



Confined Space/Permit Required Confined Space

University Facilities

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1. POLICY

The policy of Clemson University Facilities (UF) is that standard work practices and procedures necessary for personnel protection be followed when entering and working within confined spaces. These work practices and procedures shall be incorporated in all procedures that cover confined space entry.

2. SCOPE

This standard is written to define the components of the UF Confined Space Entry Program and to define responsibilities for assuring that all requirements for confined space entry, documentation and training are met.

3. DEFINITIONS

3.1. Shall - The word "shall" is to be understood as mandatory.

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

3.3. Attendant - An individual stationed outside a confined space that monitors the Authorized Entrants and performs all Attendant's duties assigned.

3.4. Authorized Entrant - An individual who is authorized by UF to enter a confined space.

3.5. 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 pipe.

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

3.7. Permit Required Confined Space - A space (such as, tanks, vessels, bins, silos, boilers, vaults, pits, ditches, or sewers) which can be completely entered, has limited or restricted means of egress, is not intended for continuous employee occupancy and has one or more of the following characteristics:

3.7.1. Contains or have the potential to contain a flammable, explosive, acid, caustic, toxic, oxygen enriched, oxygen deficient, or noxious odor atmosphere.

3.7.2. Contains a material that has the potential for engulfing an entrant

3.7.3. 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

3.7.4. Contains any other recognized serious safety or health hazard; such as, ionizing radiation, electric shock, temperature extremes, or moving parts.

3.8. Confined Space Program – UF’s overall program for controlling, and, where appropriate, for protecting employees from confined space hazards and for regulating employee entry into confined spaces.

3.9. Contractor - Any non-UF employee of another employer who enters a confined space to perform work.

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

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

3.12. Engulfment - The surrounding of a person by a liquid or flowable solid that can cause death by filling or plugging the respirator system or that can exert enough force on the body to cause death, by strangulation, constriction or crushing.

3.13. Entry - The action by which a person passes through an opening into a 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 the space.

3.14. Entry Permit - The written or printed document that is provided by the employer to allow and control entry into a confined space and that contains the required information specified.

3.15. Entry Supervisor - Trained and qualified personnel; such as, supervisors, crew leaders, foreman etc., for the affected department/unit. The Entry Supervisor will be responsible for:

3.15.1. Determining if acceptable Entry conditions are present at a Confined Space,

3.15.2. Insuring that all applicable safety standards are adhered to – with special consideration given to fall protection, as it applies to the confined space entry,

3.15.3. Authorizing Entry and overseeing Entry operations, and

3.15.4. Terminating Entry activities, if required

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

3.16.1. Flammable/combustible gas, vapor or mist that is detectable on a properly calibrated combustible gas meter.

3.16.2. Airborne combustible dust at a concentration that meets or exceeds its Lower Flash Limit (LFL). This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less).

3.16.3. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

3.16.4. Atmospheric concentration of any substance above its allowable short-term exposure limit.

3.16.5. Any other atmospheric condition that is immediately dangerous to life and health.

3.17. Hot Work – The performance of any work that that could or will produce arcs, flames, heat, sparks or other sources of ignition (i.e., cutting, brazing, welding, soldering, etc.).

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

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

3.20. Lock Out/Tag Out – The placement of a lock and tag on the energy isolating device. The energy isolating device shall not be operated until all lock out/tag out devices have been removed by the installer of said locks and tags.

3.21. Safety Data Sheets (SDS) - An SDS gives detailed information on a chemical and its hazards, such as permissible exposure limits, hazardous ingredients, physical data, fire/explosion data, health hazard data,-reactivity data, precautions, special protection, etc. SDS are located in area Hazard Communication Centers.

3.22. Non-Permit Required Confined Space – A space which by configuration, meets the definition of a confined space but which after evaluation is found to have no potential for creation of a hazardous atmosphere or has had such hazardous conditions eliminated by engineering controls.

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

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

3.25. Permit – The UF written authorization to perform confined space entry operations. Only the UF approved permit for confined space entry may be used.

3.26. Permit System - The employer's written procedure for preparing and issuing permits for Entry and for returning the Confined Space to service following termination of Entry.

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

3.28. Qualified/Competent Person - One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are hazardous or dangerous to persons and who has authorization to take prompt corrective action to eliminate them.

