

Confined Space Program

The program describes reasonable and necessary policies and procedures for any and all facilities, departments, and individuals who are associated with confined space entry operations. A site-specific program may be used, providing it meets or exceeds the requirements listed in this program.

Governing Regulations

[OSHA 1910.146 Permit-Required Confined Spaces](#)

[OSHA 1910.134 Respiratory Protection](#)

[OSHA 1910.147 Control of Hazardous Energy](#)

[OSHA 1926.652 Requirements for Protective Systems](#)

[OSHA 1926 Subpart AA Confined Spaces in Construction](#)

Definitions

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

Attendant: an individual stationed outside a permit space who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit confined space program.

Authorized Entrant: an employee who is authorized by the employer to enter a permit space.

Barrier: a physical obstruction that blocks or limits access.

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.

Bonding: the joining of two or more items with an electrical conductor so that all ends joined have the same electrical charge or potential.

Confined Space: a space that:

- Is large enough and so configured that an employee can bodily enter it and perform assigned work;
- Has limited or restricted means for entry and exit (for example, storage tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that have limited means of entry); and
- Is not designed for continuous employee occupancy.

Control: the action taken to reduce the level of any hazard inside a confined space using engineering methods (for example, by ventilation) and then using these methods to maintain the reduced hazard level. Control also refers to the engineering methods used for this purpose. Personal protective equipment is not a control.

Early-warning system: the method used to alert authorized entrants and attendants that an engulfment hazard may be developing. Examples of early-warning systems include, but are not limited to: alarms activated by remote sensors and lookouts with equipment for immediately communicating with the authorized entrants and attendants.

Emergency: any occurrence (including any failure of power, hazard control, or monitoring equipment) or event, internal or external, to the permit space that could endanger entrants.

Energized: Connected to an energy source or containing residual or stored energy.

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, crushing, or suffocation.

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.

Entry Permit: the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in this program.

Entry Supervisor: Department Head or the designated representative (such as the 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 program. The entry supervisor is also responsible for authorizing any hot work and completing the Hot Work Permit.

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 program 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 entry operation. This would be required if the entry supervisor was to enter the permit space.

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:

- A. Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit (LFL).
- B. Airborne combustible dust at a concentration that meets or exceeds its lower flammability limit (LFL).
 - a. NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less.
- C. Atmospheric oxygen concentration below 19.5% or above 23.5%.
- D. 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 29 CFR 1910 and
 - i. That could result in employee exposure in excess of its dose or permissible exposure limit. (SEE NOTE BELOW)
 - ii. 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.
- E. Any other atmospheric conditions that are 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 Safety Data Sheets that comply with the Hazard Communication Standard, section 1910.1200, published information, or internal documents can provide guidance in establishing acceptable atmospheric conditions.

Hot Work: any work involving burning, welding, or similar fire-producing operations. Also, any work that produces a source of ignition, such as grinding, drilling, or heating.

Hot Work Permit: the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, or heating) capable of providing a source of ignition. The entry supervisor is also responsible for authorizing any hot work and completing the Hot Work Permit.

Immediately Dangerous to Life or Health (IDLH): an atmosphere that poses an immediate threat of loss of life; may result in irreversible or immediate severe health effects; may result in eye damage/irritation; or other condition that could impair escape from a confined space.

Isolate or isolation: the process by which employees in a confined space are completely protected against the release of energy and material into the space and contact with a physical hazard, 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; blocking or disconnecting all mechanical linkages; or placement of barriers to eliminate the potential for employee contact with a physical hazard.

Limited or restricted means for entry or exit: a condition that has a potential to impede an employee's movement into or out of a confined space. Such conditions include, but are not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces, and ladders.

Lockout: the placement of a lockout device on an energy isolating device, in accordance with an established procedure (with the University's [Hazardous Energy Control Program \(Lockout-Tagout\)](#)), ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lower Explosive Limit (LEL): the minimum concentration of a combustible gas or vapor in air that will ignite if an ignition source is introduced.

Monitor or monitoring: the process used to identify and evaluate the hazards after an authorized entrant enters the space. This is a process of checking for changes that is performed in a periodic or continuous manner after the completion of the initial testing or evaluation of that space.

Non-entry rescue: occurs when a rescue service, usually the attendant, retrieves employees in a permit space without entering the permit space.

Non-Permit Required Confined Space: a confined space that meets the definition of a confined space but does not meet the requirements for a permit-required confined space.

Oxygen-Deficient Atmosphere: an atmosphere that contains an oxygen concentration of less than 19.5% by volume.

Oxygen-Enriched Atmosphere: an atmosphere that contains an oxygen concentration greater than 22% by volume.

Permissible Exposure Level (PEL): concentration of a substance to which an individual may be exposed repeatedly without adverse effect.

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.

Personal Protective Equipment (PPE): any device or clothing worn by the worker to protect against hazards in the environment. Examples are respirators, gloves, and chemical splash goggles.

Purging: the removal of gases or vapors from a confined space by the process of displacement.

Rescue: retrieving, and providing medical assistance to, one or more employees who are in a permit space.

Tagout:

1. Placement of a tagout device on a circuit or equipment that has been deenergized, in accordance with an established procedure, to indicate that the circuit or equipment being controlled may not be operated until the tagout device is removed; and
2. The employer ensures that:
 - i. Tagout provides equivalent protection to lockout; or
 - ii. That lockout is infeasible and the employer has relieved, disconnected, restrained and otherwise rendered safe stored (residual) energy. For more on tagout see [Control of Hazardous Energy \(Lockout-Tagout\)](#)

Responsibilities and Training Requirements

Everyone involved in a confined space entry project has certain responsibilities and requires a certain amount of training. It is very important that every individual is familiar with his/her responsibilities. This section outlines the responsibilities and training requirements of each individual involved in a project.

Environmental Health & Safety

Environmental Health & Safety shall be responsible for the following:

- Reviewing and updating the Confined Space Entry Program.
- Conducting periodic on site review of groups performing permit confined space entry.
- Assisting Supervisors with:
 - providing training as set forth in the program,
 - identification of confined spaces,
 - identifying spaces that require a permit for entry, and
 - labeling permit-required confined spaces as applicable.

Responsibilities and Training Requirements of Supervisors or Their Designated Representatives

Supervisors or their designated representatives shall be responsible for the following:

- Identifying confined spaces within facilities or areas under their control.
- Identifying hazards within a confined space under their control.
- Documenting that all training requirements for a permit required confined space entry have been met by signing the pre-entry authorization space on the Confined Space Entry Permit.

Responsibilities and Training Requirements of the Entry Supervisors shall be the following:

- Ensuring that the required atmospheric tests are performed at the permit-required confined space and results recorded on the permit prior to entry authorization.
- Obtaining and maintaining all equipment necessary to complete the permit-confined space entry project.
- Authorize entry by signing the entry authorization space on the entry permit after all conditions for a safe entry have been met.
- Terminating the entry and canceling the permit when:

- entry operations covered by the entry permit have been completed, or
 - a condition that is not allowed under the entry permit arises in or near the permit space.
- Determining, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.
- Authorizing any hot work and completing the Hot Work Permit.

Responsibilities and Training Requirements of Authorized Entrants

The person(s) authorized to enter a confined space shall be responsible for and receive training in the following:

- The knowledge of hazards that may be faced during entry, including the mode, signs or symptoms, and consequences of the exposure.
- Proper use of equipment, which includes:
 - Atmospheric testing and monitoring equipment as required based on the hazards identified.
 - Ventilating equipment needed to obtain acceptable entry conditions.
 - Communication equipment necessary to maintain contact with the attendant.
 - Personal protective equipment.
 - Lighting equipment.
 - Barriers and shields.
 - Equipment, such as ladders, needed for safe ingress and egress.
 - Rescue and emergency equipment.
 - Any other equipment necessary for safe entry into and rescue from permit spaces.
- Communication with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space if required.
- Alert the attendant whenever:
 - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
 - The entrant detects a prohibited condition.
- Exiting the permit space as quickly as possible whenever:
 - An order to evacuate has been 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; or
 - An evacuation alarm is activated.

Responsibilities and Training Requirements of Attendants

Persons authorized to perform duties as attendant shall be responsible for and receive training in the following:

- Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.
- Awareness of possible behavioral effects of hazard exposure in authorized entrants.
- Continuously maintaining an accurate count of authorized entrants in the permit space and ensuring that the means used to identify authorized entrants accurately identifies who is in the permit space.

- Remains outside the permit space during entry operations until relieved by another attendant.
- Attempting non-entry rescue if proper equipment is in place and the rescue attempt will not present further hazards to the entrant or attendant.
- Communicating with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space when conditions warrant.
- Monitoring activities inside and outside the space to determine if it is safe for entrants to remain in the space and ordering 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 hazard exposure in an authorized entrant.
 - If the attendant detects a situation outside the space that could endanger the authorized entrants.
 - If the attendant cannot effectively and safely perform all the duties required by this program.
- Summoning rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space.
- Taking the following actions when unauthorized people approach or enter a permit space while entry is underway:
 - Warning the unauthorized persons that they must stay away from the permit space.
 - Advising the unauthorized persons that they must exit immediately if they have entered the permit space.
 - Informing the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
- Performing no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

Identifying Confined Spaces

Not all confined spaces will be considered permit-required confined spaces and being able to identify the difference between the two is important.

A Confined Space is any space that has the following characteristics:

1. It is large enough or so configured that an employee can bodily enter and perform assigned work.
2. It has limited or restricted means for entry or exit.
3. Confined-space openings are limited primarily by size and location. Openings may be small in size and may be difficult to move through easily. However, in some cases openings may be very large; for example, open-topped spaces such as pits or excavations. Entrance and exit may be required from top, bottom, or side. In some cases, having to access the work area by a fixed ladder may constitute limited or restricted entry or exit. Size or location may make rescue efforts difficult.
4. Is not designed for continuous employee occupancy.
5. Most confined spaces are not designed for employees to enter and work on a routine basis. They may be designed to store a product, enclose materials and processes, or transport products or substances. Because they are not designed for continuous occupancy, frequently they will not have good ventilation or lighting. Therefore, occasional employee entry for inspection, maintenance, repair, cleanup, or similar tasks can be difficult and

dangerous. The danger associated with entry may come from chemical or physical hazards within the space.

A Non-Permit Confined Space is a confined space that does not contain, nor has the potential to contain, any hazard capable of causing death or serious physical harm, with respect to atmospheric hazards. 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.

A Permit-Required Confined Space (permit space) includes the confined space description above and one or more of the following characteristics:

- A. Contains, or has a potential to contain, a hazardous atmosphere.
- B. Contains a material that has the potential for engulfing an entrant.
- C. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly-converging walls or by a floor that slopes downward and tapers to a smaller cross-section; or
- D. Contains any other recognized serious safety or health hazard. Examples of serious safety or health hazards might include:
 - Fall hazards
 - Unguarded machinery
 - Extreme heat or cold
 - Steam pipes or chemical lines
 - Hazardous noise levels
 - Electrical hazards
 - Presence of asbestos
 - Potentially hazardous levels of dust

Because of the lack of ventilation in most confined spaces, there may be the potential for a hazardous atmosphere. Therefore, the space must be designated permit-required, and the procedures for making entry into a permit-required space must be followed. Examples of permit-required confined spaces include sewers, electrical vaults, steam tunnels, sump pits, certain mechanical rooms, some excavations, and other types of enclosures.

Any space that is accessed by lifting a manhole cover shall be considered a permit-required confined space unless EHS performs an assessment and determines otherwise. EHS shall provide the assessment upon request of the Entry Supervisor.

It may be determined that a space presents no real danger for employees. However, it is recommended that all spaces be considered potentially dangerous until they have been evaluated and tested.

Identifying Hazards in Confined Spaces

Once a space has been identified as a confined space, the hazards that may be present within the confined space must be identified. Confined-space hazards can be grouped into the following categories:

- 1) Oxygen-deficient atmospheres,
- 2) flammable atmospheres,
- 3) toxic atmospheres, and
- 4) mechanical and physical hazards.

Every confined space must be evaluated for these four types of hazards. The three types of atmospheric hazards are often the most difficult to identify since they might not be detected without the assistance of a gas monitor.

Oxygen-Deficient Atmospheres

The normal atmosphere is composed of approximately 21% oxygen and 79% nitrogen. An atmosphere containing less than 19.5% oxygen shall be considered oxygen-deficient. The oxygen level inside a confined space may be decreased as the result of either consumption or displacement.

There are a number of processes that consume oxygen in a confined space. Oxygen is consumed during combustion of flammable materials, as in welding, cutting, or brazing. A subtler consumption of oxygen occurs during bacterial action, as in the fermentation process. Oxygen can also be consumed during chemical reactions such as in the formation of rust on the exposed surfaces of a confined space. The number of people working in a confined space and the amount of physical activity can also influence oxygen consumption. Oxygen levels can also be reduced as the result of oxygen displacement by other gases.

Flammable Atmospheres

Flammable atmospheres are generally the result of flammable gases, vapors, dust mixed in certain concentrations with air, or an oxygen-enriched atmosphere.

Oxygen-enriched atmospheres are those atmospheres that contain an oxygen concentration greater than 22%. An oxygen-enriched atmosphere will cause flammable materials such as clothing and hair to burn violently when ignited.

Combustible gases or vapors can accumulate within a confined space when there is inadequate ventilation. Gases that are heavier than air will accumulate in the lower levels of a confined space. Therefore, it is especially important that atmospheric tests be conducted from the top to the bottom of all confined spaces.

The work being conducted in a confined space can have the potential to generate a flammable atmosphere. Work such as spray-painting, coating, or the use of flammable solvents for cleaning can result in the formation of an explosive atmosphere. Welding or cutting with oxyacetylene equipment can also be the cause of an explosion in a confined space and shall not be allowed without a hot work permit. Oxygen and acetylene hoses may have small leaks in them that could generate an explosive atmosphere and, therefore, should be removed when not in use. The atmosphere shall be tested continuously while any hot work is being conducted within the confined space.

Toxic Atmospheres

Toxic atmospheres may be present within a confined space as the result of one or more of the following:

- The Product Stored in the Confined Space

When a product is stored in a confined space, the product can be absorbed by the walls and give off toxic vapors when removed or when cleaning the residual material. The product can also produce toxic vapors that will remain in the atmosphere due to poor ventilation.

- The Work Being Conducted in the Confined Space

Toxic atmospheres can be generated as the result of work being conducted inside the confined space. Examples of such work include: welding or brazing with metals capable of producing toxic

vapors, painting, scraping, sanding, etc. Many of the solvents used for cleaning and/or degreasing produce highly toxic vapors.

- **Areas Adjacent to the Confined Space**

Toxic fumes, dusts, or vapors produced by processes near the confined space may enter and accumulate in the confined space. For example, if the confined space is lower than the adjacent area and the toxic fume is heavier than air, the toxic fume may "settle" into the confined space.

Mechanical and Physical Hazards

Problems such as rotating or moving mechanical parts or energy sources can create hazards within a confined space. All rotating or moving equipment such as pumps, process lines, electrical sources, etc., within a confined space must be identified and appropriate safety considerations must be applied.

Physical factors such as heat, cold, noise, vibration, and fatigue can contribute to accidents. These factors must be evaluated for all confined spaces.

Excavations could present the possibility of engulfment. Employees shall be protected from cave-ins by sloping, benching, or shoring systems when the depth of the excavation is more than four feet, in accordance with 29 CFR 1926.652. See [Trenching and Excavation Program](#) for additional guidance. In some circumstances, air monitoring may also be required.

Confined Space Entry Program

Identifying All Confined Spaces

All confined spaces located within a department/facility or under the departments/facility's control should be identified. Once the space has been identified as confined, Environmental Health & Safety will assist in determining if a permit is required.

Preventing Unauthorized Entry

All employees shall be instructed by supervisors or their designated representatives that entry into a permit-required confined space is prohibited without an authorized permit.

Supervisors or their designated representatives shall instruct all employees to list their names on the authorized permit before they will be allowed to enter a permit-required confined space.

The Permit System

When a confined space must be entered, a permit shall be completed and authorized by department heads, supervisors, or their designated representatives prior to entry into the confined space. This permit shall serve as certification that the space is safe for entry. The permit shall contain the date, the location of the space, and the signature of the person providing the certification.

A permit shall not be authorized until all conditions of the permit have been met.

See Appendix A for a copy of the Permit Form.

Planning the Entry

The first step towards conducting a safe permit-required confined space entry is to plan the entry. This will allow for the identification of all hazards and for the determination of all equipment necessary to complete the project.

Gathering General Data

- Identify the confined space. Give the name and specific location of the confined space.

- Give the reason for entering the confined space. Be specific. Also, identify if hot work will be performed.
- Identify the contents of the confined space. This refers to any chemicals or other materials and energy sources that are usually present in the confined space.

Identifying the Hazards

NOTE: Atmospheric testing shall be conducted prior to entering permit-required confined spaces. It is recommended that the entry supervisor conduct these tests; however, any competent person in confined space entry may do so.

- The entry supervisor will determine the oxygen content and record this on the entry permit.
- The entry supervisor will determine flammable gas content and record this on the entry permit.
- The entry supervisor will determine levels of Hydrogen Sulfide (H₂S) and Carbon Monoxide (CO) and record them on the entry permit.
- If a toxic substance is suspected or determined to be in the confined space during testing by the entry supervisor, Environmental Health & Safety shall be contacted to assist in obtaining a Safety Data Sheet or other chemical information to determine what type of personal protective equipment is required, the potential health effects, the Permissible Exposure Limits, and any other information needed to safely conduct the work.
- Entry supervisors will determine mechanical and physical hazards. They should list all items and energy sources that will require lockout/tagout, blanking and bleeding, disconnecting, or securing. All physical hazards must be listed.

Ventilation of the Confined Space

Indicate whether mechanical or natural ventilation will be used. Describe the procedures to be used.

NOTE: If mechanical ventilation is to be used, the exhaust must be pointed away from personnel or ignition sources. Also, mechanical ventilators should be bonded to the confined space if possible.

Isolating the Confined Space

Describe the procedures for disconnecting equipment or lockout/tagout. All mechanical, electrical, or heat-producing equipment should be disconnected or locked and tagged out. This would also include any pumps that pull fluid from, or pump fluid into, the confined space.

Purging/Cleaning the Confined Space

Indicate if the confined space will be purged. Purging with inert gas is not recommended. If the space must be purged, describe the procedures.

Indicate the type of cleaning methods to be used. If chemical cleaners are to be used, name the type and describe the procedures. The Safety Data Sheets for the chemical should be consulted prior to use.

NOTE: When introducing a chemical into a confined space, the compatibility of that chemical with the contents of the confined space must be checked. If in doubt, consult with Environmental Health & Safety.

Placement of Warning Signs

Indicate if warning signs or barriers will be needed to prevent unauthorized entry or to protect workers from external hazards. If the confined space will be left open and unattended for any length of time, warning signs and barriers such as barricades and/or caution tape will be required.

Identifying All Personnel

List all employees that will be required to prepare the confined space and complete the work inside the space.

Identifying Necessary Equipment

List all equipment that will be necessary to complete the project.

Conducting Pre-Entry Meeting/Briefing

Once the entry has been planned, the entry supervisor must confirm that employees involved have received permit confined space training.

Prior to entry, the entry supervisor must review the following with all workers involved:

- Identify the confined space and the reason(s) for entry.
- Identify work detail and work to be performed.
 - Assign each employee the job(s) he/she is to perform in the entry project.
 - If an employee is required to use a piece of equipment, be sure that he/she is capable of using the equipment properly.
 - Inform all personnel that no one is to enter the confined space unless the attendant is present at the work site.
- Inform entrants of all known or suspected hazards
 - Inform personnel of any access or exit problems.
 - Inform personnel of all equipment that must be locked out or tagged out.
 - Inform personnel of the contents of the confined space.
 - Inform personnel of all atmospheric levels that must be maintained before entering and while working in the confined space.
 - ***If a toxic atmosphere or substance is present or could become present, the following additional information must be conveyed to entrants (Environmental Health and Safety shall be contacted to assist with evaluating toxic atmospheres, conducting an exposure assessment, and training):***
 - If respiratory protection is not going to be used, inform personnel of the maximum permissible exposure level (PEL) that can exist within the confined space and the method used to monitor PEL.
 - Inform personnel of the potential health effects of exposure to the toxic atmosphere or substance.
 - Inform personnel of the signs and symptoms of exposure to the toxic atmosphere or substance.
 - Inform personnel of the personal protective equipment (PPE) that they will be required to wear.
 - If entrants are unaware of the proper use of the PPE, they must be trained in the proper use of this equipment.
- Identify isolation procedures
 - Inform the personnel responsible for the lockout/tagout of all equipment that must be isolated.

- Inform the personnel responsible for performing this function of the methods to be used.
- Identify purging and/or ventilation procedures
 - Inform all personnel responsible for performing this function of the methods to be used.
- Identify all equipment needed
 - Inform personnel involved in the project of all equipment that will be necessary to complete the project.
 - Make sure that all employees are capable of using their assigned equipment properly.
- Determine necessary personal protective equipment
 - Inform personnel of all PPE that must be used to ensure their safety.
 - Make sure that all personnel required to use PPE are trained in the proper use of the equipment.
- Establish communication
 - Inform all entrants that they are required to maintain communication with the attendant.
 - Inform attendant that he/she must maintain constant contact with all entrants.
 - Inform personnel of the type of communication they are to use.
- Protect from external hazards
 - Inform personnel where signs and barriers will be placed to prevent unauthorized entry and protect entrants from external hazards.
- Pre-plan rescue procedures
 - The designated attendant(s) should be informed of the rescue procedures to be followed.
 - The attendant should be informed that he/she can have no other duty but to maintain contact with personnel inside the confined space.
 - Inform the attendant(s) that they must not enter the confined space under any circumstances.
- Place the confined space back into service
 - Inform personnel of the steps to be taken to place the confined space back into service.

Preparing the Permit-Confined Space for Entry

Once the entry has been planned and personnel have been trained, the next step is to prepare the confined space for entry.

The following steps are to be followed when preparing the confined space for entry:

- Place warning signs or barriers around the confined space to prevent unauthorized entry as necessary.
- Place all tools, safety equipment, monitoring equipment, etc., near the confined space.
- Isolate all mechanical and/or electrical hazards as necessary.
- Purge/ventilate the confined space as necessary.
- Test the atmosphere using an appropriate gas monitor.
 - If oxygen content is less than 19.5% or greater than 21.5%, perform additional ventilation. Then shut off ventilation equipment and re-test the oxygen content.
 - If oxygen content is between 19.5% and 21.5%, continue entry preparation and continue ventilation and monitoring.
- Test for flammable gases.

- If the meter reading is less than 10% of the lower explosive limit (LEL), continue entry preparations.
- If the meter reading is above 10% of the LEL, continue ventilation of the confined space. Then shut off the ventilation and have the atmosphere re-tested.
- If the meter reading is still above 10% of the LEL, the confined space must be cleaned before entry is permitted.
- Test for toxics. If a toxic atmosphere is present, no person should be permitted to enter the confined space at a level exceeding the Permissible Exposure Limit without proper Personal Protective Equipment. Environmental Health & Safety must be called to assist in identifying proper precautions and the protective measures to be taken.
- Assemble all personnel involved and review rescue procedures. The entry supervisor will then add any needed information, then complete and sign the permit.
- Notify the Department Head or supervisor that entry is commencing.

Utilizing Safety Equipment

Where practical, all personnel entering a confined space should be equipped with a retrieval line secured at one end to the entrant by a full-body harness with its other end secured to a tripod lifting hoist or similar retrieval device, unless it creates a greater hazard

Atmospheric Testing Procedures

- For the testing equipment, all of the manufacturer's operating instructions must be followed.
- The test equipment should be tested in a known atmosphere to ensure its accuracy.
- Ventilation equipment must be shut off before conducting any atmospheric tests.
- The atmosphere must be tested at the bottom, top, and middle of all confined spaces at approximately one foot intervals.
- The atmosphere must be continuously monitored while work is being conducted in the confined space.
- If the confined space is left for any reason, the atmosphere must be re-tested before re-entering the space.

Rescue Procedures

In the event of an emergency, the attendant shall:

- Immediately summon the local Fire Department (Dial 911).
- Attempt to remove the victim by use of the retrieval line from outside the confined space if this can be accomplished without creating further hazards for the entrant or the attendant.
- If the attendant is able to remove the victim with the retrieval line, he/she should administer aid within the limits of his/her training until the Fire Department arrives.
- If the attendant is unable to remove the victim by using the retrieval line, he or she must wait for help to arrive. The attendant(s) is not to enter the confined space for any reason.
- Provide Fire Department personnel any information they request.

Forms

[Appendix A- Confined Space Entry Permit.pdf](#)

[Appendix B- Confined Space Entry Planning Worksheet.pdf](#)

Other references

[N.I.O.S.H. Training and Resource Manual - *Safety and Health in Confined Workspaces for the Construction Industry*](#)

[N.I.O.S.H. 87-113 - *A Guide to Safety in Confined Spaces*](#)