



# CONNECTICUT COLLEGE

## **CONFINED SPACE ENTRY POLICY**

28 March 2014

**Regulatory Statute:** [29 CFR 1910.146](#) (OSHA)

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## **1. Background**

Every year, over 1 1/2 million workers enter confined spaces in the workplace. Many confined spaces contain inherent risks and dangers, such as hazardous materials or gases, oxygen-deprived environments, or materials that could engulf and trap a worker. The Bureau of Labor Statistics (2002) reports an average of 20 fatalities a year from confined space hazards. More than half of the fatality victims are attendants who become would-be rescuers. The Occupational Safety and health Administration (OSHA) estimates that 85 percent of these accidents can be prevented if proper safety precautions at job sites are followed. This poses a serious problem for exposed workers and their employer. The OSHA Confined Space Standard establishes uniform requirements, to ensure that the hazards of confined spaces in U.S. workplaces are evaluated safety procedures implemented, and that the proper hazard information is transmitted to all affected workers.

## **2. Scope**

The following Confined Space, guidelines have been designed to provide the appropriate health and safety requirements that are to be followed when entering, exiting and working in confined spaces. The guidelines have been established in order to comply with all local, state and federal regulations, including that of the Occupational Health & Safety Administration (OSHA), 29 CFR 1910.146 and all applicable nationally recognized standards.

## **3. Purpose**

To establish guidelines and performance objectives for the health and safety of Connecticut College Physical Plant (Facilities Management) employees and outside contractors that are to perform work in both permit and non-permit required confined spaces at Connecticut College. Connecticut College will ensure that all potential confined spaces on college property are evaluated for confined space hazards. This policy document is intended to address comprehensively the issues of evaluating and identifying potential confined spaces, evaluating the associated potential hazards, communicating information concerning these hazards, and establishing appropriate procedures and protective measures for employees and contractors.

## **4. Applicability**

The Connecticut College Confined Space policy applies to all employees, contractors and subcontractors, who enter confined spaces on College owned property. It is the responsibility of all employees and contract personnel working in both permit and non-permit required confined spaces at Connecticut College, to adhere to this Confined Space policy, unless the use of a more stringent guideline, policy or program is utilized.

## **5. Definitions**

**Acceptable Entry Conditions** - conditions that must exist in a confined space to allow entry and to ensure that employees involved in a confined space entry can safely go into and work within the space.

**Attendant(s)** - one or more persons stationed outside a "permit required" confined space who monitor the authorized entrants, provide appropriate support services, assist in non-entry rescues and perform all other duties of the attendant as indicated herein.

**Authorized Entrant** - an employee who is authorized (with the appropriate knowledge and training) by the employer to enter a confined space, both permit and non-permit required.

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

**Confined Space** - a space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Is not designed for continuous occupancy.
- Has limited or restricted means of ingress or egress, such as, but not limited to:
  - Boilers
  - Ductwork
  - Elevator shafts, overheads and pits
  - Chimneys and stacks
  - Tanks
  - Tunnels
  - Vaults
  - Vessels
  - Manholes
  - Equipment housings
  - Crawlspace
  - Pits

**Contracting Official** – the Facilities Management Supervisor who has requested the services of the contractor.

**Double Block and Bleed** - the closure of a duct, line or pipe by closing and locking and/or tagging two (2) in-line valves and by opening and locking and/or tagging a drain or vent valve in the line between the (2) closed valves.

**Engulfment** - the surrounding and effective capture of a person by a liquid or finely

divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that which can exert enough force on the body to cause death by strangulation, constriction or crushing.

**Entry** - whenever a person places any portion of their body (i.e. arm, face, foot, hand or head) into the opening of a confined space, it is to be considered an entry.

**Entry Permit** - the printed or written document that is provided by the employer to allow and control entry into a "permit required" confined space. The entry permit shall indicate all appropriate, applicable information that will provide safe entry into a "permit required" confined space.

**Entry Supervisor** - the person responsible for determining if acceptable entry conditions are present at a "permit required" confined space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry or work in the space as required in these guidelines.

**Hazard Evaluation** - assessment of a confined space to determine hazards, known or potential.

**Hazardous Atmosphere** - an atmosphere that may expose personnel to the risk of death, incapacitation, impairment of ability to self rescue, illness, injury or one or more of the following:

- Flammable gas, mist or vapor in excess of 10% of the lower explosive limit (LEL) or lower flammable limit (LFL)
- Air-borne combustible dust at a concentration that meets or exceeds the LEL or LFL (the dust obscures vision at a distance of 5' or less)
- Atmospheric oxygen is below 19.5% or is greater than 23.5%
- Hydrogen sulfide (odor of rotten eggs) in concentrations greater than 10 ppm
- Carbon monoxide (colorless and odorless gas) in concentrations greater than 35 ppm
- Any other substance that may exceed the exposure level (i.e. PEL, STEL or TWA)
- Any other atmospheric condition that is immediately dangerous to life or health (IDLH)

**Hot Work Permit** - the host employer's written authorization to perform operations such as burning, cutting, heating, soldering or welding that would be capable of providing a source of ignition.

**Immediately Dangerous to Life and Health (IDLH)** - any condition that poses an immediate or delayed threat to life or that which would cause irreversible adverse health effects or that would interfere with an individuals ability to escape unaided from a confined space. (See the ACGIH manual, MSDS or similar for information on chemicals

or gases that may be classified as IDLH.)

**Inerting** - displacement of the atmosphere in a confined space by a non-combustible gas such as argon, carbon dioxide or nitrogen in order to make the space incombustible.

**Isolation** - the process of completely protecting or removing the release of energy and material into a confined space by such means as: blanking or blinding, misaligning or removing sections of ducts, lines or pipes, a double block and bleed system, lockout and/or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

**Lock Out/Tag Out** - the placement of a lock and/or tag on an energy-isolating device in order to separate the energy source(s), including potential or stored energy from the equipment, machine or process being maintained or serviced. (An energy isolating device is any device that prevents the transmission or release of energy, including but not limited to: blocks, circuit breakers, disconnects, line valves, slip blinds, etc.)

**Manhole** - A hole, usually with a cover, through which a person may enter a sewer, boiler, drain, or similar structure.

**Non-Permit Required Confined Space (NPRCS)** - a confined space that does not contain known or potential hazards (atmospheric or otherwise) that might or will cause serious illness, injury or death. Examples of non-permit required confined spaces might include the interiors of HVAC units, certain air plenums and pipe chases, attics, walk-in freezers or refrigerators, and some building crawl spaces. Non-permit required confined spaces will be designated where the atmosphere and safety conditions can be controlled.

**Permit Required Confined Space (PRCS)** - a confined space that contains one or more actual or potential hazards that pose a threat to the health and safety of the workers who will enter the space and for which a written authorization to enter (a permit) is required. A PRCS has one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere
- Contains a material that has the potential for engulfing an entrant
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or by a floor which slopes downward and tapers to a smaller cross section
- Has air, gas, steam or water under pressure
- Is found to have excessively high temperatures that may cause dehydration
- Has the potential to cause injury by electrocution
- Contains any other recognized health and safety hazard

**Personal Protective Equipment (PPE)** - Equipment worn to minimize exposure to hazardous conditions such as chemical, radiological, physical, electrical, mechanical, or

other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits.

**Qualified Person** - a person who has the appropriate education, experience and training to work in and around confined spaces, and who is accomplished and knowledgeable in the various operations of confined space work. This includes, but is not limited to, having the ability to properly evaluate and recognize hazards that may be part of the confined space and having the ability to mitigate hazards found.

**Rescue Service** - the company, personnel or service designated to rescue employees from confined spaces.

**Retrieval System** - equipment such as a full body harness, lifeline, rope and tripod used for non-entry rescue of persons from a confined space.

**Testing** - the identification and evaluation of hazardous conditions inside a confined space using equipment such as that which is used for monitoring hazardous atmospheres.

**Toxic Atmosphere** - the atmosphere in or around a confined space that contains a concentration of a substance (gas, liquid or solid) above the published or recognized safe levels. (See IDLH.)

## 6. General Program Requirements

As required by the Permit Required Confined Space Program standard, 29 CFR 1910.146, Connecticut College will:

- Implement the measures necessary to prevent unauthorized entry to confined spaces.
- Identify and evaluate the hazards of permit-required spaces before employees enter them.
- Develop and implement the means, procedures and practices necessary for safe permit space entry operations, including but not limited to the following:
  - Specifying acceptable entry conditions.
  - Isolating the permit space.
  - Purging, inerting, flushing or ventilating the permit space as necessary to eliminate or control atmospheric hazards.
  - Provide pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards.

- Verify that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry.
- Provide the following equipment at no cost to employees, maintain that equipment properly, and ensure that employees are trained in the proper use of the equipment:
  - Multi-gas monitors
  - Ventilation Equipment
  - Rescue tripod/davit arm and winch system
  - Body harness's
  - Extraction cable and lanyards
  - Air Compressors (as required)
  - Air purifying respirators (as required)
  - Radio communication system (as required)
  - Signage (as required)
  - Lock-out/Tag-out Equipment (as required)
  - Intrinsically safe lighting equipment
  - Personal protective clothing
  - Hearing protection equipment
  - Head protection equipment
  - Eye Protection equipment
  - First Aid kits
  - Hand tools
  - Escape ladders for depths of four feet or shoulder height

### **6.1. Written Policy Document**

Connecticut College will review and evaluate this written policy on an annual basis, or when changes occur to 29 CFR 1910.146 that prompt revision of this document, or when facility operational changes occur that require a revision of this document. Additionally, Connecticut College will review the permit-required confined space program using the canceled permits retained within 1 year after each entry and revise the program as necessary, to ensure that employees participating in entry operations are protected from permit space hazards.

### **6.2. Confined Space Survey**

It is the responsibility of the Director of Environmental Health & Safety to identify confined spaces, and to determine whether or not the spaces are "permit" or "non-permit" required. Until a determination of whether the space is "permit-required or "non-permit", any entry shall be made as if the confined space is "permit-required. This determination will consist of a formal survey of the confined space, to include:

- An evaluation of past and present uses of the confined space.



- Activities or conditions in the confined space that could change, making it more hazardous for the entrants.
- An evaluation for known or potential hazards, including:
  - Atmospheric conditions (i.e., carbon monoxide, flammable vapors, hydrogen sulfide, oxygen deficiency or enrichment, etc.)
  - Mechanical and physical hazards (i.e., electrocution, potential for falls, energy releases, flooding, steam leaks, chemical exposure, high temperatures exposure engulfment or asbestos exposure, etc.)
- Strategies to control hazards (i.e., Block and bleed, Hot work permits, Lock Out/Tag Out, Ventilation and Emergency response.)

### **6.3. Confined Space Inventory**

An inventory of all confined spaces at Connecticut College, both “permit-required” and “non-permit required” is listed in Appendix A.

### **6.4. Responsibilities of Authorized Personnel**

Only those employees who have completed appropriate confined space training will enter permitted spaces. Connecticut College will take all measures necessary to prevent non-trained employees from entering the permit-required confined spaces, to include disciplinary action.

#### **6.4.1. Entrants**

Connecticut College shall ensure that all authorized entrants:

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Properly use equipment as required by 29 CFR 1910.146 (d)(4).
- 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 as required by this section.
- Alert the attendant whenever:
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
  - The entrant detects a prohibited condition.
- Exit from the permit space as quickly as possible whenever:

- An order to evacuate is given by the attendant or the entry supervisor.
- The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
- The entrant detects a prohibited condition.
- An evacuation alarm is activated.

#### **6.4.2. Attendants**

Connecticut College shall ensure that each attendant:

- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Is aware of possible behavioral effects of hazard exposure in authorized entrants.
- Continuously maintains an accurate count of authorized entrants in the permit space.
- Remains in a pre-designated location outside the permit space during entry operations until relieved by another attendant.
- Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space.
- Monitors activities inside and outside the space, ensuring it is safe for entrants to remain in the space.
- Orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:
  - If the attendant detects a prohibited condition.
  - If the attendant detects the behavioral effects of a hazard exposure in an entrant.
  - If the attendant detects a situation outside the space that could endanger the entrants.
  - If the attendant cannot effectively and safely perform all the duties required under this section.
- Summon rescue and other emergency services as soon as the attendant determines that entrants may need assistance to escape from permit space hazards.
- Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

- Warn the unauthorized persons that they must stay away from the permit space.
  - Advise the unauthorized persons that they must exit immediately if they have entered the permit space.
  - Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
- Performs non-entry rescues as described in Section 9.
  - Refrains from any activity that might distract or interfere with the attendant's primary duty of monitoring and protecting entrants.

**Note:** *Because Connecticut College employees are not trained or equipped with Self Contained Breathing Apparatus (SCBA), attendant entry of a confined space for any reason, including the rescue of an entrant, is strictly prohibited.*

*While the attendant is attempting to extricate the entrant by means of the safety harness and retrieval equipment, Campus Safety will request assistance from the New London Fire Department.*

#### **6.4.3. Entry Supervisors**

Connecticut College shall ensure that each entry supervisor:

- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Verifies, 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. Then signs the permit before entry begins.
- Verifies that rescue services are available and that the means for summoning them are operable. Notifies the Gatehouse and the New London Fire Department (Designated Rescue Team) of the confined space entry, providing the exact location and expected duration of the entry. The phone number for the NLFD is listed on the Connecticut College Confined Space Entry Permit.
- Terminates the entry and cancels the permit as required in accordance with the "permit section" this instruction. Notifies the Gatehouse and the New London Fire Department that the confined space entry has been completed.
- Enforces the removal of unauthorized individuals who enter or who attempt to enter the permit space during entry operations.

***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 by this section 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.*

#### **6.4.4. Contractors**

When Connecticut College arranges to have employees of another employer (contractor) perform work that involves permit space entry, the following requirements will be followed:

- The contracting official at Connecticut College, will verify that the contractor (entrants and attendees) have received appropriate confined space training. Contractors are prohibited from entering permit-required spaces on College property without proof of training.
- The contracting official at Connecticut College will inform the contractor that permit-required space entry is allowed only through compliance with this policy document.
- The contracting official will ensure that the contractor has a communication plan for summoning emergency personnel. This may require that a Connecticut College employee serve as the authorized attendant or entry supervisor, to provide radio communication with the Gatehouse.
- Contractors are responsible for providing PPE, ventilation and rescue equipment for their personnel. They will not use Connecticut College equipment.
- The contracting official at Connecticut College will apprise the contractor of Connecticut College's experiences, and the hazards that makes the space in question a permit space.
- The contracting official at Connecticut College will apprise the contractor of any precautions or procedures that the college has implemented for the protection of employees in or near permit spaces where contractor personnel will be working.
- The contracting official at Connecticut College will coordinate entry operations with the contractor, when both college personnel and contractor personnel will be working in or near permit spaces.
- The contracting official at Connecticut College will debrief the contractor at the conclusion of the entry operation regarding any hazards confronted or created in the concerned permit spaces during entry operations. Any issues or problems will be brought to the attention of the Director of Environmental Health & Safety.

## 7. Reclassification of Confined Spaces

A permit required space might be reclassified as a non-permit space if all hazards within the space have been permanently eliminated, and the safety of the space has been documented through testing and inspection. When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the Director of EH&S will reevaluate that space, and if necessary, reclassify it as a permit-required confined space. All classification and reclassification testing and inspection data will be kept on file by the Director of EH&S.

**Note:** *Control of atmospheric hazards through forced air ventilation alone does not constitute elimination of the hazards. Periodic monitoring will be conducted to ensure forced air ventilation maintains a safe worker environment for reclassification to a non-permit confined space.*

## 8. Confined Space Entry Criteria

### 8.1. Non-Permit Confined Spaces

Those spaces meeting the criteria for a confined space, but does not contain, nor has the potential to contain, any hazard capable of causing death or serious physical harm, may be entered without the need for a written permit or attendant, provided that:

- The space is determined not to be a Permit-Required confined space.
- The space can be maintained in a safe condition for entry by mechanical or natural ventilation alone.
- Monitoring and inspection data supports these determinations

### 8.2. Permit-Required Confined Spaces

Those spaces having a known potential to contain hazardous atmospheres or physical hazard will be designated as permit-required confined spaces. All spaces will be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Connecticut College will inform potentially exposed employees by posting warning signs, conducting awareness training (or by any other equally effective means) of the existence and location of and the danger posed by the permit confined spaces.

**NOTE:** *Because of the lack of sufficient ventilation, any pit, vault or other confined space at Connecticut College, which is accessed through a manhole, is considered to be a Permit-Required Confined Space.*

## 9. Entry Procedures

**Step 1:** Pre-Entry Planning. As part of the pre-planning process, the Facilities Management Supervisor will designate the persons who are to have active roles in the entry operation. The confined space entry team will include, but is not limited to the following:

- Authorized entrants
- Attendants
- Entry supervisors
- Atmospheric monitoring personnel
- Certifying personnel
- Rescue/Emergency services personnel

Specific assignments and responsibilities will be assigned to the team. Procedures for the following emergency actions and precautions will be fully understood by all team members:

- Known and potential hazards
- Summoning rescue and emergency services
- Rescuing entrants from permit spaces
- Providing necessary emergency services for rescue
- Preventing unauthorized personnel from attempting a rescue

**Step 2:** Complete the Confined Space Entry Permit, which must be signed by the Entry Supervisor. Required information is listed in

**Step 3:** Ensure radio communication with the Gatehouse is working. Notify Campus Safety that a permit-required confined space entry is about to begin. In the event of an emergency, Campus Safety will immediately request assistance from the New London Fire Department.

**Step 4:** Ensure that all conditions that could make it unsafe to remove an entrance cover are eliminated before the cover is removed.

**Step 5:** Whenever possible, make safe any physical hazards in the space, such as electrical, or steam lines. Lock and Tag Out the hazard after closing the valve or electrical breaker.

**Step 6:** Begin ventilating the space with an appropriate blower system. No employee may enter the space until atmospheric testing confirms that the forced air ventilation has eliminated any hazardous atmosphere. The forced air ventilation shall be so directed as to ventilate the immediate area where an employee is or will be present within the space, and shall continue until all employees have left the space.

**Step 7:** Ensure that the air supply for the forced air ventilation is from a clean source. If an internal combustion engine (motor vehicle or small engine) is used to power the forced air ventilation, the air intake will be situated in such a manner so as to prevent carbon monoxide from being introduced into the space.

**Step 8:** Install a railing, temporary cover or other barrier at vertical entrance openings, which will prevent accidental fall-through and will protect entrants from objects falling into the space.

**Step 9:** Erect the Emergency Retrieval system. To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems used shall meet the following requirements.

**Step 10:** Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head. Wristlets may be used in lieu of the chest or full body harness, if it is demonstrated that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative. The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

**Step 11:** Test the internal atmosphere of the confined space with a calibrated, direct-reading instrument for the following conditions, to ensure conditions are within acceptable limits for entry (See Section 9.1).

**Step 12:** Once the atmosphere in the space has been verified as being safe, the entry may begin.

**Step 13:** The attendant will remain outside the space, and will monitor activities of the entrant. The attendant will maintain radio communication with the gatehouse, in order to summon assistance in the event of an emergency.

**Step 14:** Atmospheric conditions shall be continuously monitored during all permit-required space entries to ensure acceptable entry conditions are being maintained. The attendant or entrant may perform the monitoring. Periodic readings will be documented on the entry permit.

**Step 15:** If a hazardous atmosphere is detected during an entry, all occupants will immediately evacuate the space. The Director of EH&S will be notified and the space evaluated to determine how the hazardous atmosphere developed.

**Step 16:** Upon completion of the entry, replace the entrance cover, and forward the closed out permit to the Director of EH&S for filing.

## **10. Confined Space Entry Permit**

A standardized entry permit form has been developed that documents compliance with 29 CFR 1910.146, and authorizes entry to a permit space. At a minimum, the permit will include:

- The permit space to be entered.
- The purpose of the entry.
- The date and the authorized duration of the entry permit.
- The name(s) of the authorized entrants of the permit space.
- The name(s) of personnel designated as attendants.
- The name and signature of the individual serving as entry supervisor, who originally authorized entry.
- The hazards of the permit space to be entered.
- The measures used to isolate the permit space and to eliminate or control permit space hazards before entry. (Lock Out/Tag Out of equipment, and procedures for purging, inerting, ventilating, and flushing permit spaces.)
- The acceptable entry conditions.
- The results of periodic atmospheric tests performed, accompanied by the names or initials of the testers, and by an indication of when the tests were performed.
- The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services.
- Personal Protective Equipment, testing equipment, communications equipment, alarm systems and rescue equipment to be provided for compliance with the permit requirement.
- Any other information whose inclusion is necessary given the circumstances of the particular confined space, in order to ensure employee safety.
- Any additional permits, such as for hot work that have been issued to authorize work in the permit space.

The Director of EH&S will immediately review, and as necessary halt and revise entry operations when there is reason to believe that the measures taken under the permit space program may not protect employees. The focus will be directed at the correction of deficiencies found to exist before subsequent entries are authorized. Examples of circumstances requiring the review of the permit-required confined space program are as a minimum:



- Any unauthorized entry of a permit space.
- The detection of a permit space hazard not covered by the permit.
- The detection of a condition prohibited by the permit.
- The occurrence of an injury or near-miss during entry.
- A change in the use or configuration of a permit space.
- Employee complaints about the effectiveness of the program.

Review of the permit-required confined space program using the canceled permits retained will be accomplished within 1 year after each entry and the program revised as necessary, to ensure that employees participating in entry operations are protected from permit space hazards.

All completed entry permits will be forwarded to the Director of Environmental Health & Safety, who will keep it on file for at least 1 year to facilitate the review of the permit-required confined space program. Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

## 11. Atmospheric Testing of Permitted Confined Spaces

A calibrated, fully functioning **GasAlertMax XT II, Multi-Gas Detector** (or equivalent) will be utilized to test for atmospheric hazards during entries. This multi-gas detector simultaneously monitors and displays up to four gases, including hydrogen sulfide (H<sub>2</sub>S), carbon monoxide (CO), oxygen (O<sub>2</sub>) and combustible gases (% LEL).

Monitored Hazard:	Safe Reading:
Oxygen (O <sub>2</sub> ) content	(Between 19.5% - 23.5%)
Combustible gases and vapors. (LEL)	(Less than 10%)
Hydrogen Sulfide (H <sub>2</sub> S)	(Less than 10 ppm)
Carbon monoxide (CO)	(Less than 35 ppm)
Other site-specific atmospheric hazards must be evaluated using appropriate testing equipment and procedures as necessary.	

Atmospheric testing for confined space entry is required for two distinct purposes:

- Initial evaluation of the hazards of a permit space.
- Verification that acceptable conditions exist prior to entry.

**Evaluation testing** – During the process of determining which spaces are “permit required” and which are “non-permit required”, the Director of EH&S will test the atmosphere of a confined space using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise. Evaluation and

interpretation of this data will be used in the development of the entry procedure for that space.

**Verification testing** – The atmosphere of a permit-required space will be tested prior to, and during each entry, to ensure that it is safe to enter and perform work. The internal atmosphere will be tested with a calibrated direct-reading instrument as described in 9.2 above. Results of testing (i.e., actual concentration etc.) will be recorded on the permit in the space(s) provided.

### **11.1. Stratified Atmospheres**

When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope will be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress will be slowed to accommodate the sampling speed and detector response. The stratified atmosphere will be tested with a calibrated direct-reading instrument for the conditions listed in paragraph 4.3.

## **12. Rescue and Emergency Services.**

**IMPORTANT: Connecticut College employees will only attempt non-entry rescues.** If an entrant becomes incapacitated or unconscious while in a confined space, the attendant should immediately begin extraction by means of the safety harness and retrieval equipment. Simultaneously, the attendant will notify Campus Safety via radio, and request emergency assistance from the New London Fire Department.

- Connecticut College shall ensure that all employees who are involved in confined space entry is trained to use properly, the personal protective equipment and rescue equipment necessary for making non-entry rescues from permit spaces.
- Employees who are involved in confined space entries shall practice making non-entry permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, mannequins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which anticipated rescues are to be performed.

### **12.1. Off-Campus Emergency Rescue Personnel**

- When notified of an emergency by the attendant, the Campus Safety Officer in the Gatehouse will immediately alert the NLFD and request assistance.

- When rescue personnel from the New London Fire Department arrive, the attendant will inform the rescue personnel of the hazards inside the confined space.
- If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

### **13. Training**

Training will be provided to all affected employees, so they have the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this policy. Training shall be provided to each affected employee:

- Before the employee is first assigned duties that require a confined space entry.
- Before there is a change in assigned duties.
- Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained.
- Whenever the Director of Environmental Health & Safety has reason to believe that there are deviations from the permit space entry procedures required by this instruction, or inadequacies in the employee's knowledge or use of these procedures.

The training shall establish employee proficiency in the duties required by this instruction and shall introduce new or revised procedures as necessary for compliance with this instruction, or when future revisions occur.

Connecticut College shall certify that the training required by this section has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainer(s) and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.



## Attachment (A): Connecticut College Confined Space Entry Permit

Confined Space Location: \_\_\_\_\_ Confined Space ID Number: \_\_\_\_\_

Date: \_\_\_\_\_ Permit Validity Period: \_\_\_\_\_: \_\_\_\_\_ am/pm, to \_\_\_\_\_: \_\_\_\_\_ am/pm

### Description of Confined Space Work:

### Authorized Personnel Entrant(s):

1. \_\_\_\_\_ 2. \_\_\_\_\_

### Attendant(s):

1. \_\_\_\_\_ 2. \_\_\_\_\_

### Known hazards (indicate specific hazards with initials)

\_\_\_\_\_ Oxygen deficiency (less than 19.5%)  
\_\_\_\_\_ Oxygen enrichment (more than 23.5%)  
\_\_\_\_\_ Flammable gases or vapors (more than 10% of LEL)  
\_\_\_\_\_ Airborne hazardous dusts or fumes (exceeds PEL)

\_\_\_\_\_ Toxic gases or vapors (exceeds PEL)  
\_\_\_\_\_ Mechanical hazards  
\_\_\_\_\_ Electrical hazards  
\_\_\_\_\_ Engulfment hazards  
\_\_\_\_\_ Other: \_\_\_\_\_

### Employee Training and Pre-Entry Briefing (Indicate completed requirement by initialing)

\_\_\_\_\_ Entrant(s) and Attendant(s) have Completed Confined Space Entry Training.  
\_\_\_\_\_ Gatehouse notified.  
\_\_\_\_\_ Mandatory Pre-Entry Briefing Conducted.  
\_\_\_\_\_ Special Training Required for Job. (Specify) \_\_\_\_\_

### PPE Appropriate for Expected Hazards:

\_\_\_\_\_ Respiratory Protection  
\_\_\_\_\_ Eye Protection  
\_\_\_\_\_ Hearing Protection  
\_\_\_\_\_ Hard Hat  
\_\_\_\_\_ Gloves  
\_\_\_\_\_ Other \_\_\_\_\_

### Tools and Equipment (Indicate equipment is present and operational by initialing)

\_\_\_\_\_ Communications (Radio) **(REQUIRED)**  
\_\_\_\_\_ Calibrated Direct-Reading Meter **(REQUIRED)**  
\_\_\_\_\_ Ventilation Blower **(REQUIRED)**  
\_\_\_\_\_ Safety Harness/Retrieval Equipment **(REQUIRED)**  
\_\_\_\_\_ Lighting  
\_\_\_\_\_ Ladder  
\_\_\_\_\_ Fire extinguisher(s)

### Site Preparation (Indicate all applicable preparations by initialing)

\_\_\_\_\_ Work area isolated with signs and/or barriers.  
\_\_\_\_\_ All energy sources locked/tagged out.  
\_\_\_\_\_ All input lines capped/blinded.  
\_\_\_\_\_ Tank/vessels drained, flushed, or purged.  
\_\_\_\_\_ Ventilation initiated 30 min. before entry.  
\_\_\_\_\_ Hot work permit completed if welding.  
\_\_\_\_\_ Other. Provide details: \_\_\_\_\_

### Contractor Notification (Indicate notifications by initialing)

\_\_\_\_\_ Contractor(s) Notified of Permit Conditions.  
\_\_\_\_\_ Contractor(s) Notified of Potential Hazards.

### Post Entry Actions (Indicate completion by initialing)

\_\_\_\_\_ Gatehouse notified entry complete.  
\_\_\_\_\_ Site secured/Entry cover replaced.

*Continued on Reverse.*

<u>Atmospheric Testing</u>	Pre-entry			Follow-up #1			Follow-up #2			Follow-up #3		
	Time	Results	Initials	Time	Results	Initials	Time	Results	Initials	Time	Results	Initials
(1) Oxygen level (O <sub>2</sub> ) (19.5% - 23.5%)												
(2) Comb. gases/vapors (LEL) (<10%)												
(3) Hydrogen Sulfide (H <sub>2</sub> S) (<10ppm)												
(4) Carbon monoxide (CO) (<35ppm)												

**Permit Authorization (Entry Supervisor):** I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Name:\_\_\_\_\_ Signature:\_\_\_\_\_ Date:\_\_\_\_\_

**Additional Air Sampling results and Comments:**

**Note: Send completed permits to the Director of EH&S for review and filing.**