3.29. Rescue Service - The personnel designated to rescue employees from permit spaces. Only Clemson University Fire Department personnel are designated to perform on-site entry rescues from Confined Spaces.

3.30. Retrieval System - The equipment (including a retrieval line, full body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-Entry rescue of persons from Confined Spaces.

3.31. Testing - The process by which the hazards that may confront entrants of a Confined Space are identified and evaluated. Testing includes specifying the tests and the order in which they are performed in the Confined Space.

3.32. Toxic Atmosphere – An atmosphere (in or around) a confined space that contains a concentration of a substance (solid, liquid, or gas) above the published or otherwise known safe levels.

3.33. Terms (Other):

3.33.1. TLV - Threshold Limit Values

3.33.2. PEL - Permissible Exposure Limits

3.33.3. PPM - Parts per Million

3.33.4. LEL – Lower Explosive Limit

Note! Other information pertaining to Confined Space Entry can be found in OSHA Standard 1910.146 for Permit-Required Confined Spaces and Clemson University EHS Comprehensive Environmental Health and Safety Plan.

4. Identification/Recognition

4.1. All campus locations which are considered to be permit-required confined spaces shall be identified as specifically as possible, including area or room, the building and its specific address.

4.2. Entry into these spaces shall be subject to the provisions of the Clemson University Confined Space Program found in the Comprehensive Environmental Health and Safety Plan.

4.3. Known permit-required confined spaces at Clemson University:

- Manholes
- Tunnels*
- Steam Plant: boilers, smoke stacks, bag house, coal elevators
- Amphitheater – under floor
- HVAC ducts • Water cooling towers
- Tanks
- Silos
- Waste Treatment Plant: bar screen pits, raw sewage sump pumps, clarifiers, digester tanks, belt press sump pumps.

4.4. *Each tunnel has been surveyed for hazards or potential hazards within. The survey was conducted by a team of qualified individuals from University Facilities and EHS.

4.5. The following hazards or potential hazards have been identified and are common to all tunnels:

- Extreme heat.

- Low overhead, head bumping hazards.
- High Voltage electrical hazards.
- Tripping/slipping hazards.
- Compressed gas (steam).
- Biological hazards within the tunnel.
- Mechanical hazards (i.e., piping hazards).

5. RESPONSIBILITIES:

5.1. The Chief Facilities Officer

5.1.1. The Chief Facilities Officer has the primary responsibility for the implementation of this procedure.

5.2. The Safety Coordinator

5.2.1. The Safety Coordinator has the primary responsibility for the training, initiation, re-issuance, administration, and/or interpretation of this procedure.

5.3. The Director (Owning/Operating Department)

5.3.1. It is the responsibility of the Owning/Operating Department Director to insure that the procedures of this standard are followed. The Director may delegate the responsibility for preparing the equipment and issuing the Confined Space Entry Permit.

5.4. The Maintenance Manager

5.4.1. The Maintenance Manager or his designee will select two or three competent persons who will be inspecting all the equipment for retrieving persons from confined spaces.

5.5. Owning/Operating Department Supervisors and Operators

5.5.1. It is the responsibility of the Owning/Operating department Supervisors and operators, the servicing department Supervisors, and the retrieval equipment inspectors to be thoroughly familiar with this standard and to abide by the training requirements, work practices and procedures described herein.

5.5.2. The Owner or the person who prepares the purchase requisition for retrieval equipment will specify equipment that equals or exceeds this Standard and OSHA regulations for Confined Space.

5.5.3. When it is necessary to enter a Confined Space, it is the responsibility of the Owning/Operating Department Leader to notify the Clemson University Fire Department in

advance to insure that appropriate rescue personnel and equipment will be available for potential rescue on the day of entry.

5.5.4. Supervisors are responsible for administering progressive discipline in accordance with the SC State Personnel Manual and Clemson University guidelines when subordinate personnel repeatedly fail to follow this procedure as advised.

5.6. Attendant

The attendant's responsibility to:

5.6.1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

5.6.2. Be aware of possible behavioral effects of hazard exposure in authorized entrants;

5.6.3. Monitor only one entry;

5.6.4. Continuously maintain an accurate count of authorized entrants in the permit space;

5.6.5. Remain outside the permit space during entry operations until relieved by another attendant;

5.6.6. Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space if necessary;

5.6.7. 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;

5.6.7.1. If the attendant detects a prohibited condition;

5.6.7.2. If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;

5.6.7.3. If the attendant detects a situation outside the space that could endanger the authorized entrants; or

5.6.7.4. If the attendant cannot effectively and safely perform all the duties required in this section;

5.6.8. Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

5.6.9. Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:

5.6.9.1. Warn the unauthorized persons that they must stay away from the permit space;

5.6.9.2. Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and

5.6.9.3. Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

5.6.9.4. Perform non-entry rescues as specified by the employer's rescue procedure; and

5.6.9.5. Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

5.7. Entrant

It is the Authorized Entrant's responsibility to:

5.7.1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

5.7.2. Properly use equipment as required;

5.7.3. Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space if necessary;

5.7.4. Alert the attendant whenever:

5.7.4.1. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or

5.7.4.2. The entrant detects a prohibited condition; and

5.7.4.3. Exit from the permit space as quickly as possible whenever:

5.7.4.4. An order to evacuate is given by the attendant or the entry supervisor,

5.7.4.5. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,

5.7.4.6. The entrant detects a prohibited condition, or

5.7.4.7. An evacuation alarm is activated.

5.8. Entry Supervisor

It is the responsibility of the Entry Supervisor to:

5.8.1. Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

5.8.2. Verify, by checking that the appropriate entries 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;

5.8.3. Terminate the entry and cancels the permit when:

5.8.3.1. The entry operations covered by the entry permit have been completed; or

5.8.3.2. A condition that is not allowed under the entry permit arises in or near the permit space.

5.8.4. Verify that rescue services are available and that the means for summoning them are operable;

5.8.5. Remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

5.8.6. Determine, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

5.9. Fire Chief

5.9.1. It is the responsibility of the Clemson University Fire Chief to provide emergency response and rescue services to all affected groups involved in work in and around permit-required confined spaces on the Clemson University main campus.

5.9.2. The Fire Chief will also provide annual training to all Fire Department personnel/Emergency Medical Technicians on rescue operations.

5.10. University Police

5.10.1. The University Police shall remove an unauthorized person(s) if the attendant deems it necessary.

5.11. Chief Environmental Health and Safety Officer

5.11.1. The Chief Environmental Health and Safety Officer will conduct an annual review and evaluation of the Permit Required Confined Space Safety and Health Program.

5.11.2. He will also conduct respirator fit testing for affected employees.

6. PROCEDURES

Note: Permit Required Confined Spaces as much as practical have been identified with signs.

All sewer and underground drainage systems are considered permitted spaces but identification is not practical.

However, prior to entering any questionable space, the above criteria should be used to determine if a permit is necessary. Contact the Safety Coordinator for any assistance on making this determination.

6.1. Inspection of Retrieval Equipment

6.1.1. All new equipment or repaired equipment for retrieving persons from confined spaces (retrieval equipment) shall be delivered to the Maintenance Planner for the purpose of identifying it and getting it into the inspection program.

6.1.2. The Maintenance Planner will notify the Owner when their retrieval equipment is due for periodic inspection and issue work orders for the inspections

6.1.3. After receiving the inspection message, the Owner will deliver their retrieval equipment to the Maintenance Inspectors to be inspected.

6.1.4. A qualified person (Inspector) shall thoroughly inspect all harnesses, retrieval lines, tripods and winch, and all other similar equipment for retrieving persons from confined spaces when it is initially received and thereafter every six months. To verify inspection, the appropriate colored tie wrap will be attached to each piece of the retrieval equipment. Red is for the first half of the year. Yellow is for the second half of the year. The month and year of the next due date will also be written on the tag. Any equipment that is found to be defective will be tagged with a "DANGER DO NOT OPERATE" tag. One of the Inspectors will notify the owner when the inspections are completed and will assist the owner in arranging for repairs.

6.1.5. The Owner of the retrieval equipment will pick up the equipment after inspections are completed. Any defective equipment will not be used and will not be stored in the same location as the equipment that was approved by the Inspectors. Defective equipment will be repaired or disposed. Requisitions will be issued by the owner to repair or to replace defective equipment. When defective equipment is disposed, the Maintenance Scheduler must be notified so that the equipment numbers can be removed from records.

6.1.6. Prior to each use, the user shall inspect retrieval system equipment for wear, damage, or other deterioration. Defective components shall be removed from service and tagged with a

"DANGER DO NOT OPERATE" tag by the user of the equipment, Supervisor, or a qualified person. The Owner of the retrieval equipment shall be notified so that equipment can be repaired or replaced.

6.2. Storage

6.2.1. All equipment for retrieving persons from confined spaces (retrieval equipment) shall be stored where it will not be exposed to the elements and where there is good ventilation. Do not store retrieval equipment in toolboxes or job boxes. Hang equipment on brackets against the wall.

6.2.2. Retrieval equipment can be stored in portable packs and cases provided that equipment is protected from wear and metal to metal contact.

7. Authorization

Only Authorized Entrants shall enter confined spaces. No person shall enter any Confined Space without a properly completed Confined Space Entry Permit.

8. Permits

8.1. Issuance and Authorization

8.2. When it has been determined that entry into a permit-required confined space will be necessary, the following groups must be notified:

8.2.1. Environmental Health and Safety – 656 – 2583

8.2.2. Fire Department – 656 – 2242

8.2.3. UF Work Control/Dispatch Center.

8.3. The owning Supervisor of the Confined Space and the Supervisor of the entrants shall issue a Confined Space Entry Permit.

8.4. Prior to authorizing the permit, the Supervisor shall:

8.4.1. Personally inspect the space preparation

8.4.2. Review precautions taken

8.4.3. Review personal protective equipment to be used

8.4.4. Review procedures to be followed and instructions to all personnel involved in the assignment

8.4.5. Ensure the permit is located at the work site

8.4.6. Provide an opportunity for the confined space entrant or their authorized representatives to observe pre-entry and periodic testing of the atmosphere, and

8.4.7. Re-evaluate the confined space in the presence of any authorized entrant or their representative upon requests by either if they have reason to believe that the initial evaluation may not have been adequate.

8.5. Content

8.5.1. The Entry Permit shall, at a minimum, include the following information:

8.5.1.1. Identification of Confined Space and purpose of Entry,

8.5.1.2. Date and duration of Entry,

8.5.1.3. List of names authorized to enter and names of Attendants,

8.5.1.4. Signature/initials of Entry Supervisor who originally authorized Entry,

8.5.1.5. List of the hazards and the isolation and control methods,

8.5.1.6. Acceptable Entry conditions,

8.5.1.7. Initial and periodic atmospheric testing results with initials of tester and time of test,

8.5.1.8. List of Rescue and emergency services to be summoned,

8.5.1.9. Communication procedures,

8.5.1.10. Entry equipment to be provided, and

8.5.1.11. Other permits required and an area for additional information/comments.

8.5.2. Special Procedures & Instructions

8.5.2.1. Where there exist any requirements for special procedures or instructions, they shall be noted on the Confined Space Entry permit. These instructions must be complied with prior to the issuance of the Confined Space Entry permit.

8.5.3. Duration

8.5.3.1. Confined Space Entry permit shall be valid only for the job, location and time specified.

8.5.3.2. The permit is good for a maximum of one shift of the personnel performing the Entry activities.

8.5.3.3. The Entry Supervisor shall document any personnel changes concerning Attendants and Authorized Entrants on the permit.

8.5.3.4. If a change in Entry supervision occurs, the oncoming Entry Supervisor must revalidate or reissue the Entry permit and inform representative personnel involved in the Entry of the change in supervision. The permit shall be valid only for the job, location, Entry Supervisor and the time specified. The Entry Supervisor shall document any personnel changes concerning attendants and authorized entrants on the permit.

8.5.4. Cancelled Confined Space Entry Permits

8.5.4.1. Upon completion or discontinuation of the Entry, the canceled Confined Space Entry Permit shall be forwarded to the Safety Coordinator for review to determine the effectiveness of the program.

8.5.4.2. The permit shall then be returned to the Owning/Operating Department Supervisor

8.5.4.3. The canceled permit shall be retained for a minimum of 5 years.

8.5.4.4. Any problems encountered during an Entry shall be noted on the permit so that appropriate revisions to the UF program can be made.

9. Preparation and Isolation

9.1. Techniques

9.1.1. The confined space shall be isolated from all adjoining piping, including drains and overflow lines, in order to insure that liquids, vapors or gases shall not enter the space. A line shall be deemed isolated if one or more of the following steps are taken:

9.1.1.1. A blank or stopper plate has been inserted in the line.

9.1.1.2. The line has a double block and bleed where the two block valves are closed, the bleed is opened and danger tags are applied.

9.1.1.3. The block valves in a line to jackets, coils, boilers and similar items that in themselves are not open to the area in which work is to be performed are closed and a danger tag applied.

9.1.1.4. Lines are disconnected and misaligned from the Confined Space.

9.2. Power Sources

9.2.1. If the confined space contains internal power driven mechanisms, such as agitators, all switch gear and other power sources shall be "locked, tagged and tried" in conformity with the existing Lock Out/Tag Out procedure.

9.3. Decontamination

9.3.1. The confined space along with other inter-connecting equipment should be cleaned by washing, neutralizing or purging to eliminate noxious, poisonous or flammable/combustible material.

9.4. Radioactive Devices

9.4.1. Radioactive devices, such as level detectors, shall be secured to prevent exposure during the Entry.

9.5. Sign Posting & Barricades

9.5.1. When necessary to prevent unauthorized personnel from accidentally entering the Confined Space area, the area immediately surrounding the working area shall be posted with signs or barricades cautioning of the on-going Entry.

10. Pre-Job Planning

10.1. Before anyone enters or works in any confined space, attendance at a Pre-Job Safety Meeting will be documented on a Pre-Job Entry Form. All involved employees must be thoroughly briefed on specific entry including:

10.1.1. Names and signatures of employees and contractors

10.1.2. Confined Space Permit number

10.1.3. Date of the meeting

10.1.4. Written Entry Plan

10.1.5. Confined Space Rescue Plan, i.e. description of space and techniques to rescue

10.1.6. Time frame for the completion of work

10.1.7. Methods for ventilation, e.g. blowers, fans, act.

10.1.8. Type of lighting, e.g. low voltage

10.1.9. Methods for accountability for Entrants, e.g., log sheet

10.1.10. Methods for isolation, e.g., double-block bleed, removal of spool piece, blind flange

10.1.11. PPE Requirements, e.g. clothing, respiratory protection, body harness, wristlets

10.1.12. Review of Confined Space entry Permit and other work permits

10.1.13. Method of entry and exit of the confined space

10.1.14. Posting of signs at entrance

10.1.15. Sounding of alarm, bullhorn, air horn

10.1.16. Methods of communication, radio, verbal, non-verbal

10.1.17. Names of personnel to be contacted in the event of an emergency

10.1.18. Methods for barricading entrances when confined spaces are vacant

10.1.19. Entry Permit conditions

10.1.20. Atmospheric test results, temperature shall be considered

10.1.21. Safe work procedures

10.1.22. Using the MSDS, and other documents, review, the hazards associated with the substances, and consequences of exposure

10.2. Once all preparations are complete, checks made, pre-job safety discussion held, etc. the Confined Space Entry Supervisor will print their name, date, list the time, and sign the permit, certifying the space is ready for entry.

11. Entry

11.1. Communication

11.1.1. Communications (visual, verbal, or signal line) shall be maintained between the Attendant and all individuals involved in the Entry.

11.2. Attendant Location

11.2.1. When personnel are working within a Confined Space, a trained Attendant shall be immediately outside the space to perform their responsibilities in accordance with Section 4.6 of this Procedure.

11.2.2. Safety Procedure SP6, "Fall Protection", must be followed by the Attendant if appropriate for the conditions of the entry.

11.3. Ladder Use

11.3.1. When a portable ladder (See Safety Procedure) is required to enter a confined space, the ladder shall be:

11.3.1.1. Inspected,

11.3.1.2. Suitable for the type of space, and

11.3.1.3. Readily available for exit to everyone in the space. If it is necessary to work above six feet and to walk in an area without handrails to get access to the confined space, personal fall protection equipment shall be used according to Safety Procedure N.

11.4. Electrical Equipment Use

11.4.1. All electrical equipment used inside a confined space shall be:

11.4.1.1. Consistent with the area classification,

11.4.1.2. In a safe condition, and

11.4.1.3. Grounded or double insulated

11.4.2. Extension cords for lighting shall be "approved" low voltage units or be equipped with a functional Ground Fault Circuit Interrupter (GFCI). The GFCI must remain outside of the confined space.

11.4.3. Temporary lighting shall be equipped with guards to prevent contact with the bulb.

11.4.4. Vapor-proof flashlights may also be used.

11.5. Smoking Prohibition

11.5.1. Under no circumstances is smoking to be allowed in any confined space entry situation.

11.6. Ventilation

11.6.1. Ventilation shall be provided during entry of a confined space, where it is necessary to reduce concentrations of gases and vapors.

11.6.2. Ventilation may also be necessary in some circumstances where excessive heat or humidity may be present.

11.7. Welding & Cutting

11.7.1. Welding/Cutting in Confined Spaces shall be in compliance with:

11.7.1.1. 29 CFR 1910, Subpart Q – Welding, Cutting, and Brazing;

11.7.1.2. Gas welding/cutting equipment, other than the torch and gas feed lines, shall not be taken into the space. Gas welding/cutting equipment, when not in actual use, shall be removed from the space in which the work is being performed.

11.7.1.3. Welding/cutting equipment on wheeled units shall be chocked or otherwise secured to guard against unexpected movement.

11.7.1.4. Main gas supply or electric power shall be under the control of the Attendant to effect immediate shut-off if required.

11.8. Entry into Tank Cars & Tank Trucks

11.8.1. No person shall enter any railroad tank car or tank truck without the prior approval of the Operating/Owning Department Manager or the person having jurisdiction over the area where the work is to be performed using a properly executed Confined Space Entry Permit.

11.8.2. Prior to commencing tank car and/or tank truck preparation, the tank car or tank truck shall be secured.

11.8.3. For tank cars, derails must be set, track signs or flags set and wheels chocked.

11.8.4. Tank trucks must have wheels chocked and hand brakes set.

11.9. Atmospheric Conditions

11.9.1. Oxygen

11.9.1.1. Under no circumstances shall a routine Entry be made into an atmosphere containing less than 19.5% oxygen.

11.9.1.2. Where the level of oxygen is found to be below 19.5% and corrective actions do not alleviate the situation, a SCBA or pressure demand airline respirator with a 5-minute emergency egress bottle shall be used.

11.9.1.3. Where the level of oxygen is between 19.5% and the normal 21% and the integrity of the atmosphere cannot be guaranteed an airline respirator or SCBA shall be used.

11.9.2. Enriched Oxygen

11.9.2.1. Atmospheres found to have enriched oxygen supplies (greater than 23.5%) require appropriate action to reduce the level to 23.5%. Excess oxygen can extend the flammable range of gases and vapors and can also make combustible materials ignite and burn rapidly.

11.9.3. Flammable Gases/Vapors

11.9.3.1. Spaces containing detectable flammable gases/vapors using a combustible gas indicator shall not be entered under any circumstances.

11.9.4. Generation of Flammable Gases/Vapors

11.9.4.1. If work activities to be performed in a Confined Space are expected to generate flammable gases/vapors, continuous ventilation, and representative-continuous monitoring are required.

11.9.4.2. If flammable gases/vapors are detected, immediate corrective action must be taken to reduce their concentrations; e.g., increased ventilation and reduced rate of vapor generation.

11.9.4.3. If the combustible gas readings reach 10% of the LFL, work must cease and the entrants must exit the Confined Space immediately.

11.9.5. IDLH

11.9.5.1. When entry is made into an IDLH atmosphere or into a space that can quickly develop an IDLH atmosphere (if ventilation fails or for other reasons), the rescue team shall be standing by at the Confined Space.

11.9.6. Toxic Substances

11.9.6.1. If a confined space has contained a toxic material to the extent that an allowable exposure level may be exceeded, the space shall be tested to ascertain the level of the toxic substance.

11.9.6.2. At all times during entry the level of a toxic substance should be maintained below the appropriate allowable level.

11.9.6.3. In those situations where the concentration cannot be maintained below the allowable limit, all personnel within the space shall use appropriate respiratory protection.

11.9.7. Particulates

11.9.7.1. Confined spaces containing airborne combustible dust at a concentration that obscures vision at a distance of five feet or less shall not be entered.

12. Testing

12.1. Maintenance & Calibration

12.1.1. Only UF approved oxygen/combustible gas/toxic gas analyzers may be used. 12.1.2. These analyzers must receive an extensive calibration prior to first use.

12.2. Instrument Tolerances

12.2.1. Instrument calibration and subsequent testing prior to Entry shall allow for normal acceptable instrument deviations as determined by the manufacturer.

12.3. Sequence

12.3.1. Before entry, the atmosphere of all confined spaces shall be tested with properly calibrated equipment in the following order

:

12.3.1.1. Oxygen content,

12.3.1.2. Flammable gases/vapors,

12.3.1.3. Toxic gases/vapors/mists and,

12.3.1.4. Observed for combustible dusts.

12.3.2. The results shall be noted on the permit, including the time of the tests and the tester's initials.

12.4. Frequency

12.4.1. Initial

12.4.1.1. All testing for atmospheric conditions shall be conducted as close to entry time as possible.

12.4.1.2. If the space is unoccupied due to work breaks or delays (more than 30 minutes), retesting shall be performed.

12.4.1.3. Various levels or sections of the confined space shall be checked to account for oxygen being displaced by gases heavier or lighter than air.

12.4.2. Periodic

12.4.2.1. Each entry shall be evaluated to establish whether only initial testing is appropriate or if circumstances warrant periodic or continuous testing.

12.4.2.2. No prescribed number of tests is dictated.

12.4.2.3. Each entry must be evaluated separately and adequate samples, along with documentation, must be provided.

12.4.2.4. When isolation of the confined space is not feasible, special procedures that include continuous monitoring must be prepared.

12.4.3. Documentation

12.4.3.1. All of the following must be documented on the Entry permit:

12.4.3.1.1. Monitoring instrument calibration results

12.4.3.1.2. Confined Space atmosphere monitoring results, including the time of the tests and the tester's initials.

12.4.3.1.3. The frequency of documentation for all monitoring which shall be determined before each Entry.

12.4.3.1.4. Results of air monitoring that indicate the atmosphere the employee actually entered, including oxygen concentration below 19.5%, flammable gases/vapors, and toxic substances, are considered

Note: Results and corrections from the periodic program review will be documented and retained until the next review.

13. Rescue

13.1. Retrieval System

13.1.1. A retrieval system shall be used when entering any confined space unless the retrieval equipment would increase the overall risk of entry or impair the rescue of the entrant.

13.1.2. The retrieval system shall consist of a full body harness with a retrieval line in good condition attached to the entrant and a fixed point or mechanical device outside the confined space.

13.1.3. A full body harness shall be donned before entering any confined space.

13.1.4. A mechanical device (an approved tripod and winch or other similar approved rigging) shall be used for vertical entry into confined spaces more than 5 feet deep.

13.1.5. When the use of a lifeline attached to a full body harness is infeasible or creates a greater hazard, wristlets for potential rescue may be utilized.

14. Rescue Services

14.1. When personnel are working within a confined space a competent Attendant shall be immediately outside the space so that a non-entry rescue may be made if required.

14.2. The Attendant shall be instructed and equipped to initiate non-entry rescue operations.

Note! It is recognized that a single person can seldom raise an unconscious person without the aid of a mechanical device. Without such a device, qualified rescue personnel shall be within easy summoning distance.

14.3. When non-entry rescue methods are inappropriate, any rescue equipment that would be used in a rescue should be readily available to reduce the response time.

Note! Only authorized rescue personnel may perform confined space entry rescues.

14.4. Any entry into an atmosphere which may be hazardous to retrieve a downed person shall require the use of a pressure demand airline respirator with a 5 minute emergency egress bottle or an open circuit positive pressure demand Self- Contained Breathing Apparatus (SCBA).

15. Training

15.1. Persons Directly Involved in Entry Operations

15.1.1. Entry Supervisors, Entrants, Attendants, testers or other personnel whose job may require involvement in the entry of confined spaces shall receive training by a competent person as described above and be trained in the proper use of all associated equipment to successfully effect an entry and a rescue.

15.1.2. This training shall be conducted prior to assignment to entry or attendant duties. This training shall be documented.

15.1.3. Training documentation shall be maintained a minimum of 7 years. 15.1.4. In addition, employees shall be retrained whenever deviations or inadequacies to the Confined Space Entry procedure are identified.

15.2. Persons Not Directly Involved in Entry Operations

15.2.1. Personnel not directly involved in entry operations who may be exposed to the hazards of Confined Spaces shall initially receive awareness training to prevent unauthorized Entry.

15.3. Rescue Service

15.3.1. The Clemson University Fire Department provides Rescue Service to UF and shall be notified prior to a Confined Space Entry. The Fire Department shall be provided with a description of the Confined Space, the purpose of the Entry, the time and duration of the Entry. After closure of the Entry, the Fire Department shall also be notified.

15.4. Frequency

15.4.1. Personnel shall receive training prior to assignment.

15.4.2. Employees shall be retrained whenever deviations or inadequacies to the Confined Space Entry procedure are identified.

15.4.3. Each member of the Rescue Service shall practice in a Confined Space rescue drill, representative of the Confined Spaces at their facility, at least once every 12 months.

15.5. Documentation

15.5.1. Training shall be documented (and maintained 7 years) including:

15.5.2. Date of training,

15.5.3. Trainee's names,

15.5.4. Trainer's signature, and

15.5.5. Content of training.

16. Annual Audit

16.1. An annual, documented audit of UF confined space entry procedures shall be conducted.

17. Contractors

17.1. Contractors whose work involves or may be affected by confined space entry shall be informed of UF procedures and how the requirements will be applied.

17.2. Contractors shall be debriefed concerning the program and any hazards that were created or confronted during entry at the end of any entry operation.

18. Unauthorized Entrant Removal

18.1. Notification

18.1.1. If notified that an unauthorized person(s) have entered a confined space, University Police shall ensure that the Fire Department has been notified and responds the scene.

18.1.2. Upon arrival, University Police shall attempt to communicate with the unauthorized person(s) and request that they exit the confined space immediately.

18.1.3. If the unauthorized person(s) fail to exit as instructed, all confined space exits shall be secured and an Entry Permit obtained (if one is not on the scene) before entry into the confined space.

18.2. Permitting

18.2.1. Because of the hazards associated with any confined space entry, a Permit-Required Confined Space Entry Permit shall always be used for entry into a permit- required confined space. Obtain a permit number by contacting Environmental Health and Safety at 656-2583. In an emergency, the permit number may be obtained after the emergency has been resolved. Additional details may be found in the Comprehensive Environmental Health and Safety Plan.

18.2.2. Since the unauthorized person(s) may or could be injured, the police officer must be accompanied by at least one fireman who has been trained in confined space rescue.

19. Disciplinary Action

19.1. At a minimum, employees who violate these procedures will be subject to the following disciplinary actions:

19.1.1. 1st Offense: Mandatory oral reprimand with written documentation placed in the individual's Facilities personnel file.

19.1.2. Subsequent Offenses: Written reprimand placed in the individual's University personnel file, suspension without pay, or dismissal, depending on the severity of the violation.

20. Exceptions

20.1. Whenever any of the requirements of this procedure cannot be fulfilled, the EHS OSHA Compliance Officer must approve deviations.

20.2. Where there exists any requirement for special procedures or instructions, they shall be specified on the Confined Space Entry/Safe Work Permit.

20.3. Entrance into any tunnel on campus through a manhole is a Permit-Required Confined Space entry. However, entry through an equipment room personnel door into a tunnel may be made without a Permit as long as ALL of the following conditions are met:

20.3.1. The Entrant remains in visual AND audio (includes radio) contact with an Attendant.

20.3.2. The Entrant wears appropriate eye protection, hard hat, and safety shoes at all times and other PPE to match the work to be done.

20.3.3. An alternate emergency escape route is available.

20.3.4. The entrant(s) have in their possession any key(s) necessary to exit alternate escape routes.

21. References:

29 CFR 1910.146 – Permit-Required Confined Spaces 29 CFR 1926.502 – Fall Protection Systems Criteria and Practices UF Safety Procedure SP6 – Fall Protection

22. RELATED DOCUMENTS

Attachment Pre-Entry Safety Meeting Log Attachment: Confined Space Entry Permit Attachment
Confined Space Entrant/Attendant Log