flammable gas, vapor, or mist present in the space is at or above 10 percent of its lower flammable limit (LFL).
- 15.3.8.3 An airborne combustible dust concentration that is at or above the LFL, as indicated by conditions that do not obscure vision at a distance of 5 feet or less.
- 15.3.8.4 An airborne concentration of any substance for which there is an OSHA dose or permissible exposure limit (PEL), or other exposure limit(s) when a PEL has not been established, that could result in an exposure above permissible limit(s).
- 15.3.8.5 Any other atmospheric condition that is immediately dangerous to life and health (IDLH).
- 15.3.8.6 **CAUTION:** Concentrations of flammable less than 10 percent are not likely to be an explosion hazard. However, 10 percent of the LEL can be well above 1000 parts per million (PPM) for many solvents or gases, which may be a toxic hazard. If significant levels of gases or solvents are detected below 10 percent of the LFL, additional investigation shall be done if the nature and source of contamination is not known. If the source is known, proper steps shall be taken to assure a safe entry.
- 15.3.9 Whenever monitoring of the atmosphere of a permit space indicates that a hazardous atmosphere exists, entry shall be prohibited until the hazardous atmosphere is removed through the use of positive mechanical ventilation.
- 15.3.10 If additional atmospheric testing fails to eliminate the hazardous atmosphere, following mechanical ventilation, entry shall be permitted only with: the continuation of the ventilation; use of the highest level of personal protection equipment (PPE); and continuous air monitoring. Entry cannot be made prior to contacting an Industrial Hygienist for assistance. Other precautions shall be adequate to deal with the worst possible condition, which could occur in the permit space.
- 15.3.11 If the atmospheric test results indicate that acceptable limits exist initially, but the work to be done in the permit space may produce a hazardous atmosphere while the work is in progress, procedures and equipment shall be used that allow the entrant(s) to safely exit the space. ***Examples of such processes include but are not limited to:***



Welding, cutting, disturbance of accumulated sludge on the space floor; or the use of solvents in the space.

15.3.12 Results of all atmospheric tests shall be recorded on the Entry Permit form along with the corresponding time. The person monitoring the atmosphere shall also initial the results in the designated box on the Entry Permit.

15.3.13 The Entry Supervisor shall have the responsibility to evaluate and monitor the potential and actual atmospheric hazards that may be present during work to be conducted within a permit space, if the supervisor is not a qualified tester, a qualified person must be consulted with prior to entry. Safety procedures, personal protective equipment (PPE), and rescue equipment required must be confirmed prior to signing the Permit.



16.0 Rescue and Emergencies

16.1 Equipment

16.1.1 In Permit-Required Spaces all authorized entrants shall use a full body harness, with a retrieval line attached at the center of the entrants' back near shoulder level, or above the entrant's head. Wristlets may only be used if the use of the harness is infeasible or creates a greater hazard, and the use of wristlets is the safest and most effective alternative.

16.1.2 Emergency respiratory protection equipment shall be available at the permit space prior to requesting the issuance of the Entry Permit.

16.2 Procedures

16.2.1 Employer Rescue Services - The Assistant Director for Central Plant Operations shall ensure that:

16.2.1.1 All employees assigned to rescue response duties are provided with and trained in the use of PPE and rescue equipment needed.

16.2.1.2 Rescue service members receive training:

16.2.1.2.1 needed to perform rescue

16.2.1.2.2 Required for authorized entrants

16.2.1.3 each member of the rescue service practice rescues at least once every 12 months, using simulated rescue from a representative permit space each member of rescue service is trained in basic first aid and CPR.

16.2.1.4 maintains a list of rescue team members who have current certification in first aid and CPR.

16.2.2 Contracted Rescue Services - If contract rescue services are used, The Assistant Director for Central Plant Operations shall

16.2.2.1 Inform the rescue service of hazards they may encounter.

16.2.2.2 Make available any permit space for the purpose of developing and practicing rescue plans.



16.2.3 Retrieval Systems

16.2.3.1 Retrieval systems and methods, which facilitate non-entry rescue, shall be used, unless that would increase overall risk to entrants. Must use a mechanical device for spaces more than 5 feet deep.

16.2.3.2 Retrieval systems shall meet the following requirements:

16.2.3.2.1 Each authorized entrant shall use a chest or body harness with retrieval line attached at center back near shoulders, unless the use of wristlets is safer and more productive.

16.2.3.2.2 The other end of the retrieval line shall be attached to a mechanical device or fixed point the permit space, so rescue can be in immediately.

16.2.3.3 Material Safety Data Sheet (MSDS)

16.2.3.3.1 MSDSs for all materials used in Permit-Spaces shall be available at the attendants station during entry.

16.2.3.3.2 if an injured entrant is exposed to a substance for which an MSDS is required, the MSDS shall be made available to the treating medical facility.

17.0 Alternative Procedures for Permit-Required Spaces

17.1 The Assistant Director for Plant Operations with the assistance of an Industrial Hygienist, Public Safety, Environmental or Facility Engineer, and/or other required personnel shall evaluate and certify permit-required confined spaces to determine if alternate procedures can be used. Once a space has been certified for alternative procedures, a permit, an attendant, certain equipment, respirators, and rescue equipment are not necessary for each entry into the space. The step-by-step alternative procedure described below can be used for subsequent entries, provided conditions, which could result in an increased hazard, do not change. To certify that alternative procedures can be used, the Assistant Director of Plant Operations shall:

17.1.1 Verify that the only actual or potential hazard posed by the space is atmospheric



- 17.1.2 Verify that the space has continuous forced air ventilation, which is sufficient to maintain an atmosphere, that is safe for entry.
 - 17.1.3 Document air monitoring and inspection data to support the above verifications
 - 17.1.4 Make this documentation available to employees who enter the space
- 17.2 Verification of the above conditions shall be documented by completing a Confined Space Entry Permit shown in Appendix A. This form shall be available to employees entering the space. The Assistant Director for Central Plant Operations shall make the initial certification. All certifications shall be valid until or unless entry conditions change which could result in an increased hazard to entrants. Certifications shall be valid for no longer than one year and shall be retained in Appendix A this program.
- 17.3 The alternative procedures for entry into permit spaces are:
- 17.3.1 Any conditions that would make it unsafe to remove the cover to the space shall be eliminated before the cover is removed.
 - 17.3.2 The entrance to the space shall be guarded, or barricaded to prevent anyone from accidentally falling onto the space and to prevent the entry of foreign objects into the space.
 - 17.3.3 Prior to entry, the atmosphere of the space shall be tested for oxygen content, flammable gases and vapors and potential toxic contaminants. Proper test procedures shall be used as outlined in section 15.0.
 - 17.3.4 Continuous forced air ventilation shall be used so that:
 - 17.3.4.1 No employee enters the space until the ventilation has eliminated any/all hazardous atmospheric conditions.
 - 17.3.4.2 The air is directed to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space.
 - 17.3.4.3 The air is supplied from a clean source and does not increase the hazard of the space
 - 17.3.5 The atmosphere inside the space shall be continuously tested to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Results of this monitoring shall be recorded and retained for one year.

17.3.6 In the event that a hazardous atmosphere is detected inside the space all employees shall leave the space immediately. The Assistant Director for Central Plant Operations or entry supervisor shall investigate and determine how the hazardous atmosphere developed. Subsequent entry shall not be permitted until steps have been implemented to protect employees from the hazardous atmosphere. Furthermore, alternative procedures can no longer be used until the space is certified again for the use of alternative procedures.



18.0 Training

- 18.1 All authorized entrants, attendants, entry supervisors, atmospheric monitoring personnel, and rescue service members and any other affected employees shall attend the Confined Space Entry Training Course as revised to meet 29 CFR1910.146.
- 18.2 Training shall be given to each *affected* employee:
- 18.2.1 Prior to the employee first being assigned to conduct work involving permit spaces.
 - 18.2.2 Before and employee's permit space assigned job is changed (e.g., can now act as both attendant and entrant).
 - 18.2.3 Whenever a change occurs in permit space operations that present a new space hazard for which an employee has not been trained previously; and
 - 18.2.4 Whenever the Assistant Director for Central Plant Operations has reason to believe either that: there are changes required to the procedures in the Permit Space Entry Program, or there are inadequacies in the employee's knowledge or use of the Program procedures.
 - 18.2.5 General training shall ensure that those trained are proficient in the performance of their duties which include but are not limited to, the following:
 - 18.2.5.1 An explanation of the general hazards associated with permit spaces;
 - 18.2.5.2 A review of the specific permit space hazards found in all applicable permit spaces at American University;
 - 18.2.5.3 A discussion of the reason for the proper use of, and the limitations of, personal protective equipment (PPE) and additional safety equipment required for permit space entry;
 - 18.2.5.4 An explanation of the Entry Permit System and other procedural requirement, as outlined in this Program, for conducting a permit space entry;
 - 18.2.5.5 Information on the proper methods to respond to permit space entry emergencies;



- 18.2.5.6 Training of atmospheric monitoring personnel shall include information pertaining to: the proper operation of the air sampling equipment; the equipment limitations associated with anticipated environmental conditions; field calibration; the nature of the work to be performed; the anticipated hazardous atmosphere contaminants from the permit space; and any process which has the potential to significantly alter the original environmental conditions inside or outside the permit space;
- 18.2.5.7 Training necessary to competently perform specific duties as required is section (h) through (k) of the Standard.
- 18.2.6 The Assistant Director for Plant Operations shall certify that training required by paragraph (g) (1) through (3) of the Standard has been accomplished. The certification shall contain each employee's name, the signature or initial of the trainers, and the dates of the training. The certification shall be available for inspection by employees and their authorized representatives. A list of employees who have received training shall also be maintained.
- 18.2.7 The Assistant Director for Central Plant Operations shall maintain a list of trainers for confined Space Entry and will ensure that appropriate training materials are available.

19.0 Contractors

When contractors are hired to perform work involving confined spaces, the following procedures apply.

- 19.1 The Project Manager shall notify each contractor whose work will involve confined spaces that this facility has confined spaces that entry into these spaces is allowed only through compliance with the plant confined space permit program. See "Notice to Contractors" below.
- 19.2 A representative of the University shall inform the contractor of the characteristics of the space, which make it a permit-required space and the procedures and instructions specific to the space. A copy of the specific entry instructions and procedures for the space to be entered shall be given to the contractor along with a copy of the most recent executed permit for that space.
- 19.3 Prior to entry, the Project Manager shall obtain and review a copy of the contractor's entry procedure for the space in question.

19.4 When entry operations involve both American University's employees and the contractor's employees, the Project Manager and Entry Supervisor shall coordinate entry activities to ensure that applicable entry procedures of this program are followed.



19.5 At the conclusion of entry operations, Project Manager shall discuss the entry with the contractor to determine what entry procedures were followed and what hazards were confronted or created during entry.

19.6 **Notice to Contractors**

This facility has confined spaces, which require a written permit prior to entry in accordance with the OSHA standard for permit-required confined spaces (1910.146). Entry into any of the Confined Spaces is prohibited until the Project Manager has been contacted and your confined space entry procedures have been reviewed and approved.



Confined Space Inventory

Campus Grounds:

1. Steam Service Manholes - Permit Required - Hazardous Atmosphere
2. Storm Water and Sewage Manholes - Permit Required - Hazardous Atmosphere

Anderson:

1. Cooling Tower - Permit Required - Mechanical and Energy Hazards
2. Air Handling Units - Permit Required - Mechanical and Energy Hazards
3. Trash Compactor - Permit Required - Mechanical Hazards
4. Sump Pits - Permit Required - Hazardous Atmosphere, Energy Hazards
5. Sanitary Sewer – Permit Required – Hazardous Atmosphere

Asbury Building:

1. Boilers 1, 2, and 3 - Permit Required - Hazardous Atmosphere, Energy Hazards
2. Smoke Stacks - Permit Required - Hazardous Atmosphere
3. Trash Compactors - Permit required - Mechanical Hazards
4. Makeup water tank – Permit required – Engulfment
5. Sump pit – Permit Required – Mechanical hazards, Hazardous atmosphere
6. Air Handling Units - Permit Required - Mechanical and Energy Hazards

Beeghly:

1. Sump Pits – Permit Required – Hazardous Atmosphere, Energy and Mechanical Hazards

Bender Library:

1. Cooling Tower - Permit Required - Mechanical and Energy Hazards
2. Air Handling Units - Permit Required - Mechanical and Energy Hazards
3. Domestic Hot Water Tanks - Permit Required - Hazardous Atmosphere

Brandywine

1. Sump Pits – Permit Required – Hazardous Atmosphere, Energy and Mechanical Hazards

Butler:

1. Air Handling Units - Permit Required - Mechanical and Energy Hazards

Capital:

1. Smoke Stacks - Permit Required - Hazardous Atmosphere
2. Cooling Tower - Permit Required - Mechanical and Energy Hazards
3. Sump Pit - Permit Required - Hazardous Atmosphere, Energy Hazards
4. Domestic Hot Water Tanks - Permit Required - Hazardous Atmosphere
5. Boilers (if flu is removed) – Hazardous Atmosphere
6. Air Handling Units- Permits Required - Mechanical and Energy Hazards

Centennial:

1. Elevator Pits - Permit Required - Mechanical and Energy Hazards
2. Air Handling Units- Permit Required – Mechanical and Energy Hazards

**Congressional**

1. Sump Pits – Permit Required – Hazardous Atmosphere, Energy and Mechanical Hazards
2. Air Handling Units – Permit Required - Mechanical and Energy Hazards

Constitution:

1. Sump Pits – Permit Required – Hazardous Atmosphere, Energy and Mechanical Hazards
2. Crawl Space – Non-permit
3. Air Handling Units - Permit Required – Mechanical and Energy Hazards

Hamilton:

1. Steam Pit – Permit Required – Hazardous Atmosphere, Energy and Mechanical Hazards

Hughes Hall:

1. Elevator Pits - Permit Required - Mechanical and Energy Hazards
2. Cooling Towers - Permit Required - Mechanical and Energy Hazards
3. Air Handling Units - Permit Required - Mechanical and Energy Hazards
1. Domestic Hot Water Tanks – Permit Required - Hazardous Atmosphere

Hurst Building:

1. Areas Under Stair - Permit Required - Energy Hazards
2. Pipe Chase in Attic – Non-Permit

Kay Spiritual:

1. Air Handling Units - Permit Required - Mechanical and Energy Hazards
2. Sump pit – Mechanical and Energy Hazards

Kogod

1. Crawl Space in Basement – undetermined – no lighting. Treat as Permit Required
2. Air Handling Units - Permit Required - Mechanical and Energy Hazards

Leonard Hall:

1. Elevator Pit - Permit Required - Mechanical and Energy Hazards
2. Cooling Tower - Permit Required - Mechanical and Energy Hazards
4. Air Handling Units - Permit Required - Mechanical and Energy Hazards
5. Domestic Hot Water Tanks – Permit Required - Hazardous Atmosphere

Letts Hall:

1. Elevator Pits - Permit Required - Mechanical and Energy Hazards
2. Cooling Tower - Permit Required - Mechanical and Energy Hazards
3. Air Handling Units - Permit Required - Mechanical and Energy Hazards
4. Domestic Cold and Hot Water Tanks – Permit Required - Hazardous Atmosphere

