



Confined Space Program

**Office of Environmental Health
And Safety**

Revised June 2015

Cleveland State University Confined Space Entry Program

Introduction

Final rules addressing safe entry into confined spaces can be found in 29 CFR 1910.146 (Permit-Required Confined Spaces) under the authority of the Occupational Safety and Health Administration (OSHA). Through the passage of the Public Employees Risk Reduction Act, the State of Ohio has adopted this OSHA and all public employers are required to comply with its provisions.

Program Scope

The purpose of this procedure is to protect the health and safety of personnel who as a function of their job duties, work in or around confined spaces. Confined spaces have the potential to contain atmospheric hazards such as toxic vapors and/or oxygen deficiency. Confined spaces also have the potential to possess physical hazards including but not limited to fires, explosions, suffocation by engulfment

Important Elements

Access to all confined spaces are restricted using locks and keys. Confined space entry can only be made by authorized and trained employees.

Identification and inventory of all confined spaces and permit-required confined spaces (herein referred to as permit spaces).

Coordinate a training program for University employees who are affected by this program, to ensure that all entry supervisors, attendants, entrants, and rescue services understand their respective duties.

Establish a written permit entry system that includes a pre-authorization entry procedure

Ensure that all equipment, tools and survey meters are identified, and that personnel are knowledgeable in their use, maintenance and care.

Program Administration

The Confined Space Entry Program is administered for Cleveland State University through the Office of Environmental Health and Safety. This written program includes:

Conducting surveys to identify those areas that meet the definition of a confined space and/or permit-required confined space

Reviewing the spaces every three years to determine if classification is correct, the hazards identified are correct, if new spaces have been created or others should be removed from the list.

The Confined Space Inventory is provided to affected employees so they are aware of confined spaces at Cleveland State University and the corresponding location, descriptions and danger.

Utilize signage or other means to communicate to all employees the location of confined spaces and/or permit-required confined spaces

Secure confined spaces and/or permit-required confined spaces from entry by unauthorized personnel

Identification and evaluation of space hazards, operation of monitoring equipment; establishing both physical and environmental conditions for safe entry into confined spaces and/or permit-required confined spaces

Provide training on a continual basis for affected employees, including:

Hazard Recognition, Personal Protective Equipment, Monitoring Equipment, Communications, Entry and Exit Procedures, Entry Termination Conditions, Rescue applications, Permit-Entry System, coordination of work by outside contractors, tools and equipment, and continual audit and review of program components to ensure continued effectiveness and improvement.

Program Responsibilities

Director of Environmental Health and Safety

Cleveland State University has designated the Director of Environmental Health and Safety as the Confined Space Entry Coordinator for this Confined Space Entry Program. The Director is responsible for the development and annual evaluation of the Program, including employee training. The Director shall provide technical guidance on specific aspects of the program, and together with input from Departmental Supervisors, shall determine the designation of areas as confined spaces and/or permit-required confined spaces, and which employees are affected.

Departmental Supervisors

Departmental Supervisors shall assist the Director of Environmental Health and Safety in developing and maintaining an accurate inventory of all confined spaces and/or permit required confined spaces in their work areas. Departmental

Supervisors shall ensure that the permit-entry system is being adhered to for those spaces in whose entry a permit is required. They will ensure that affected employees are following established protocols, and that employees attend training sessions on Confined Spaces. New employees must receive formal University training prior to entering a confined space and/or permit-required confined space.

Affected Employees

All University Employees affected by this Program, are required to participate in the University training program for Confined Space Entry, and to adhere to the policies and procedures set forth in the University's Confined Space Entry Program

Program Duties

Participants in the Confined Space Entry Program are identified, functionally as having one of three designations: Entry Supervisor, Attendant, or Entrant. For purposes of this Program, the rescue services function is provided by the City of Cleveland's Fire Department.

Entry Supervisor

The Entry Supervisor has the responsibility for all activities at a Permit-Required Entry Site. Employees with the following job classifications are identified as being Entry Supervisors: Director of Facilities Management, Assistant Director of Facilities Management/Mechanical Operations, Superintendents of Building Maintenance and Grounds Operations, Foremen

Entry Supervisor duties include:

Terminating the entry upon discovery of a hazardous atmosphere/condition, or upon completion of the job

Verifying the permitted space is safe for entry by filling out the Permit completely, making recommendations and then signing after appropriate measure have been taken to ensure the safety of the entrant(s).

Assuring mechanism of communication between entrant and attendant and rescue team is identified and adequate for the job, prior to entry.

Reviewing tools and equipment to be used during the entry (including PPE).

Specifying continuous testing of atmosphere both inside and outside the permitted space when warranted (i.e., if there is a potential for a hazardous atmosphere to develop during the job.)

Establishing measures for unauthorized entry (i.e., restrict access and have employees intercept visitors).

Ensuring measures will be taken to remove all conditions making a permitted space unsafe prior to entry (i.e., increasing ventilation, lock-out tagout procedures, using intrinsically-safe equipment.)

Coordinating entry of University spaces by Outside contractors.

Reviewing training records to verify employees have participated in training programs.

Attendants

Employees with the following job classifications are designated as Attendant's:
(Entry Supervisors are authorized as attendants)

Attendant duties include:

Ensuring that all monitoring equipment is calibrated and operation prior to use in adherence to manufacturer's recommendations.

Ensuring that all entrants are familiar with monitoring procedures prior to entry.

Monitoring the atmosphere inside and outside the space the entire time the entrant is in the permitted space when the atmosphere has the potential to become hazardous.

Monitoring the initial entry conditions only when risk of a hazardous atmosphere developing is negligible.

Maintaining communications with the entrant and rescue services.

Performing non-entry rescue if deemed essential (e.g., using a winch to retrieve entrant without breaking the plane).

Attending formal Confined Space Entry Program training.

Notes:

Attendants are not permitted to engage in any other duties or tasks which may be a distraction from monitoring the activities of the entrant inside the permitted space, or from observing the conditions outside the space which may become a threat to the entrant.

The entrant is never permitted to leave the entrance to the permitted space for any reason unless another trained attendant is present to provide relief.

Entrants

Employees with the following job descriptions are designated as Entrants:

- Heating Ventilation & Air Conditioning Technicians,
- Plumbers and
- Electricians

Entrants are employees that have completed confined space entry training, are familiar with the hazards associated with confined spaces and capable of performing job duties involved with the task (i.e., cleaning, welding, repair, etc.)

Entrant duties include:

Following all instructions stipulated on the entry-permit

Continually monitoring atmospheric conditions of the space if required by the permit

Be familiar with monitoring procedures and proper use of monitoring equipment

Attending formal training course in Confined Space Entry

Utilize only those tools and PPE that have been approved as per permit

Immediately evacuate a permitted space upon directive from an Entry Supervisor, Attendant, whenever a hazardous atmosphere is indicated by monitoring equipment or if a condition outside the confined space occurs that may potentially affect Entrants (i.e., fire, severe weather).

Rescue Service Personnel

Rescue Services are identified as being provided by members of the local emergency rescue services. Upon the decision to implement a permitted entry, entry supervisor shall notify said local emergency rescue services that a permitted entry will be taking place. Such rescue services will be trained in first aid and cardio-pulmonary resuscitation.

Confined Space Evaluation

Designation of all spaces as either confined spaces or permit-required confined spaces will be made by the Director of Environmental Health and Safety, in consultation with

Department Administrators and Supervisors. Space evaluation is made in consultation with the decision flow chart found in Appendix A of 29 CFR 1910.146.

Initial hazard assessments will be performed on prospective spaces. If the original conditions are changed, a reassessment shall be performed to determine if a reclassification is necessary. Permit-required confined spaces will be labeled as such and identified as part of an inventory of all confined spaces (Appendix B).

Permit System

Prior to entering any area listed as a Permit-Required Confined Space, an authorized entrant must obtain an entry permit (Appendix C). This permit must be filled out entirely, and signed by an authorized entry supervisor. This entry permit is a written document that indicates approval for the individuals listed on the permit to enter and work in the permitted space identified. The permit is designed to ensure that all hazards have been evaluated, and that precautions have been taken to ensure the safety of the worker.

