



Title: **Confined Space Operations**

Program: Occupational Safety

Effective Date: May 4, 2011

1. **Purpose:**

To establish safe working practices for entering and working in confined spaces.

2. **Scope:**

This policy applies to all employees, contractors, or other individuals whose job duties require them to enter a confined space located on Stony Brook University property.

3. **Policy:**

Individuals will not be directed or permitted to enter any confined space until an assessment of that space has been made to determine if a permit is required and to establish the safety precautions that are necessary to maintain a safe environment.

4. **Responsibilities:**

4.1. Environmental Health and Safety

- 4.1.1. Develop, implement and maintain the Confined Space Operations Policy.
- 4.1.2. Issue Confined Space Assessment / Permit Forms (Appendix A) to SBU employees or outside contractors conducting the work.
- 4.1.3. Provide assistance in classifying a Confined Space as Permit or Non-Permit
- 4.1.4. Provide initial monitoring of Confined Spaces as Permit or Non-Permit locations.
- 4.1.5. Maintain air monitoring records as needed.
- 4.1.6. Provide confined space rescue services.
- 4.1.7. Provide training for all Stony Brook University Personnel.

4.2. Department Supervisor

- 4.2.1. Ensure that SBU employees under their direct supervision understand and adhere to adopted procedures during confined space entry operations.
- 4.2.2. Ensure SBU employees have been trained prior to the employees conducting confined space operations.
- 4.2.3. Contact Environmental Health & Safety Fire Marshals, to obtain a Confined Space Assessment / Permit Form, with as much advance notice as possible prior to performing confined space work.
- 4.2.4. Maintain copies of all Confined Space Assessment / Permit Forms, including all air testing results.
- 4.2.5. Identify Confined Space locations and work with EH&S to identify potential hazards of each confined space that may require entry by employees.
- 4.2.6. Contact Environmental Health & Safety prior to initiating work with off campus contractors that will involve confined space entry.

- 4.2.7. Assure that contractors are trained and comply with Confined Space requirements by obtaining proof of training.
- 4.2.8. Include confined space requirements in contracts and inform contractors of confined space hazards associated with confined space work.

4.3. Entry Supervisor

- 4.3.1. Obtain a Confined Space Assessment / Permit form (Appendix A) to assess the confined space location.
- 4.3.2. Complete all sections of the Confined Space Assessment / Permit Form (Appendix A).
- 4.3.3. Verify that the entry is made in accordance with Confined Space entry permit requirements.
- 4.3.4. Oversee entry operations for the duration of assigned work and terminate entry when conditions change or are determined to be unsafe.
- 4.3.5. Assure that air monitoring is performed as required.
- 4.3.6. Verify that rescue services are available and that the means for summoning additional services are operable.
- 4.3.7. Control access to the confined space, prohibiting entry of unauthorized individuals.

4.4. Entrants

- 4.4.1. Review the Confined Space Assessment / Permit Form to identify hazards, entry requirements and conditions prior to entry.
- 4.4.2. Comply with procedures and guidelines.
- 4.4.3. Utilize the approved equipment as required by the Confined Space Assessment / Permit Form.
- 4.4.4. Maintain communication with attendants outside the Confined Space.
- 4.4.5. Alert the attendant of any signs or symptoms of exposure, to a dangerous situation or hazardous condition.
- 4.4.6. Notify the attendant of any un-authorized individuals accessing the confined space area.
- 4.4.7. In the event of an emergency, attempt to self rescue.

4.5. Attendants

- 4.5.1. Attendant should never enter a confined space to perform rescue services.
- 4.5.2. Initiate on-site rescue procedures by calling additional rescue and emergency services Contact University Police (911-campus phone) or (632-3333- cell phone).
- 4.5.3. Perform non-entry rescues or other rescue services. This includes providing air to the space, obtaining rescue equipment, and any other non-entry rescue activities.
- 4.5.4. Review the Confined Space Assessment / Permit Form to identify hazards, entry requirements and conditions prior to entry.
- 4.5.5. Continuously maintain an accurate count of authorized entrants in the permit space.
- 4.5.6. Remain outside the permit space during entry operations until relieved by another attendant.
- 4.5.7. Maintain communication with entrants inside the Confined Space
- 4.5.8. Prohibit and report to University Police (911-campus phone) or (632-3333-cell phone) any unauthorized individuals trying to access the confined space location.
- 4.5.9. Notify the entrant of any un-authorized individuals trying to access the confined space area.
- 4.5.10. Do not perform any duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

5. **Definitions:**

- 5.1. **Acceptable entry conditions:** 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 into and work within the space.
- 5.2. **Atmosphere:** refers to oxygen content, gases, vapors, mists, fumes, and dusts within a confined space.
- 5.3. **Atmospheric testing:** pre-entry testing by a *competent person* with a calibrated direct-reading instrument to measure (in sequence) oxygen content, flammable gases and vapors, and toxic air contaminants.
- 5.4. **Atmospheric monitoring:** continuous monitoring with a calibrated direct-reading instrument to verify acceptable atmospheric conditions for entrants.
- 5.5. **Attendant:** a trained individual stationed outside one or more permit required confined spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit required confined space program.
- 5.6. **Authorized entrant:** an trained employee who is authorized by the employer to enter a permit required confined space.
- 5.7. **Blanking or blinding:** the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.
- 5.8. **Competent person:** a person who by training and experience is familiar with all requirements and can evaluate confined space hazards, perform atmospheric tests and/or evaluate the results.
- 5.9. **Confined space:** a space that:
 - (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and
 - (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
 - (3) Is not designed for continuous occupancy.
- 5.10. **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.
- 5.11. **Emergency:** any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit required confined space that could endanger entrants.
- 5.12. **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 can exert enough force on the body to cause death by strangulation, constriction, or crushing.
- 5.13. **Entry:** 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.
- 5.14. **Entry permit:** the written or printed document that is provided by the employer to allow and control entry into a permit required confined space.
- 5.15. **Entry supervisor:** the trained person (such as the employer, foreman, or crew chief) 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 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.

- 5.16. **Hazardous atmosphere:** 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:
- (1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);
 - (2) Airborne combustible dust at a concentration that meets or exceeds its LFL;
NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.
 - (3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
 - (4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this Part and which could result in employee exposure in excess of its dose or permissible exposure limit;
NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.
 - (5) Any other atmospheric condition that is immediately dangerous to life or health.
NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, section 1910.1200 of this Part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.
- 5.17. **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 permit space.
NOTE: Some materials -- hydrogen fluoride gas and cadmium vapor, for example -- may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.
- 5.18. **Inerting:** the displacement of oxygen in a permit required confined space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.
- 5.19. **Isolation:** the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.
- 5.20. **Line Breaking:** the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.
- 5.21. **Non-permit confined space:** a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.
- 5.22. **Oxygen deficient atmosphere:** an atmosphere containing less than 19.5% oxygen by volume.
- 5.23. **Oxygen enriched atmosphere:** an atmosphere containing more than 23.5% oxygen by volume.
- 5.24. **Permit required confined space:** means a confined space that has one or more of the following characteristics:
- (1) Contains or has a potential to contain a hazardous atmosphere;
 - (2) Contains a material that has the potential for engulfing an entrant;
 - (3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
 - (4) Contains any other recognized serious safety or health hazard.

- 5.25. **Permit system:** the employer's written procedure for preparing and issuing permits for entry and for returning the permit required confined space to service following termination of entry.
- 5.26. **Prohibited condition:** any condition in a permit required confined space that is not allowed by the permit during the period when entry is authorized.
- 5.27. **Retrieval system:** 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 required confined spaces.

6. Procedures:

6.1. Identification of Confined Spaces

- 6.1.1. The Department of Environmental Health and Safety shall assist departments with identifying all Permit and Non-Permit Required Confined spaces in their area.
- 6.1.2. Departments are responsible for posting signs and/or permits approved by the Department of Environmental Health and Safety on all permit required confined spaces. Signs must be posted at the confined space entry location.
- 6.1.3. Departments are responsible for identifying confined space locations to employees, contractors and outside agencies working at or on Stony Brook University property.

6.2. Pre-Entry Procedures

- 6.2.1. A typical confined space team consists of an entry supervisor, an attendant, and entry personnel. A minimum of two employees can fulfill the roles where the supervisor assumes role of the attendant.

- Only confined space qualified "Authorized Entrants" may enter a permit required confined space.

6.2.1.1. Permit Required Confined Space

- Prior to entry the Permit Required Confined Space must be tested for oxygen concentration, combustible gas or vapor, and potential toxic contaminants. Any hazardous conditions detected must be reported to the Supervisor and the University Police.
- Air testing shall be conducted initially and every 2 hours to monitor the pre-existing atmospheric environment and to detect any atmospheric changes that might occur. All testing data obtained shall be recorded on the confined space atmospheric monitoring/entry log.
- If air sampling instruments indicate a developing adverse atmospheric change (e.g. steadily rising hydrogen sulfide or carbon monoxide levels, or steadily increasing or decreasing oxygen concentration), the supervisor will immediately pull all entrants from the confined space and reassess the area for its new hazard.
- Employees working in permit confined spaces shall wear all personal protective equipment appropriate for the hazards expected in the space.
- An approved safety harness with an attached line shall be used. The free end of the line will be secured outside the entry opening.
- Where an entry supervisor determines that a safety harness connected to a line would further endanger the life of the employee, the harness should remain worn by the employee to facilitate rescue in the event of an emergency.
- When entry must be made through a top opening, the following requirements also apply:
 - ✓ A safety harness shall be of the type that suspends a person in an upright position and must be worn by any person entering the space.

- ✓ A hoisting device (tripod) or other effective means shall be provided for lifting employees out of the space.
- When entry is made through a side opening, wristlets or anklets should be made available for the confined space entrant.

6.2.1.2. The Supervisor must:

- Understand all the requirements of this policy.
- Ensure that all entrants and attendants have been properly trained. If not, entry is NOT permitted.
- Review the confined space entry requirements with the qualified authorized entrants and attendants.
- Obtain a Confined Space Assessment/Permit Form (Appendix A) and provide all required information, including estimated entry time(s).
- Contact the Department of Environmental Health and Safety for authorization and to establish entry requirements.
- Arrange for all "Special Requirements" and ensure that all "Special Requirement" re completed, provided and in place. "Special Requirements" include, but are not limited to:
 - ✓ Lock Out/Tag Out, including blank, cap, purge, flush or vent lines
 - ✓ Lifelines, harness, emergency tripod, wristlets, anklets, etc.
 - ✓ Lighting and ventilation
 - ✓ Respirators, breathing apparatus, PPE, etc.
 - ✓ Posting and securing access to the confined space as necessary
 - ✓ Fire extinguishers
 - ✓ Hot Work Permit
- Ensure air monitoring and entry/exit tracking is being conducted by obtaining and maintaining the Confined Space Air Monitoring/Entry Log (Appendix B).
 - ✓ If IDLH environment is present – **DO NOT ENTER SPACE**. Contact University Police immediately (632-3333 cell phone) (911 – campus phone).
- Ensure before a permit required confined space is entered, the atmosphere in the area is tested for oxygen levels, combustible gases, toxic gases and vapors, contaminants that could be found in that confined space, and physical hazards such as noise, temperature extremes, engulfment and other serious safety or health hazards.
- Ensure the initial testing is performed by the Department of Environmental Health and Safety Fire Marshals. Subsequent testing may be done by other technically qualified personnel using an appropriate gas meter calibrated within the past 12 months.
- Ensure atmospheric conditions are acceptable in conjunction with EH&S. Atmospheric conditions are unacceptable if:
 - ✓ Oxygen levels are less than 19.5% or greater than 23.5%.
 - ✓ Flammable gas, vapor or mist greater than 10% of its lower explosive limit (LEL).
 - ✓ An airborne combustible dust at a concentration that obscures vision at a distance of five feet or less.
 - ✓ An atmospheric concentration of a substance greater than the OSHA Permissible Exposure Level (PEL) or ACGIH Threshold Limit Value (TLV) established for that substance
 - ✓ If test results done show that the atmospheric conditions in the confined space are unacceptable, entry into that area will be prohibited or discontinued until conditions are brought into acceptable limits.

6.3. Entry Requirements

- 6.3.1. Confined space qualified entrants must ensure that all "Special Requirements" have been implemented and that environmental testing results are acceptable. In addition, the entrant must:
- 6.3.1.1. Know the hazards associated with the space and their effects.
 - 6.3.1.2. Properly use the required personal protective equipment and other equipment required for entry.
 - 6.3.1.3. Maintain a continuous means of communication with the attendant.
 - 6.3.1.4. Alert the attendant in the event of an emergency.
 - 6.3.1.5. Evacuate the space if an emergency occurs.
- 6.3.2. A confined space qualified attendant must be in position at all times while workers are in the confined space. The attendant shall:
- 6.3.2.1. Know the hazards associated with the confined space and their effects.
 - 6.3.2.2. Maintain an accurate count of all persons in the confined space (see Appendix B).
 - 6.3.2.3. Remain at their assigned station until relieved by another qualified attendant or until all entrants leave the confined space.
 - 6.3.2.4. Know how, and have the means, to summon emergency assistance. Contact University Police immediately (632-3333 cell phone) or (911 – campus phone).
 - 6.3.2.5. Have the authority to order the workers out of a confined space if:
 - Hazardous conditions exceed those set by the permit.
 - An unexpected hazard presents itself.
 - Workers in the confined space show signs of toxic reaction.
 - A situation occurs outside the confined space which could pose a hazard to the workers located inside the confined space.
 - The attendant must leave the area.
 - 6.3.2.6. Perform non-entry rescue procedures.
 - ✓ **NOTE: UNDER NO CIRCUMSTANCES IS THE ATTENDANT TO ENTER THE CONFINED SPACE UNLESS THEY ARE EQUIPPED FOR EMERGENCY RESCUE AND THERE IS A QUALIFIED PERSON TO TAKE THEIR PLACE AS ATTENDANT.**
- 6.3.3. The supervisor shall monitor the confined space operations as often as necessary to ensure they remain consistent with the entry permit and that acceptable entry conditions are maintained. In addition, the supervisor shall:
- 6.3.3.1. Terminate entry and cancel permits when entry operations are completed or if a new condition exists.
 - 6.3.3.2. Take immediate and appropriate measures to remove unauthorized entrants.
 - 6.3.3.3. Conduct required continuous air monitoring, if the work being conducted can adversely affect the atmosphere.

6.4. Post-Entry Procedures

- 6.4.1. The entrants shall remove all equipment and materials from the space, return the space to its planned operating condition, and secure the space.
- 6.4.2. The attendant shall account for all entrants and return all paperwork and logs to the supervisor.
- 6.4.3. The supervisor shall ensure that all appropriate steps have been taken, notify the Department of Environmental Health and Safety of the completion of the operation, and return the permit to them.

6.5. Rescue and Emergency Procedures

- 6.5.1. If an emergency arises, notify University Police at (911-campus phone) or (632-3333 - cell phone) immediately, explain the nature and location of the emergency, and request that they contact the Fire Marshals to respond for a confined space incident.
- 6.5.2. The Department of Environmental Health and Safety Fire Marshal's Office provides primary emergency rescue services. The Fire Marshals routinely train with the surrounding Fire Departments who will respond to assist in the event of an actual emergency.

6.6. Training

- 6.6.1. All persons involved in confined space operations including supervisors, authorized entrants and authorized attendants must be trained in confined space operations. Initial and refresher training is required to provide employees with the necessary understanding, skills, and knowledge to perform the job safely. Refresher training must be conducted whenever an employee's duties change, when hazards in the confined space change, or whenever an evaluation of the confined space entry program identifies inadequacies in the employee's knowledge.
- 6.6.2. Training will include:
 - 6.6.2.1. Types of confined space hazards.
 - 6.6.2.2. Components of the written Confined Space Operations program.
 - 6.6.2.3. The entry permit system and the hot work permit.
 - 6.6.2.4. Guarding of the entrance opening.
 - 6.6.2.5. Atmospheric testing equipment including its use, calibration, and maintenance.
 - 6.6.2.6. Atmospheric testing protocol and interpretation of results.
 - 6.6.2.7. Methods for the control or elimination of any atmospheric hazards, including inerting, draining and rinsing, purging and cleaning, and continuous forced air ventilation.
 - 6.6.2.8. Procedures the employees must follow if they detect a hazard.
 - 6.6.2.9. The evaluation process to be used for reentry if hazards are detected.
 - 6.6.2.10. The use of entry equipment such as ladders, communication devices, etc.
 - 6.6.2.11. Personal protective equipment, including full body harness, respiratory protection, chemical protective clothing and eye and face protection.
 - 6.6.2.12. Personnel and their responsibilities, including the qualified entrant, attendant, entry supervisor and rescue team.

6.7. Contractors

- 6.7.1. When contractors are involved in permit required confined space entry work at Stony Brook University, Stony Brook Southampton and/or other University off-site facilities, the hiring department's confined space qualified supervisor shall:
 - 6.7.1.1. Inform the contractor that the work place contains permit required spaces and entry is allowed only through compliance with a "Permit-Required Confined Space Program." This includes providing the EH&S department with proof of Confined Space Entry training for each entrant, attendant and supervisor in order to obtain a Confined Space Entry Permit.
 - 6.7.1.2. Inform the contractor of the hazards of the space and precautions or procedures that must be followed.
 - 6.7.1.3. Coordinate entry in accordance with this procedure.
 - 6.7.1.4. Debrief the contractor at the conclusion of entry operations.

- 6.7.1.5. Prior to performing welding, brazing, torch operations, grinding or any other related process which generates sparks in a confined space a Hot Work Permit issued by the Department of Environmental Health and Safety is also required.
- 6.7.1.6. Ensure confined space air monitoring and entry/exit of personnel is being maintained (see Appendix B).

7. Related attachments, forms or documents:

- 7.1. Appendix A - Confined Space Assessment /Permit Form
- 7.2. Appendix B - Confined Space Air Monitoring/Entry Log
- 7.3. Appendix C - Confined Space Entry Decision Flowchart
- 7.4. Appendix D – Confined Space Responsibility Flowchart
- 7.5. OSHA 29 CFR 1910.146 - Confined Space Entry
- 7.6. ANSI Z117.1-2003 - Safety Requirements for Confined Spaces

Appendix B Sample Document

EMERGENCIES: University Police – 911
From a cell phone (631) 632-3333.
Contact EH&S (2-6410) to report a safety problem.

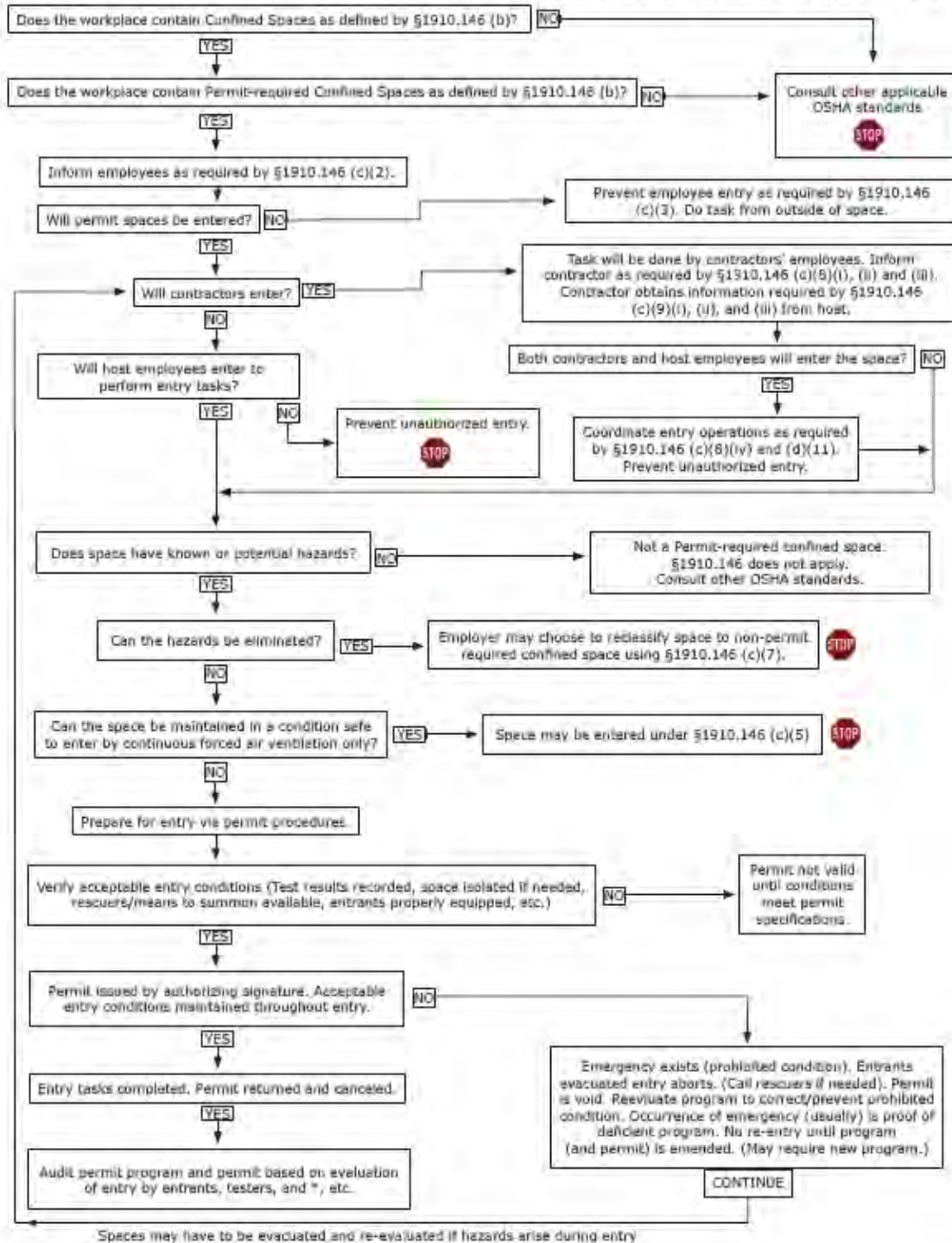


CONFINED SPACE ATMOSPHERIC MONITORING/ENTRY LOG

ATMOSPHERIC MONITORING						
Instrument name:				Calibration date:		
GAS	LIMIT	INITIAL RESULT	2 ND HOUR RESULT	4 TH HOUR RESULT	6 TH HOUR RESULT	8 TH HOUR RESULT
% Oxygen	19.5% to 23.5%					
% LEL (flammable atmosphere)	<10%					
H ₂ S	<10 ppm					
Carbon Monoxide	<35 ppm					
Other:						
Time tested						
Date tested						
Person performing testing:			Dept:		Date:	
<p>Monitor continuously, recording results every 2 hours • Retest after breaks and lunch Maintain separate air monitoring/entry log for each additional day</p>						
◀ CONFINED SPACE ENTRY LOG ▶						
DATE	ENTRANT'S NAME	ENTRY TIME	EXIT TIME	ATTENDANT'S INITIALS		
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**Appendix C
Sample Document**

CONFINED SPACE DECISION FLOW CHART



Appendix D.
Confined Space Responsibility Flowchart