**McCabe:**

1. Domestic Hot Water Tanks – Permit Required - Hazardous Atmosphere

McDowell Hall:

1. Elevator Pits - Permit Required - Mechanical and Energy Hazards
2. Cooling Tower - Permit Required - Mechanical and Energy Hazards
3. Air Handling Units - Permit Required - Mechanical and Energy Hazards
4. Trash Compactors - Permit Required - Mechanical Hazards
5. Old Chimney in fire pump room – Permit Required – Hazardous Atmosphere
6. Trash Chute – Permit Required – Fall hazards
7. Domestic Hot Water Tank – Permit Required - Hazardous Atmosphere

Nebraska Hall:

1. Elevator Pits - Permit Required - Mechanical and Energy Hazards
2. Domestic Hot Water Tank – Permit Required - Hazardous Atmosphere
3. Smoke Stacks - Permit Required - Hazardous Atmosphere

Reeves Aquatic Center/Bender Arena:

1. Water Tank - Permit Required - Hazardous Atmosphere
2. Sump Pit -Permit Required - Hazardous Atmosphere, Energy Hazards
3. Air Handling Units - Permit Required - Mechanical and Energy Hazards
4. Steam Pit – Mechanical and Energy Hazards

School of International Service Building:

1. Sump Pit - Permit Required - Hazardous Atmosphere - Energy Hazards

Ward Circle Building:

1. Cooling Tower - Permit Required - Mechanical and Energy Hazards
2. Steam Line Tunnel - Permit Required - Hazardous Atmosphere, Energy Hazards
3. Sewage Sumps - Permit Required - Hazardous Atmosphere, Engulfment Hazards
4. Elevator Pit – Permit Required – Mechanical and Energy Hazards
5. Storm Sump – Permit Required - Hazardous Atmosphere, Engulfment Hazards
6. Air Handling Units - Permit Required - Mechanical and Energy Hazards

* Other confined spaces and associated hazards may exist that are not listed within the confines of the University. Therefore it is imperative that Facilities and Administrative Services' employees report all other areas that may be potentially classified as a confined space and/or confined space hazard to the Assistant Director of Central Plant Operations for inclusion in this program.

Confined Space Entry Permit

Site location and description:		
Date:	Time:	Expires:
Purpose of entry:		
Name of entry supervisor:		Name of attendant:

HAZARD CONTROLS

Requirements Completed	Date	Time	Requirements Completed	Date	Time
Lockout/De-energize			Full body harness w/ D ring		
Liens broken-capped and/or blanked			Emergency escape retrieval		
Respiratory protection			Attendant		
Secure area			Ventilation		
PPE			Fire extinguishers		
Lifelines			Other		
Other			Other		

EQUIPMENT REQUIRED

What type of communication equipment will be used to maintain contact with entrants? radio phone visual contact
 other _____

What type of communication equipment will be available to contact emergency services? radio phone other _____

Is respiratory protective equipment required for this job? yes no

If yes, what type? SCBA supplied air PAPR full face half face Cartridge used: _____

Is personal protective clothing required for this job? yes no

If yes, what type? coveralls splash suit leather gloves chemical gloves goggles face shield ear plugs

ear muffs hard hat welding hood welding gloves welding jacket safety boots

chemical boots other: _____

What type of hazardous energy may be present? electrical mechanical hydraulic chemical
 pneumatic thermal

How will these hazards be eliminated or controlled?

CONTINUOUS MONITORING RECORDINGS

		<u>Time and Readings</u>							
Contaminant	Acceptable Entry Level	time	time	time	time	time	time	time	time
Oxygen content	20% > O ₂ <22%								
Lower explosive limit	< 1%								
Carbon monoxide	< 30 ppm								
Make and model of meter:		Serial Number							
Date of most recent calibration:									

Acceptable entry conditions met – signature of supervisor:

Date:

Time: