UC Santa Barbara
Confined Space Program Manual

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I. Purpose/Introduction

Working in confined spaces poses an increased hazard to workers for a variety of reasons. Hundreds of workers are injured or killed while working in confined spaces each year. An estimated 60% of the fatalities have been among the would-be rescuers. The principle objective of the UCSB Confined Space Program is to establish practices and procedures that will ensure the health and safety of employees entering and working in campus confined spaces. This objective is met by:

1. Identifying all campus confined spaces
2. Determining which spaces are permit-required confined spaces.
3. Posting appropriate signage and providing training so individuals will recognize confined spaces and will not enter unless authorized.
4. Authorizing individuals to work in confined spaces and ensuring they have received proper training.
5. Implementing a permit system to ensure safe and legal entry into permit-required confined spaces.

This program has been designed to comply with Cal/OSHA Section 5157. Telecommunication utility manholes/vaults are regulated under Cal/OSHA Section 8616.

II. Applicability/Scope

The UCSB Confined Space Program, through the requirements described in this manual, establishes procedures and responsibilities for UCSB students, faculty, staff and volunteers while engaged in University related activities. These requirements are based on the California Code of Regulations, Title 8, Section 5157, Permit-Required Confined Spaces.

III. Responsibilities

A. Department Heads and Chairs

Directors and Department Chairs are responsible for:

- Ensuring departmental compliance with campus health and safety policies and procedures;
- Providing the necessary resources to ensure the health and safety of their employees;
- Identifying individuals as supervisors and ensuring they are trained on their health and safety responsibilities; and
- Ensuring departmental workplace hazards are identified and controlled.

B. Space Owners (Departments, PIs)

Space owners are responsible for:

Space Identification

It is the space owner’s responsibility ensure spaces under their control are identified, and evaluated and classified by the Confined Space Program Manager. Each department shall designate an individual or individuals to assist with this inventory and evaluation. The survey shall:

- Conducted by the space owner (department) in conjunction with EH&S.
- Include an assessment of any real or potential hazards within the space.
- Describe how hazards present will be mitigated prior to entry if entries are to take place.

A confined space inventory shall be maintained by each department with confined spaces. A master inventory for the campus will be maintained current by EH&S, with updates initiated by the Space Owner as needed.
Labeling

Signage for non-permit required confined spaces is not required, however it is recommended for spaces that may be accessed by untrained personnel. Recommended signage is as follows:

**CAUTION**
**CONFINED SPACE**
**AUTHORIZED PERSONNEL ONLY**

Permit-required spaces, which could be inadvertently entered, shall be labeled as a permit-required confined space using the following language:

**DANGER**
**PERMIT-REQUIRED CONFINED SPACE**
**DO NOT ENTER**

Contractor Awareness

When the Department arranges to have employees of another employer perform work that involves confined space entry, the Department shall:

- Inform the contractor, in writing, that the workplace contains confined spaces and that permit space entry is only allowed through compliance with a permit space program meeting the requirements set forth by Cal/OSHA (e.g. California Code of Regulations, Title 8, Section 5157).
- Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of campus employees in or near the confined space where contractor personnel will be working.
- Apprise the contractor of the elements, including the hazard(s) identified and the campus’s experience with the space, that make the space in question a permit-required confined space.
- Coordinate entry operations with the contractor when both campus personnel and contractor personnel will be working in or near confined spaces.
- Consult with the contractor at the conclusion of entry operations regarding any hazards confronted or created in confined spaces during entry operations.

All records associated with the above section shall be maintained as a part of the permanent record with the terminated entry permit(s).

EH&S Notification

Departments shall notify EH&S immediately if the following occurs:

- Unauthorized entry of a permit space.
- The occurrence of an injury or near-miss during a confined space entry.
- A change in the use or configuration of a permit space.
- Employee concerns about the effectiveness of this program.

C. Managers, Supervisors, and Principal Investigators

Supervisors have the primary responsibility for ensuring the health and safety of their supervisees. Specific confined space responsibilities include:

- Identifying confined spaces that their employees may enter and ensuring they have been classified;
- Designating persons who are to have active roles (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry
operations, identify the duties of each such employee and provide each such employee with the training required;

- Ensuring their employees are properly trained and training is documented;
- Ensuring all hot work is authorized through the Campus Fire Marshal on a separate hot work permit and attached and noted on the entry permit;
- Ensuring a copy of all entry permits is retained by the department and a copy is also submitted to the EH&S Confined Space Program Manager;
- Developing and implementing special procedures for confined space entry as needed.

D. Outside Contractors

A copy of UCSB’s Confined Space Program will be made available to contractors upon request. Contractors are expected to fully comply with safety and health standards issued by the California Department for Occupational Safety and Health (Cal/OSHA). Each contractor who is retained to perform work that will require permit space entry operations shall:

- Furnish a written permit space program that complies with Cal/OSHA regulations;
- Obtain any available information regarding permit space hazards and entry operations from the Department;
- Coordinate entry operations with the Department when both the contractor and campus personnel will be working in or near permit spaces;
- Inform the Department, either during a debriefing or during entry operations, of the procedures that the contractor will follow and of any hazards confronted or created in permit spaces.

E. Employees, Students, and Volunteers

Employees, Students and Volunteers are responsible for:

- Understanding and complying with campus health and safety policies and procedures;
- Notifying their supervisor or EH&S about any hazardous conditions observed on the worksite.

F. Environmental Health and Safety (EH&S)

The UCSB Confined Space Program is administered by EH&S. EH&S will function as a technical resource to departments and will assist them in carrying out their responsibilities as necessary. Specifically, EH&S is responsible for:

- Developing and maintaining the UCSB Confined Space Program, and ensuring it meets all applicable regulatory requirements;
- Assisting departments in identifying and classifying confined spaces;
- Assisting with atmospheric testing and equipment selection as needed;
- Developing and providing confined space entry training;
- Reviewing all entry permits on an annual basis;
- Maintaining a master list of campus confined spaces;
- Assessing the effectiveness of the program as described in this document.

IV. Definitions

“Acceptable entry conditions” means the conditions that must exist in a space to allow entry and to ensure that employees involved with a confined space entry can safely enter into and work within the space.

“Atmosphere-controlled confined space” means a permit-required confined space in which potential or actual atmospheric hazards can be eliminated prior to entry or can be controlled with continuous forced mechanical ventilation.
“Attendant” means an individual stationed outside the permit spaces who monitors the authorized entrants and who performs attendant’s duties as required by this program.

“Blanking or blinding” means 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.

“Cal/OSHA” means California Department for Occupational Safety and Health.

“Confined space” is any space that is large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy. Confined spaces include, but are not limited to: storage tanks, pits, vats, vessels, environmental chambers, sewer manholes, electrical manholes, vaults, pump or lift stations, septic tanks, boilers, pipelines, tunnels, ventilation and exhaust ducts, trenches, and excavations.

“Control Measures” means a system or device used, or action taken, to control or prevent the introduction of physical hazards into a confined space.

“Department” means any Campus department that performs work in a confined space or permit-required confined space. This includes, but is not limited to: Facilities Management, Design and Construction Services, Communications, and EH&S.

“Department Safety Coordinator” means the person(s) designated by the department to ensure that entries are conducted according to this program. The Department Safety Coordinator will, in cooperation with EH&S, assist in the evaluation of confined space hazards, provide documentation of all program record keeping requirements related to this program, will ensure that entry conditions are monitored and that hazards are properly controlled and will participate in the annual review of permits conducted by EH&S.

“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.

“Emergency” means any occurrence or event inside or outside of the permit space that could endanger entrants.

“Engulfment” means the surrounding of a person by finely divided solids or a liquid. A worker in a storage tank filled with sawdust, for example, could fall into an air pocket, be completely surrounded by sawdust, and suffocate to death.

“Entrant” means any employee or contractor who enters a confined space.

“Entry” means any action resulting in any part of the employees’ body breaking the plane of any opening of a confined space, and includes any work activities inside the confined space.

“Entry Permit” means the employers’ written authorization for employee entry into a confined space under defined conditions for a stated purpose during a specified time.

“Entry Supervisor” or “Supervisor” means the departmental person responsible for determining if acceptable entry conditions are present in a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this document.
“Ground-fault circuit-interrupter” is a device designed to disconnect an electric circuit when it seeks ground through a person or grounded object, thus preventing electric shock and fires.

“Hazardous Atmosphere” means an atmosphere presenting a potential for death, disablement, 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).
- An oxygen deficient atmosphere containing less than 19.5% oxygen by volume or an oxygen enriched atmosphere containing more than 23.5% oxygen by volume.
- Airborne combustible dust at a concentration that meets or exceeds its LFL (airborne combustible dust which obscures vision at five feet or less).
- An atmospheric concentration of any substance for which a dose is published in Group 14 for Radiation and Radioactivity, or a permissible exposure limit is published in Section 5155 for Airborne Contaminants which could result in an employee exposure in excess of its dose or permissible exposure limit, and that could cause death, incapacitation, impairment of ability to self-rescue, injury or acute illness.
- Any other atmospheric condition that is immediately dangerous to life or health (IDLH).

“Hot work permit” means the employer’s written authorization to perform operations (for example, welding, cutting, burning or heating) capable of providing a source of ignition.

“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 (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. Note that this procedure produces an IDLH oxygen deficient atmosphere that can only be entered using self-contained breathing apparatus (SCBA).

“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 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.

“Line breaking” means 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.

“Lockout-tagout” means placing locks or tags on the energy isolating device (e.g. breaker boxes, control switches, valves, etc.) to prevent the unauthorized re-energization of the device or circuit while work is being performed by personnel. Tags shall indicate that the energy isolated device shall not be operated until the tag is removed by the individual(s) that installed the tag.

“Non-permit confined space” means a confined space that does not contain or have the potential to contain any hazard capable of causing death or serious physical harm.

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

- Contains or has the potential to contain a hazardous atmosphere.
- Contains a material that has the potential for engulfing an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section or
- Contains any other recognized serious safety or health hazard (such as noise, welding, electricity, radiation, or moving parts of machinery).

“Permit-required confined space program” means the campus’s overall program for controlling and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

“Permit system” means the campus’s written procedures for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

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

“Qualified person” means an entry supervisor who is trained to recognize and evaluate the anticipated hazard(s) of the confined space and who shall be capable of specifying necessary control measures to assure worker safety.
- The department shall designate an employee(s) as a qualified person for the purposes of assuring safe confined space entry procedures and practices at a specific site. The qualified person may also be an entrant when permissible according to this standard.
- Where the department is unable to designate a qualified person, then the department shall coordinate work activities with the Safety Coordinator or their designee.

“Rescue Team” mean those persons whom the employer has designated prior to any permit-required confined space entry to perform rescues from confined spaces.

“Retrieval System” means the equipment used for non-entry rescue of persons from permit spaces, and includes retrieval lines, chest or full body harness, and a lifting device or anchor. A retrieval line is primarily of use in vertical confined spaces, and shall not be used in confined spaces consisting of horizontal tunnels or spaces where obstructions could increase the hazard to the entrant during emergency non-entry removal.

“Testing,” means the process by which the hazards that may confront entrants to a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

“Zero Mechanical State” means that the mechanical potential energy of all portions of the machine or equipment is set so that the opening of the pipe(s), tube(s), hose(s) or actuation of any valve, lever, or button will not produce a movement which could cause injury.

V. Confined Space Classification and Hazards

Confined spaces can be below or above ground, and may be found in almost any workplace. A confined space, despite its name, is not necessarily small. Examples of confined spaces include silos, vats, hoppers, utility vaults, tanks, sewers, pipes, access shafts, truck or rail tank cars, aircraft wings, boilers, manholes, manure pits and storage bins. Ditches and trenches may also be a confined space when access or egress is limited.

A. Space Classification

All confined spaces must be evaluated and classified as a non-permit or permit-required confined space. A non-permit required confined space meets the definition of a confined space, but does not have any additional known or potential hazards. A permit-required confined space is a confined space with one or more actual or potential hazard. Below are the legal definitions of the two classifications of confined spaces:
A confined space is a space which has all three of the following characteristics:

1. Large enough for an employee to enter and perform assigned work; and
2. Has limited or restricted means for entry or exit; and
3. Is not designed for continuous employee occupancy.

A permit-required confined space (PRCS) is a confined space that has one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere;
2. Contains a material that has the potential for engulfing an entrant (e.g. water, sand, dirt);
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 (such as electricity, biological hazards, radiation hazards, or moving parts of machinery).

B. Confined Space Hazards

The following are common confined space hazards that would require a space to be classified as a permit-required confined space:

Hazardous Atmospheres

Hazardous atmospheres are atmospheres presenting a potential for death, disablement, impairment of ability to self-rescue, injury, or acute illness. These may occur when the lack of adequate mechanical or natural ventilation or the presence of stored or introduced materials (such as chemicals), or the work process being performed in a confined space causes, or has the potential to cause, one or more of the following:

Oxygen-Deficient Atmospheres: An oxygen-deficient atmosphere has less than 19.5% available oxygen. Any atmosphere with less than 19.5% oxygen shall not be entered unless personnel have been properly trained and have an approved self-contained breathing apparatus (SCBA). This is an atmosphere that is Immediately Dangerous to Life and Health (IDLH). Oxygen deficient atmospheres may develop in the following situations:

- Ambient oxygen is consumed by the work being performed, such as welding, cutting or brazing, or it can be decreased by certain chemical reactions (for example, the rusting of metal) or through bacterial action.
- Ambient oxygen is displaced by another gas, such as carbon dioxide or nitrogen (inerting).

Oxygen-Enriched Atmospheres: Oxygen enrichment refers to air containing more than 23.5 percent oxygen. This dangerous condition is an extreme fire hazard in which static electricity from materials such as hair or clothing can provide the ignition source needed to start a fire. This environment also allows any fire to burn more readily. Oxygen enrichment does not occur naturally and should be investigated.

Flammable atmospheres: Different gases have different flammable ranges. An atmosphere is considered hazardous if the concentration of any substance exceeds 10% of its lower explosive limit (LEL). If a source of ignition (such as a sparking or electrical tool) is introduced into a space with a flammable atmosphere, an explosion will result. For an atmosphere to be flammable there must be:

- A sufficient amount of oxygen, or other oxidizing gases, in the air; and
- A flammable gas, vapor, or dust present in the proper proportion.

Toxic atmospheres: Most substances (liquids, vapors, gases, mists, solid materials, and dusts) can present a hazard in a confined space. Toxic atmosphere contain an atmospheric concentration of one or more
substances at or above their Permissible Exposure Limit (PEL), and include any other atmospheric condition that are IDLH. Toxic substances can come from the following:

- A product stored in the space.
- The work being performed in the space. Examples include welding, cutting, brazing, painting, scraping, sanding, degreasing, use of solvents, etc.
- Toxic materials stored in areas adjacent to the confined space. Examples include chemicals or fuel stored in leaking underground storage tanks, or sections of the steam tunnels that may overlay or lie adjacent to a leaking sewer system.

**Non-Atmospheric Hazards**

Additional hazards which may require a confined space to be classified as a permit-required confined space:

**Mechanical Hazards:** Moving equipment or parts and energized or pressurized systems can be dangerous. Examples include shafts, couplings, gears, belts, conveyors, mixers, rotors, and compressing devices. A permit space must be isolated, or removed from service, and completely protected against the release of energy or materials into the space. This is accomplished by:

- Blanking, blinding, misaligning or removing sections of lines, pipes or ducts;
- A double block and bleed system;
- Lockout or blockout of all sources of energy, including mechanical, electrical, chemical, pressurized systems, thermal (e.g. systems which operate at a temperature, either hot or cold, that could cause physical injury upon contact) or potential (for example, elevated platforms that could shift and then lower upon an entrant);
- Blocking or disconnecting all mechanical linkages to prevent movement.

**Entrapment Hazards:** Examples of entrapment hazards in confined spaces include inwardly converging walls or floors that slope downward and taper to a smaller cross-section (such as air plenums).

**Engulfment Hazards:** This refers to the surrounding or burial of the worker in a liquid or loose, finely divided solid material, such as sand or grain. Such materials can suffocate a worker. Examples include:

- Accidental dumping of a product on a worker.
- A worker walking on unstable material such as settled grain.

**Thermal Hazards:** A thermal hazard is a dangerous condition caused by excessive heat or cold or a hot surface. Employees engaged in continuous heavy work while wearing PPE (e.g., body suit and respirator) in warm surroundings are particularly susceptible to thermal hazards. Heat stress may lead to heat exhaustion, heat cramps, heat stroke, loss of consciousness, or death. A confined space entry permit must address any hazards from heat or cold within confined spaces.

**Other Hazards:** Snakes, rodents, spiders, poor lighting, obstructions, falling objects, wet surfaces, trip/slip and fall hazards, electrical shock, radioactive and acute chemical hazards may also need to be addressed.

**VI. Training**

Departments are responsible for ensuring their employees are properly trained prior to entering or performing work in confined spaces. Training must be documented and training records shall be kept for as long as it is reasonably expected an employee will be working in confined spaces. The costs associated with any necessary equipment or training contracted outside of EH&S shall be borne by the Department.
A. All Confined Space Work

All personnel involved in confined space work shall receive appropriate training in hazard recognition, personal protective equipment, safety equipment, communications equipment, procedures for calling rescue services and proper use of non-entry rescue equipment as needed. This training shall:

- Be conducted before the employee engages in confined space duties, when there is change in assigned duties, whenever there is a change in operations that presents a hazard about which an employee has not previously been trained and whenever the employer has reason to believe either that there are deviations from confined space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.
- Establish employee proficiency in their duties and introduce new or revised procedures as necessary.
- Be documented and contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.
- Include conditions or work practices that may produce a hazard in a non-permit confined space that may require that the space be reevaluated by the entry supervisor prior to entry.

B. Permit-Required Confined Space Work

Specialized training is required based upon an individual’s role when entering a PRCS. Specialized training including duties and responsibilities shall be provided for the following roles:

**Entrants**

Employees and contractors who enter a confined space shall be trained on the following:

- The hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- How to properly use all equipment and necessary PPE.
- How to communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space.
- To 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.
- Exit from the permit space as quickly as possible whenever:
  - An order to evacuate is given by the attendant or the entry supervisor,
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
  - The entrant detects a prohibited condition, or
  - An evacuation alarm is activated.

**Attendants**

The individual stationed outside the permit spaces who monitors the authorized entrants and who performs attendant’s duties as required by this program shall be trained on the following:

- The hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Possible behavioral effects of hazard exposure in authorized entrants.
- How to continuously maintain an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants is available and correct.
• How to communicate with authorized entrants to monitor entrant status and to alert entrants of the need to evacuate the space.
• Their responsibility to remain outside the permit space during entry operations until relieved by another attendant.
• To not perform other duties that might interfere with their primary duty to monitor and protect the authorized entrants.
• How to monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space, and to order the authorized entrants to evacuate the permit space immediately under any of the following conditions:
  o If the attendant detects a prohibited condition.
  o If the attendant detects the behavioral effects of hazards exposure in an authorized entrant.
  o If the attendant detects a situation outside the space that could endanger the authorized entrants, or
  o If the attendant cannot effectively and safely perform all the duties required.
• How to initiate on-site rescue procedures and, if necessary, summon additional rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
• To take the following actions when unauthorized persons approach or enter a permit space while entry is underway:
  o Warn the unauthorized persons that they must stay away from the permit space.
  o Advise the unauthorized persons that they must exit immediately if they have entered the permit space and
  o Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
• Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
• How to perform non-entry rescues if required.

Entry Supervisors

The departmental person responsible for determining if acceptable entry conditions are present in a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this document. The entry supervisor may also perform the roles of the attendant. The entry supervisor shall be trained on and is responsible for:

• Ensuring each entry is performed in a safe manner.
• Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
• Ensuring the entry permit filled out completely and correctly.
• Verifying that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
• Ensuring all hot work is authorized through the Campus Fire Marshal on a separate hot work permit, which should be attached and noted on the entry permit.
• Signing the permit prior to allow entry and ensuring that entry operations remain consistent with the terms on the permit. The entry shall be terminated if a potential hazardous situation occurs which exceeds the conditions authorized on the permit.
• Ensuring the permit is available at the work site outside the confined space.
• Verifying that emergency and rescue services are available and that the means for summoning additional services are operable.
• Notifying unauthorized individuals who enter, or attempt to enter, the permit space during entry operations to leave.
• Terminating the entry and canceling the permit when entry operations covered by the entry permit have been completed, or when a condition that is not allowed under the permit arises in or near the permit space.
• Ensuring a copy of all completed entry permits are turned in to the departmental supervisor and EH&S.

VII. Confined Space Entry Procedures

A. Non-Permit Confined Space Entry Procedures

Employees must notify their supervisor prior to entering and performing work in confined spaces and should work in pairs whenever possible. The following procedures shall be followed prior to entering any confined space:

• Any condition making it unsafe to remove an entrance cover will be eliminated before the cover is removed.
• When the cover has been removed, the opening(s) shall be promptly guarded to prevent accidental fall into the opening and prevent objects from falling into the opening.
• Appropriate vehicle and pedestrian barriers shall be used.
• All safety policies and procedures shall be followed.
• Metal ladders shall not be used when working around electrical equipment.
• There shall be no smoking in a confined space.
• Adequate lighting must be provided and used.
• Personal protective equipment shall be provided and worn as necessary for safe entry into confined space.
• Any use of chemicals must be pre-approved by the Supervisor, in consultation with EH&S.
• Safety Data Sheets (SDSs) shall be available for all hazardous materials used or may be encountered during the entry.
• Welding, soldering, cutting, or other hot work must be pre-approved by the Supervisor in consultation with EH&S, and requires a Hot Work Permit approved by the Campus Fire Marshal.
• Contractors who send their employees into confined spaces under the control of UCSB will be informed of the potential hazards, safety rules, and emergency procedures by the department.

When there are changes in the use of a non-permit confined space or if hazards are introduced to the space, the space shall be reevaluated and classified as a permit-required space if necessary. The entry supervisor and/or EH&S shall be consulted to reevaluate and reclassify confined spaces as necessary depending upon the work activities to be performed in spaces. For example, reclassification would be required:

• During application of solvents, paints, chemicals or other materials that could potentially create a hazardous atmosphere in a confined space.
• During welding, cutting, brazing or soldering in some confined spaces with limited ventilation.
• If any other real or potential hazards are introduced into the space.

B. Permit Confined Space Entry Procedures

***Permit-required confined spaces shall only be entered after all hazards have been eliminated and the space has been reclassified into non-permit required confined space. If a space cannot be reclassified the entry shall not take place.***

Reclassification of a Permit-Required Confined Space to a Non-Permit Required Confined Space
All permit-required confined spaces shall be reclassified to non-permit required confined spaces prior to entry. If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as all hazards remain eliminated. Control of atmospheric hazards through forced air ventilation alone does not constitute an elimination of the hazard. The department shall document the basis for determining that all hazards in a permit space have been eliminated on the entry permit. If it is necessary to enter the space to remove any residual hazards, then the entry shall not take place. If hazards arise within a permit space that has been declassified to a non-permit space, employees shall exit the space immediately. The entry supervisor and EH&S shall then be notified and the space must be reevaluated prior to reentry. The permit space may be reclassified as a non-permit confined space for as long as all hazards are eliminated. Examples of hazard elimination are as follows:

- 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.
- Emptying tanks/vessel to remove engulfment hazards.
- Opening all access ports to allow for temperature reduction and natural ventilation.

In addition to the items listed in the Non-Permit Confined Space Entry Procedures section, the entry supervisor shall ensure the following procedures are performed prior to entering a reclassified permit-required confined space:

- The entry supervisor shall designate the persons who are to have active roles (authorized entrants, attendants, and atmospheric testing personnel) in entry operations and ensure they have received adequate training.
- An entry permit must be completed by a qualified person and signed by the entry supervisor. The entry permit shall be kept outside of the confined space and made available to the authorized entrants for review. The entry permit shall document the steps taken to mitigate hazards and reclassify the space into a non-permit space.
- Pre-entry atmospheric testing is completed and document in accordance with Subsection C.
- A tripod or other non-entry retrieval equipment shall be setup if it is possible to use the equipment to safely rescue an entrant from a confined space. Entry supervisors are responsible for ensuring individuals are trained in emergency and rescue procedures, and that authorized entrants don harnesses prior to entering the space.

During the entry:

- At least one attendant shall be stationed outside the permit space into which entry is authorized for the duration of entry operations.
- Atmospheric testing is completed and documented in accordance with Subsection C.
- The entry supervisor or attendant shall cancel the permit and end the entry immediately if any of the following occur during the entry:
  - A hazard is detected within the space, or
  - A condition prohibited by the permit arises.

Additionally, the entry supervisor shall ensure:

- The duration of the permit does not exceed the time required to complete the assigned task of job identified on the permit.
- The entry permit shall be terminated when:
  - The 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.
- A copy of all completed entry permits must be submitted to the departmental supervisor and EH&S Confined Space Program Manager.
Alternate Procedures: Atmosphere-controlled Permit-Required Confined Space Entry

If the space cannot be reclassified otherwise and the only hazard posed by the permit space is an actual or potential hazardous atmosphere that can be controlled by continuous forced air ventilation alone, then employees may enter the space without retrieval equipment. EH&S must be consulted and approve this type of entry. The entry supervisor shall ensure the following:

- Flammable and toxic air contaminants must be less than 50% of a “hazardous atmosphere” to qualify as an atmosphere-controlled space. Employees may not enter the space until this condition is met.
- Continuous monitoring must be performed. Monitoring results must be documented on the entry permit every 15 minutes.
- Forced air ventilation shall be directed to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space.
- The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.
- There may be no hazardous atmosphere within the space whenever any employee is inside of the space. If a hazardous atmosphere is detected during entry:
  - Each employee shall leave the space immediately.
  - The space shall be evaluated to determine how the hazardous atmosphere developed and
  - Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
- The entry supervisor shall verify that the space is safe for entry and document pre-entry safety precautions taken and air monitoring results on the entry permit.
- All other applicable confined space and PRCS entry procedures must be followed.

C. Atmospheric Testing Procedures

Atmospheric testing is required prior to entering all reclassified permit-required confined spaces. It is also recommended prior to entering a non-permit required confined spaces, and is required if a potential atmospheric hazard is introduced into the space during entry. Properly calibrated direct reading gas monitors shall be used for all atmospheric testing. Additionally, direct reading gas detector tubes or other acceptable means may also be used to test potentially toxic atmospheres as needed. Only personnel who have successfully completed training, provided or approved by EH&S, may perform atmosphere testing. Atmospheric testing instruments shall be calibrated on a schedule and in the manner recommended by the manufacturer, and be field checked immediately prior to use to ensure that it is operating properly. Any atmospheric testing instrument that has not been calibrated within thirty (30) days shall be recalibrated or bump tested by the EH&S prior to use. Copies of calibration records will be kept by the EH&S Industrial Hygiene Program.

Non-Entry Conditions

If any of the following atmospheric conditions are encountered before or during the entry, the permit shall be canceled and entry shall not take place:

- Oxygen levels below 19.5% or greater than 23.5% by volume.
- Combustible gas levels greater than 10% of the lower explosive limit (LEL).
- Hazardous substance levels exceeding Cal/OSHA or American Conference of Governmental Industrial Hygienists (ACGIH) limits, or where exposure could result in death, acute illness or impairment of ability to self-rescue. (Department to consult with EH&S in identifying these substances.)
- Airborne combustible dust or other particulates obscures vision to five feet or less, or
- Any atmospheric condition recognized as immediately dangerous to life or health (IDLH) is present.
Pre-entry Atmospheric Testing

The atmosphere in all permit-required confined space atmospheres shall be tested for oxygen concentration, combustible gases, carbon monoxide, hydrogen sulfide and any known or suspected toxic or hazardous substances prior to entry. Pre entry sampling shall be conducted from outside of the space and cover various levels within the space (i.e. at least top, middle and bottom), and around all conduits, pipes, or cables. Intrinsically safe equipment shall be used if a flammable atmosphere is present, or is suspected of being present. All atmospheric testing results shall be recorded on the entry permit. If more than 15 minutes have elapsed between pre-entry atmospheric testing and the actual entry, all tests shall be reperformed prior to entry.

Post-entry Atmospheric Testing

Continuous monitoring shall be conducted for oxygen, combustible gases, carbon monoxide, hydrogen sulfide and any known or suspected toxic or hazardous substances during all permit-required confined space entries. All monitoring devices shall be equipped with an audible alarm. Testing results shall be recorded on the permit at least every 15 minutes during entry. Both the entry supervisor and EH&S shall be notified immediately if an unacceptable atmospheric condition is encountered during entry.

VIII. Telecommunications

This section applies to manholes and street openings, where telecommunications field work is performed on or with underground lines. If hazards exist that cannot be controlled permit-required confined space procedures shall be followed. Before an employee enters a manhole or unvented vault, the following steps shall be taken:

- When covers of manholes or vaults are removed, the opening shall be promptly guarded by a railing, temporary cover, or other suitable temporary barrier which is appropriate to prevent an accidental fall through the opening and to protect employees working in the manhole from foreign objects entering the manhole.
- The internal atmosphere shall be tested for oxygen, combustible gases, carbon monoxide, hydrogen sulfide and any other known or suspected hazardous substances.
- While work is being performed in a manhole occupied jointly by an electric utility and a telecommunication utility, an employee with basic first-aid training shall be available in the immediate vicinity to render emergency assistance as may be required. The employee whose presence is required in the immediate vicinity for the purposes of rendering emergency assistance is not to be precluded from occasionally entering a manhole to provide assistance other than in an emergency.
- Portable reinforced plastic ladders having non-skid rungs shall be used to enter and exit manholes exceeding 4 feet in depth. No metal ladders shall be used.

IX. Rescue Procedures

UCSB employees shall not enter confined spaces to perform rescue under any circumstances unless properly trained to do so. If rescue is necessary during an entry the following procedures shall be followed:

1. The attendant shall immediately call the UCSB police dispatcher (893-3446) if on campus, and 911 if off campus, to inform them that a confined space emergency has occurred. EH&S should also be notified.
2. After notifying emergency services, the attendant will attempt to retrieve the entrant using the retrieval line or other non-entry procedures if applicable. Under no circumstance will the attendant or any other person enter the confined space until emergency services have arrived. All individuals
participating in the rescue effort must have received training in confined space rescue techniques provided, or approved by EH&S.

3. If entry to perform the rescue is required, the attendant or entry supervisor shall inform rescue services of any hazards they may encounter during entry. Where practical, rescuers will be connected to a safety line attached to a point outside the confined space. An attendant shall remain outside of the confined space at all times while the rescue is being performed.

X. References

Cal/OSHA Permit-Required Confined Space Standard (CCR Title 8, Section 5157)
Cal/OSHA Confined Spaces, Scope, Application and Definitions (CCR Title 8, Section 5156)

XI. Issued By and Next Review Date

Issued by: Nick Nieberding, Industrial Hygiene Specialist
Date: July 2017
Next Review Date: Annually

XII. Attachments

Attachment A: UCSB Confined Space Entry Flow Chart
Attachment B: UCSB Confined Space Evaluation Form
Attachment C: UCSB Confined Space Entry Permit
Attachment A

UCSB Confined Space Entry Flow Chart

START
- Identify confined spaces “owned” by department.
- Contact EH&S to classify space (Permit or Non-Permit).
- Permit Required Space? Yes – Signage required.
- Ensure space is added to EHS inventory of confined spaces.

PROGRAM AUDIT & REVIEW
- Audit Permit Required Confined Space Entry Program at least annually.
- Develop and revise as needed.
- Communicate changes to affected departments.

SCOPE OF ENTRY & HAZARD ASSESSMENT
- Define work to be conducted in the confined space.
- Ensure all entrants have completed confined space entry training.
- Perform Hazard Assessment for work to be completed.

Work to be completed in Permit Required Confined Space (PRCS)?

Non-UCSB Employee (Contractor) Entry

YES
- Inform the contractor in writing that the workplace contains permit spaces and entry is only allowed under a Cal/OSHA compliant PRCS program.
- Verify contractors PRCS program.
- Apprise contractor of space hazards and campus procedures for space entry.
- Coordinate entry with contractor.

NO
- Proceed with Non-Permit Entry:
  1. Prepare site for entry
  2. Check for hazardous or unusual conditions
  3. If hazardous conditions found, stop entry and contact EHS.

UCSB Employee Entry

YES
- Is space classified as PRCS because of real or potential atmospheric hazards?

NO
- CAN ALL HAZARDS BE ELIMINATED PRIOR TO ENTERING SPACE?

YES
- STOP! Entry not allowed into Permit Required Confined Spaces unless all hazards have been eliminated prior to entry and space has been reclassified as Non-Permit

NO

STOP! Atmosphere controlled entry requires EH&S consultations & approval.

If yes, STOP and Contact EHS

YES
- YES
- NO

Will work, or change in use of space create a hazard?

NO
- STOP!

Atmosphere controlled entry requires EH&S consultations & approval.

Department consults with Contractor at end of PRCS Entry regarding hazards confronted or created during entry and communicates problems to EH&S.

RECLASSIFIED SPACE ENTRY
- Prepare site and check for unusual conditions.
- Open access to space and guard as necessary.
- Evaluate for Acceptable Entry Conditions.
- Perform atmospheric monitoring.
- Document Reclassification on Permit.
- Enter (If hazards arise during entry stop work immediately and exit space).
- Complete job.
- Return space to normal operating mode.
- Turn in completed permit to Supervisor and copy to EH&S.
UCSB Confined Space Program Manual

Attachment B

UCSB Confined Space Evaluation Form

I. SPACE LOCATION and CHARACTERISTICS

1) Confined spaces are identified by location: __________________/____________/___________/_____________
   Location Building Room Number

   □ NEW Evaluation    □ Re-evaluation of existing space

2) Identify Space Owner: ____________________________________ Department: ________________

3) Opening Type: Portal Size __________ Configuration __________________ Accessibility ______________
   (inches) (round; oval; square; rectangle) (vertical top or bottom; horizontal)

4) Identify Type of Space: __________________
   (boiler, bunker, degreaser, equipment housing, furnace, hopper, manhole,
   pipeline, pit, stack, tank, test chamber, trench, tunnel, vat, vault, vessel, etc.)

5) Describe Past and Current Uses: _______________________________________________________________

II. HAZARD IDENTIFICATION and EVALUATION

1) Space is large enough and so configured that an employee can bodily enter and perform assigned work: _ (Y/N)

2) Space has limited or restricted means of entry or exit: _____ (Y/N)

3) Space is not designed for continuous employee occupancy: _____ (Y/N)

   NOTE: If answer to questions 1, 2, and 3, is “yes”, complete the remainder of section II; otherwise go to section III.

4) Space contains or has potential to contain “Hazardous Atmosphere: _____ (Y/N)

5) Space has 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: ___ (Y/N)

6) Space contains material that can engulf entrant: _____ (Y/N)

7) Welding/burning will take place in confined space: ______ (Y/N)

8) Biological hazards are associated with the confined space: ____ (Y/N)

9) Space contains mechanical hazards: ____ (Y/N)

10) Space contains physical agents (electrical; thermal; radiological; compression; etc.): ____ (Y/N)

11) Identify any other recognized serious safety and health hazard(s): _______________________________

III. CLASSIFICATION

CS Classification:    □ Permit-Required    □ Non-Permit    □ Non CS

Comments: ______________________________________________________

EVALUATOR: ___________ DATE: ___________
Attachment C: UCSB Confined Space Entry Permit

I. Confined Space Location: ___________________________________________ Emergency Telephone #: ___________________ Date: __________
   Entry Supervisor (Name, Department): ______________________________ Permit valid from: __________ to __________
   Purpose of entry: ____________________________________________________

II. Confined Space Hazards (Check and describe specific hazards)
   □ Atmospheric: ____________________________________________________  □ Fall/Trip/Slip: _____________________________
   □ Engulfment/Entrapment: _________________________________________  □ Thermal (extreme hot/cold): ______________
   □ Hazardous Energy/Mechanical: ____________________________  □ Other: ______________________________________

III. Hazard Mitigation Procedures (***All hazards must be eliminated prior to entry***):
   □ Ventilation: ______________________________________________________
   □ Engulfment Hazard Mitigation: _________________________________
   □ Energy Isolation/LOTO: ______________________________________
   □ Barriers/Fall Protection: ________________________________________
   □ Protective Clothing: __________________________________________
   □ Other: _______________________________________________________

IV. Required Equipment (Check ALL that apply and describe where indicated):
   □ Barricades, Barrier Tape  □ Blower and duct  □ Fire Extinguisher  □ GFI Device  □ First Aid Kit
   □ Communication Equipment  □ Rescue Equipment  □ Other: ________________________________
   □ Personal Protective Equipment (Specify): __________________________

V. Atmospheric Testing (Continuous Monitoring May be Required)

<table>
<thead>
<tr>
<th>Order of Testing</th>
<th>Tests to Be Performed</th>
<th>Acceptable Entry Conditions</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
<th>Test 5</th>
<th>Test 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oxygen (% Volume)</td>
<td>20.9% (19.5% to 23.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Flammable Gases (% LEL)</td>
<td>≤ 10% of LEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hydrogen Sulfide (ppm)</td>
<td>≤ 5 ppm H2S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Carbon Monoxide (ppm)</td>
<td>≤ 10 ppm CO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   Perform By/Time:
   Instrument: ___________________ Make & Model: ___________________ Date Last Calibrated: ___________________

   Additional Tests

VI. Personnel
   Authorized Entrant(s) (Name, Department):
   ________________________________________________________________
   Attendant(s) (Name, Department):
   ________________________________________________________________
   Individual Performing Atmospheric Testing:
   ________________________________________________________________

VII. Permit Acceptance – Supervisor Authorizing Entry (signature): ___________________________ Date: __________ Time: __________
   Certifying Supervisor is responsible for ensuring that all necessary procedures, practices, and equipment for safe entry are in place before and during entry.

VIII. Permit Closure
   Reason the permit was cancelled:
   ________________________________________________________________
   Was all work completed and space returned to normal operating mode? Yes No
   Permit Cancelled By: ___________________________ Date: __________ Time: __________

   ***Entry Supervisor must send copy of completed permit to EH&S Confined Space Program Manager (nick.nieberding@ucsb.edu, MC: 5132)***