Permits are valid only for one (1) eight-hour period. Following this time, a reassessment of the space and of job progress will take place, followed by the issuance of another permit to continue work, if necessary.

No permits will be issued for spaces where the atmosphere may potentially expose entrants to incapacitation, chronic or acute illnesses, or prevent self-rescue.

Required Permit Information

Permits for space entry are to be filled out completely by the entry supervisor. The permit contains the following information:

- Entrant's Name
- Required Tools
- Estimated time of occupancy
- Description of job
- Attendant's Name
- Pre-Entry Preparation Procedures
- Data on atmospheric testing

Permits are to be posted at the entrance to the permitted space. Upon completion of the job, a copy of the permit is to be forwarded to the Director of Safety and Environmental Services.

Pre-Entry Assessment

Prior to issuing a permit for a confined space entry, the entry supervisor should consult the decision flow chart for permit-required confined space entry (Appendix A) together with the prospective trained Attendant and the Entrant.

Means of Entry/Egress: Evaluate means of entry/egress prior to entering space to ensure that the opening will accommodate the size of the entrant in both the conscious and unconscious state.

Means of Isolation: all pumps, lines, and other existing equipment which potentially may introduce hazardous substances into the space must be disconnected, deactivated or isolated by some other means. Lock out all valves and switches that have the potential to be inadvertently opened/activated. All mechanical and/or electrical energy sources must be reduced to a zero energy state through lock-out procedures.

Mechanical Ventilation: Evaluate the use of mechanical ventilation if the need exists to reduce and maintain any air contaminants to safe levels

Atmospheric Monitoring

Pre-entry atmospheric testing shall be performed without breaking the plane. This can be accomplished by lowering survey meters into the space on a retractable cord or by any other means that will ensure accurate readings. The atmosphere will be assessed to determine: Oxygen levels, flammability and toxic gases (carbon monoxide and hydrogen sulfide). Monitoring frequency intervals shall be established by the entry supervisor, and must be at least performed hourly for the duration of the time the entrant is actually in the space. (Additional recordings can be made on the back of the Confined Space Entry form with notation made on the front indicating data on back of form.) The results of monitoring are to be recorded in the appropriate areas provided on the entry permit. Entry is prohibited in spaces whose atmospheres contain levels considered Immediately Dangerous to Life and Health (IDLH). Consult the *NIOSH Pocket Guide to Chemical Hazards*, (National Institute for Occupational Safety and Health - Publication 97-140) as a reference when testing atmospheres to determine specific IDLH levels. Copies of this publication will be provided with the atmosphere testing equipment, and is also kept in the Offices of Environmental Health and Safety.

Instrumentation

Instrumentation utilized to test the atmosphere of a permit-required confined space shall be of the direct reading type. Such instrumentation must be calibrated and in working condition prior to use. When not in use, instrumentation will be maintained and stored by the Confined Space Program Coordinator. When needed, the appropriate personnel shall

request the use of this instrumentation from the Program Coordinator prior to each entry. Confined Space monitoring equipment shall be calibrated and maintained as per manufacturer's guidelines.

Tools/Equipment

A variety of tools and equipment may be needed during a permit-required confined space entry. If a specific type of tool or piece of equipment is needed for a permit-required confined space entry and does not fall into the categories listed below, consult with the Program Coordinator prior to the entry.

Lighting

All lighting intended for use in spaces that contain flammable and/or combustible materials must be explosion proof (i.e., intrinsically-safe or approved for use in Class I, Division I or Class II, Division I environments). This includes flash lights, drop lights, etc... Service lighting and outlets must be properly grounded and all cords used must be equipped with a grounding plug. Ground fault circuit interrupters must be used where wet conditions are present.

Powered Tools

Power tools intended for use in permit-required confined spaces are to be either pneumatic or electrical. Electric tools shall be protected by a ground fault circuit interrupter or be double insulated. All power tools to be used in potentially flammable atmospheres shall be explosion proof.

Non-Powered Tools

All non-powered tools intended for use in potentially flammable atmospheres must be intrinsically-safe.

Ladders

All ladders used in conjunction with a permit-required confined space entry shall meet specifications set forth by OSHA. Use ladders when entering a space from ground level when there is a depth of four feet or more.

Compressed Gases/Flame Generating Equipment

Compressed gas cylinders are prohibited from being taken into permit-required confined spaces, with exception of a Self Contained Breathing Apparatus (SCBA). Such equipment shall only be used by personnel trained in SCBA use. No welding equipment shall be used in potentially flammable atmospheres. Matches, lighters or any other flame producing equipment are prohibited from being taken into spaces containing potentially flammable atmospheres.

Ventilation Equipment

Ventilation equipment, including fans, intended for use to ventilate spaces containing potentially flammable atmospheres shall be explosion proof.

Communication Devices

All communication devices brought into spaces where potentially flammable atmospheres exist must be explosion proof. A method of communication must be selected and agreed upon (i.e., radio, verbal, rope tugs, etc.).

Personal Protective Equipment (PPE)

Specific types of Personal Protective Equipment (PPE) shall be identified and made available prior to entry into a permit-required confined space. PPE selection shall be made to address expected hazards encountered, using acceptable industry standards (American National Standards Institute, etc...) and the best available information present at the time. The Director of Environmental Health and Safety shall be consulted in regard to PPE use and selection.

Emergency Rescue

For Emergency assistance, Dial 9-1-1 or 8, 9-1-1 from campus phone. Cell phone users are to also Dial 9-1-1 and tell the operator to connect you to CSU Police.

Attendants

An authorized attendant shall be stationed at the entrance of each confined space that is identified as having a potentially hazardous atmosphere, a potentially engulfment hazard, or any other hazard that may pose a threat to the life, safety or health of the entrant. The attendant must remain at the entrance to the space at all times while the entrant is in the space and must have a means of communicating with the entrant. The Attendant is never permitted to have other responsibilities and must keep focused on entrant activities. In addition, the attendant shall also have a mechanism available to immediately communicate with the rescue team and other emergency services (Paramedics, Campus Police). Under no circumstance is the attendant to enter the space, and may only leave the space if relieved by another authorized attendant.

Rescue Teams

Rescue teams are to be available at all times where a permit-required confined space entry is underway.

Rescue Equipment

Communication Equipment

Appropriate communication equipment will be provided to the attendant to assure they can maintain contact with entrants and rescue team members. Such equipment may include telephones, radios, pagers, etc...

Body Harness/Retrieval Lines

A full-body safety harness will be worn by all entrants into a permit-required confined space. This harness will be designed to allow easy lifting and/or dragging of incapacitated entrants safety from the space by both shoulders or by a single line connection between the shoulder and the back.

The only instances where wearing a safety harness may be exempted is where the space configuration/construction may actually result in a potential hazard by becoming entangled with equipment or items located within the space. The Program Director alone shall make the determination as to whether this exemption may be granted.

Hoists

A hoisting device shall be provided should the intended space for entry be a manhole, or if the space contains a top/vertical opening. This device shall not be electrical or pneumatic, but rather mechanically operated. When there is no suitable structure overhead to mount the hoist on, a tripod system shall be placed over the space entrance. This tripod system must be of sufficient strength and height, and constructed so that the entrant may be safely removed from the space, and swung outward.

Ladders

Ladders that meet OSHA specifications shall be used when entering or leaving a manhole, vertical opening, or pit. Use ladders when entering a space from ground level when there is a depth of four feet or more.

Procedures for Rescue

Rescue team members are not permitted to enter a confined space unless an authorized attendant is stationed at the entrance. No rescue team member shall enter a permit-required confined space without a safety harness and retrieval line.

Definitions

The following are some terms applicable to this Confined Space Program. The definitions were taken from the Code of Federal Regulations Title 29 (29 CFR 1910.146):

“Attendant” means an individual stationed outside a permit space who monitors the authorized entrants, and performs all duties of an attendant as assigned by this Confined Space Program.

“Blanking or Blinding” means the absolute closure of a pipe, line, or duct by the fastening of a solid plate that completely covers the bore and is capable of withstanding the maximum pressure of the pipe, line, or duct, with no leakage beyond the plate.

“Calibration” means a laboratory or bench-top resetting of alarm points and zeros, in accordance with manufacturer’s specifications. Calibration shall be conducted by the manufacturer, or by a trained company representative.

“Class I, Division I Location” means a location in which (1) ignitable concentrations of flammable gases or vapors can exist under normal operating conditions; or (2) ignitable concentrations of such gases or vapors can exist frequently due to repair or maintenance operations or due to leakage; or (3) breakdown of faulty operation equipment or processes might release ignitable concentrations of flammable gases or vapors and might also cause simultaneous failure of electrical equipment.

“Class II, Division I Location” means a location in which (1) combustible dust in the air under normal operating conditions in quantities and sufficient to produce explosive or ignitable mixtures; or (2) mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electrical equipment, operation of protection devices, or from other causes, or (3) combustible dusts or an electrically conductive nature may be present in hazardous quantities.

“Confined Space” means any space that:

1. Is large enough and configured such that an employee can bodily enter and perform assigned work;
2. has limited means of entry/egress (for example, tanks, vessels, silos, storage bins, hoppers, vaults, boilers, sewers, manholes, ventilation or exhaust ducts, and pits are some spaces that may have limited means of entry.); and
3. is not designed for continuous human occupancy

“Double block and bleed” means 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.

“Engulfment” means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that may result in death by interfering with the respiratory system or that can exert enough force on the body resulting in strangulation, constriction, or crushing.

“Entrant” means any employee who is authorized to enter a permit space, and perform all the duties of an authorized entrant as assigned by this Confined Space Program.

“Entry” means the action whereby a person passes through an opening into a confined space whereby any part of the body breaks the plane of an opening into a confined space. Entry also includes any ensuing work activities performed.

“Entry Permit” means the written or printed documentation that is provided by the employer to allow and control entry into a permit space for a particular reason and a defined time period.

“Entry Supervisor” means any employee responsible for determining whether acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, for terminating entry as required by this section, and for performing all the duties of an authorized entry supervisor by this Confined Space Program.

PLEASE NOTE: An entry supervisor may perform duties of authorized attendants and/or entrants, provided the person is trained and equipped for those duties. Also duties of an entry supervisor may be passed from one authorized entry supervisor to another during the course of an entry operation.

“Hazardous atmosphere” means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or illness from one or more of the following causes:

1. Flammable gas, vapor, or mist in excess of 10 % of the lower explosive limit (LEL);
2. An oxygen-deficient atmosphere containing less than 19.5% oxygen or an oxygen-enriched atmosphere containing more than 23.5% oxygen;
3. Atmospheric concentration of any substance for above which a dose or a permissible exposure limit (PEL) is published in Subpart Z of Part 1910 Standards;

4. Airborne combustible dust at a concentration that meets or exceeds its LEL, e.g., approximated where dust obscures vision at a distance of five feet or less;
5. Any other atmospheric condition defined as immediately dangerous to life or health as defined in this section.

“Immediately Dangerous to Life or Health (IDLH)” means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual’s ability to escape unaided from a permit space.

“Inerting” means the displacement of the atmosphere in a permit space by a noncombustible gas (e.g. nitrogen) to such an extent that the resulting atmosphere becomes noncombustible (this procedure produces an IDLH oxygen-deficient atmosphere).

“Isolation” means the process by which a permit space is removed from service and completely protected against the release of energy and material into the space.

“Line Breaking” means the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive or toxic material, inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

“Lockout or Tagout” means placing locks or tags on an energy-isolating device. Tags shall indicate that the energy-isolated device shall not be operated until the tag has been removed by the individual who affixed it.

“Permit-required confined space (Permit Space)” means a confined space that has one or more of the following:

1. Contains or has the potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant;
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
4. Contains any other serious safety or health hazard, e.g. electrical, radioactive, moving mechanical parts, thermal, etc....

“Prohibited Condition” means any condition in a permit space that is not allowed by the permit during the period when an entry is authorized.

“Rescue Service” means those persons designated to perform rescues from permit spaces. Such service may be provided by external emergency personnel, provided the training requirements of applicable OSHA standards have been met.

“Retrieval System” means the equipment (including a retrieval line, full-body harness, and lifting device or anchor) used for non-entry rescue of a person(s) from permit spaces.

“Zero mechanical state” means that the mechanical potential energy of all portions of a machine or equipment is set so that the opening of a pipe(s), tube(s), hose(s) or actuation of any valve(s) or a button(s), will not result in energy being released.

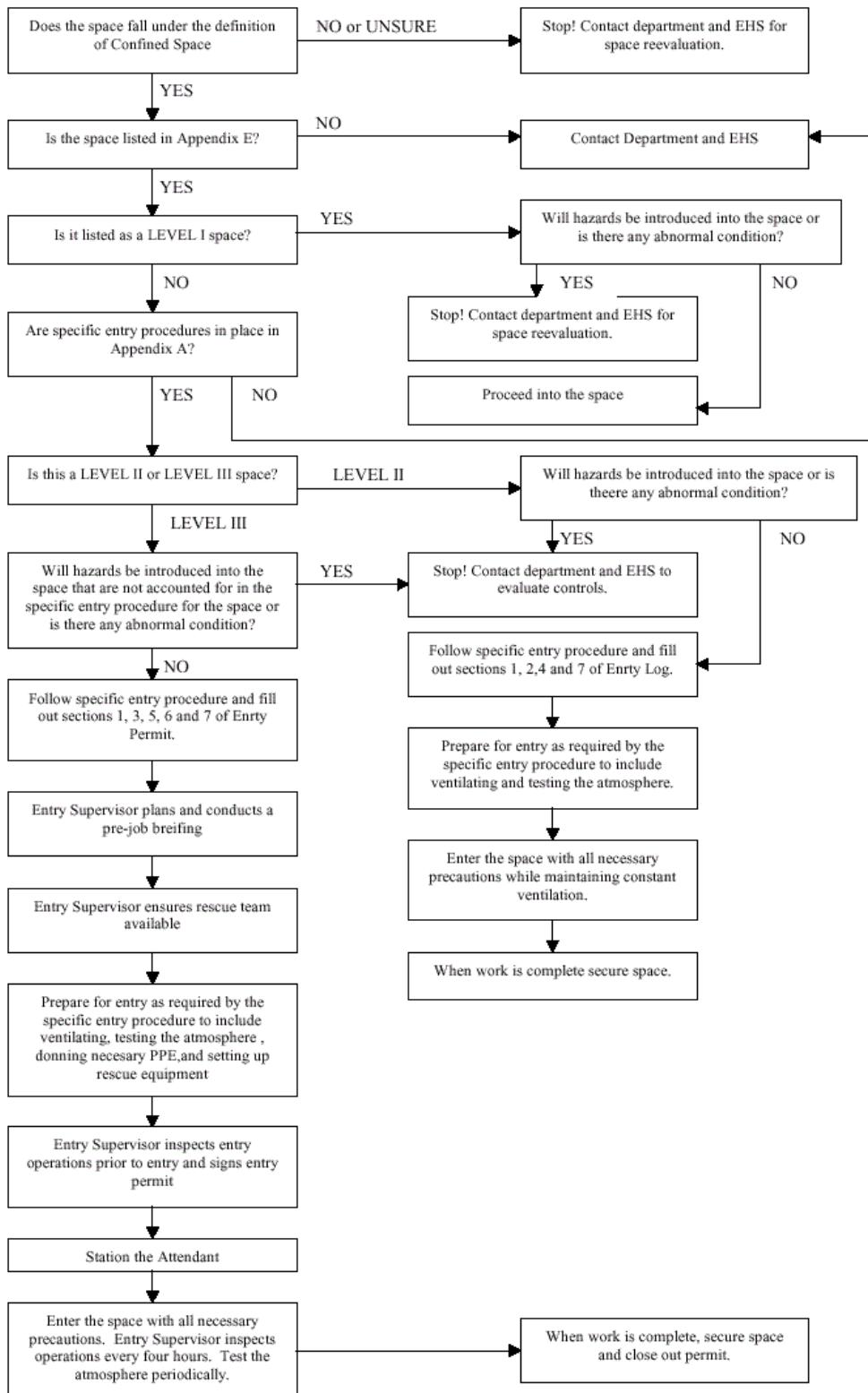
Training

All personnel who can be assigned to perform the duties of either an entry supervisor, attendant or entrant shall undergo a formal training program (See Appendix D).

Appendix A

Confined Space Decision Tree

Confined Space Flowchart



Appendix B

Confined Space Inventory

Confined Space Inventory

Appendix C

Confined Space Permit

Location of Confined Space and Purpose of Entry				Date:
Atmospheric Hazards: <input type="checkbox"/> Oxygen Deficiency <input type="checkbox"/> Flammable <input type="checkbox"/> Toxic				Duration:
Physical Hazards: <input type="checkbox"/> Mechanical <input type="checkbox"/> Electrical <input type="checkbox"/> Chemical <input type="checkbox"/> Engulfment <input type="checkbox"/> Other				Expires:
If other explain:				

PRE-ENTRY CHECKLIST

<u>YES</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>
<input type="checkbox"/>	Entry area free of debris	<input type="checkbox"/>	Non sparking tools
<input type="checkbox"/>	Warning barriers and signs in place	<input type="checkbox"/>	Low voltage lighting used
<input type="checkbox"/>	Space: purged, flushed, vented	<input type="checkbox"/>	Electrical equipment explosion proof
<input type="checkbox"/>	Area barricaded and secured	<input type="checkbox"/>	Adequate ventilation
<input type="checkbox"/>	Lockout/Tagout	<input type="checkbox"/>	Energy sources isolated
<input type="checkbox"/>	Lines broken, capped, blanked	<input type="checkbox"/>	Electrical equipment grounded (GFCI)
<input type="checkbox"/>	Hot work permit issued	<input type="checkbox"/>	Fire extinguisher(s) available

ATMOSPHERIC CHECKS

Instrument Type	Acceptable Entry Conditions TIME ⇒ PEL	Measurement				
Oxygen	19.5-23.5%					
Carbon Monoxide	Less than 50 ppm					
Hydrogen Sulfide	Less than 20 ppm					
LEL	Less than 10%					

Print _____ Sign _____ Date _____
 Atmospheric Tester: _____

PROTECTIVE EQUIPMENT

<u>YES</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>	<u>YES</u>	<u>NO</u>
<input type="checkbox"/>	Hard hat	<input type="checkbox"/>	Protective clothing	<input type="checkbox"/>	Communication equipment
<input type="checkbox"/>	Eye/face protection	<input type="checkbox"/>	Hearing protection	<input type="checkbox"/>	Respirator type: _____
<input type="checkbox"/>	Retrieval devices	<input type="checkbox"/>	Harness and lifelines	<input type="checkbox"/>	Fire extinguisher type: _____
<input type="checkbox"/>	Safety Shoes				

All outside contractors will provide a copy of their Confined Space Entry Program and will confirm that all employees have been trained to OSHA Standards.

I CERTIFY THAT ALL NECESSARY PRECAUTIONS HAVE BEEN TAKEN TO MAKE THIS CONFINED SPACE SAFE FOR CONDUCTING THE PRESCRIBED WORK DURING THE PRESCRIBED TIME AS WELL AS EMERGENCY PROCEDURES.

Print _____ Sign _____ Date _____
 Entry Supervisor: _____

Attendant: _____

Entrant(s): _____

Job Completed: YES NO REMARKS:

Job Terminated: YES NO If YES STATE REASON FOR TERMINATION: