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 principal objective of the UCSB Confined Space Program is to establish practices and procedures that ensure the health and safety of personnel entering and working in campus confined spaces. This objective is met by:

1. Ensuring all campus confined spaces are identified and correctly classified.
2. Posting appropriate signage and providing training, so individuals recognize confined spaces and do not enter unless authorized.
3. Authorizing individuals to work in confined spaces and ensuring they have received proper training.
4. Implementing procedures to ensure safe and legal entry into campus confined spaces. **Note: As of the publishing date of this manual, all known UCSB permit-required confined spaces can be reclassified to non-permit spaces before entry. UCSB personnel must not enter permit-spaces until they have reclassified to a non-permit space using the procedures outlined in this manual. If a space cannot be reclassified, entry must not take place.**

This program has been designed to comply with Cal/OSHA Section 5157. Telecommunication utility holes/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, volunteers, and visitors 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 and PIs)

Space Owners are responsible for:

Space Identification

Space owners are responsible for ensuring to all confined spaces under their control have identified, and evaluated by the program administrator. Each space owner must maintain a local confined space inventory. A master inventory for the campus is maintained by the confined space program administrator, 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, must be labeled as a permit-required confined space using the following language:

DANGER
PERMIT-REQUIRED CONFINED SPACE
DO NOT ENTER

Contractor Awareness

When the space owner arranges to have employees of another employer perform work that involves confined space entry, they must:

- Notify the program administrator prior to entry, and as far in advance as possible;
- 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 personnel 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; and
- 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 must be maintained as a part of the permanent record with the terminated entry permit(s).

EH&S Notification

Space owners must notify the program administrator immediately if any of the following occur:

- 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 confined space.

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 personnel may enter and ensuring they have been reviewed and classified by the program administrator;
- 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 entry operations, identify the duties of personnel and provide personnel with the training required;

- Ensuring personnel receive the proper level of training and that training is documented;
- Ensuring hot work is authorized through the Campus Fire Marshal on a separate hot work permit and attached and noted on the permit space reclassification form;
- Ensuring copies of all permit space reclassification forms are retained by the department and a copy is submitted to the program administrator;
- Developing and implementing special procedures for confined space entry as needed; and
- Notifying the program administrator of unauthorized entry of a permit space, or an injury or near-miss during a confined space entry.

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 must:

- 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 space owner;
- Coordinate entry operations with the space owner when both the contractor and campus personnel will be working in or near permit spaces; and
- Inform the space owner, 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, Volunteers, and Visitors

Employees, Students, Volunteers, and Visitors are responsible for:

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

F. Office of Environmental Health and Safety (EH&S)

The UCSB Confined Space Program is administered by the Office of Environmental Health and Safety. EH&S is responsible for:

- Designating an individual who is qualified by appropriate training and/or experience to administer the program.

G. Program Administrator

The Program Administrator functions as a technical resource to departments and assists them in carrying out their responsibilities as necessary. Additionally, the program administrator 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 permit space reclassification forms on an annual basis;
- Maintaining a master list of campus confined spaces;
- Assisting departments and supervisors in performing hazard assessments when requested, and recommending appropriate controls; and
- 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 personnel 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.

"Atmospheric testing" or "testing" means the process by which atmospheric hazards are identified and evaluated. Testing includes specifying the tests that are to be performed prior to entering a space. If electronic or thermal equipment is used to perform such tests, and the possibility exists of an explosive substance or a hazardous atmosphere due to flammable gases and vapors, then the testing equipment must be approved for use in such explosive or flammable conditions as required by section 2540.2.

"Attendant" means an individual stationed outside a permit space or a reclassified permit space 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 personnel can bodily enter and perform assigned work, has limited or restricted means for entry or exit and is not designed for continuous personnel occupancy. Confined spaces may include, but are not limited to: storage tanks, pits, vats, vessels, environmental chambers, utility holes, vaults, pump or lift stations, septic tanks, boilers, pipelines, tunnels, ventilation and exhaust ducts, trenches, and excavations.

"Control measure" 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 UCSB department that performs work in a confined space **or** a reclassified permit-required confined space. This includes, but is not limited to Facilities Management, Design and Construction Services, Communications, and 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 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 a confined 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 surrounded entirely by sawdust, and suffocate to death.

"Entrant" means personnel or contractor who enters a confined space.

"Entry" means any action resulting in any part of an individual's body breaking the plane of any opening of a confined space, and includes any work activities inside the confined space.

"Entry permit" or "permit" means the written or printed document that is provided by the employer to allow and control entry into a permit space.

"Entry supervisor" or "supervisor" means the departmental person responsible for determining if 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 a grounded object, thus preventing electric shock and fires.

"Hazardous atmosphere" means 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);
- 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 personnel 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; or
- Any other atmospheric condition that is immediately dangerous to life or health (IDLH).

"Hot work permit" means the campus' 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 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-tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

"Lockout-tagout" means placing locks and 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 must indicate that the energy isolated device must not be operated until the lock and tag are removed by the individual(s) who installed them.

"Non-permit confined space" or "non-permit space" means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm

"Permit space reclassification form" or "reclassification form" means the form used to document the reclassification of a permit space to a non-permit space.

"Permit-required confined space" or "permit 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 personnel from, permit space hazards and for regulating personnel entry into permit spaces.

"Permit system" means an employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

"Program administrator" means the individual appointed by the Office of Environmental Health and Safety (EH&S) who is qualified by appropriate training and/or experience to administer the program.

"Prohibited condition" means any condition in a reclassified permit space that is not allowed during the period when entry is authorized.

"Reclassified permit-required confined space" or "reclassified permit space" means a permit-required confined space that has been temporarily reclassified to a non-permit required confined space.

"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 reclassified 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 must 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.

"Serious hazard" means a hazard where there is a substantial probability that death or serious physical harm could result. A serious injury or illness is one that requires employee hospitalization for more than 24 hours for other than medical observation, or in which a part of the body is lost or permanent disfigurement occurs.

"Space owner" means the department or individual who owns, controls access, or has the primary responsibility for overseeing a confined space.

"Telecommunications" means a science dealing with the provisions of Communication Service.

"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, utility holes, manure pits, and storage bins. Ditches and trenches may also be a confined space when access or egress is limited.

A. Space Evaluation and Classification

Space owners must ensure all identified confined spaces have been evaluated and classified as a non-permit or permit-required confined space by the program administrator. A ***non-permit required confined space*** meets the definition of a confined space, and does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. A ***permit-required confined space*** is a confined space which contains a recognized serious safety or health hazard, or the potential to contain a hazardous atmosphere. The full definitions of a confined space and a permit-required confined space are below:

A **confined space** is a space which has all three of the following characteristics:

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

Space Evaluation
The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure, will be done, or reviewed by the program administrator based on evaluation of all serious hazards. using UCSB Confined Space Evaluation Form (Attachment B).

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:

<u>Hazardous Atmospheres</u>

Hazardous atmosphere means 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 space containing a hazardous atmosphere must not be entered under any circumstance. Some examples of common hazardous atmospheres are:

Oxygen-Deficient Atmospheres: An oxygen-deficient atmosphere has less than 19.5% available oxygen. Any atmosphere with less than 19.5% oxygen must 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; or
- 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 could result.

Toxic atmospheres: Most substances (liquids, vapors, gases, mists, solid materials, and dusts) can present a hazard in a confined space. Toxic atmospheres contain an atmospheric concentration of one or more substances at or above their Permissible Exposure Limits (PEL), and include any other atmospheric conditions 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; or
- 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 serious hazards which should be evaluated and may require a confined space to be classified as a permit-required confined space include but are not limited to:

Hazardous Energy: Confined spaces may contain hazards from electrical, mechanical, pneumatic or hydraulic energy sources. Hazardous energy sources must be identified and mitigated using proper energy isolation procedures prior to entry. **Lockout-tagout** (LOTO) refers to the safety procedures used to ensure that dangerous equipment has been properly shut-down and is incapable of being started up again prior to the completion of the entry or servicing work. It requires that all hazardous energy sources have been (1) *identified* (2) *isolated* and (3) *rendered inoperative***.** Some common forms of energy isolation include electrical circuit breakers, disconnect switches, ball or gate valves, blind flanges, and blocks. Push buttons, e-stops, selector switches, and control panels are not considered proper points for energy isolation. Types of energy that may need to be isolated include potential energy (mechanical springs in tension or compression, compressed gas cylinders, counterweights, etc.), kinetic energy (rotating flywheel/shafts, moving parts, rolling components, parked vehicles, etc.) and utility energy (electricity, compressed air, steam, domestic water, etc.). For more information on Energy Isolation and LOTO procedures, please contact UCSB Industrial Safety Services (https://www.ehs.ucsb.edu/general-safety).

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. Personnel engaged in continuous heavy work while wearing PPE (e.g., bodysuit 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 permit space reclassification form must address any hazards from heat or cold within confined spaces.

Additional Hazards: Other potentially serious hazards which must be evaluated are biological, animal (snakes, rodents, spiders, etc.), poor lighting, obstructions, falling objects, slip/trip/fall, radioactive and acute chemical hazards.

VI. Training

Departments are responsible for ensuring personnel are properly trained prior to entering or performing work in confined spaces. Training must be documented and training records must be kept for as long as it is reasonably expected that an individual will be working in confined spaces. The costs associated with any necessary equipment or training will be borne by the Department.

A. All Confined Space Work

All personnel involved in confined space work must 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 must:

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

B. Permit-Required Confined Space Work

Permit-required confined spaces must only be entered after all serious hazards have been eliminated and the space has been reclassified to non-permit required confined space. If a space cannot be reclassified the entry must not take place. Specialized training is required based upon an individual's role when entering a re-classified PRCS. Specialized training including duties and responsibilities must be provided for the following roles:

Entrants

Personnel who enter a re-classified permit-required confined space must be trained on the following:

- Real and potential hazards that may arise 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 or another serious hazard.
- To exit the space as quickly as possible whenever:
    - The attendant or the entry supervisor give an order to evacuate;
    - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation;
    - The entrant detects a prohibited condition or another serious hazard; or
    - An evacuation alarm is activated.

Attendants

Personnel stationed outside of a permit space or a reclassified permit space who perform attendant duties as required by this program must be trained on the following:

- Real and potential hazards that may be faced during entry, including information on the mode, signs or symptoms, behavior effects and consequences of the exposure;
- How to continuously maintain an accurate count of authorized entrants in the space and ensure 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 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 space immediately under any of the following conditions:
    - If the attendant detects a prohibited condition or another serious hazard;
    - If the attendant detects the behavioral effects of hazards exposure in an authorized entrant;
    - If the attendant detects a situation outside the space that could endanger the authorized entrants; or
    - 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 take the following actions when unauthorized persons approach or enter a space while entry is underway:
    - Warn the unauthorized persons that they must stay away from the space;
    - Advise the unauthorized persons that they must exit immediately if they have entered the space; and
    - Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the space.
- Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance; and

- How to perform non-entry rescues if required.

Entry Supervisors

The departmental person responsible for determining if acceptable entry conditions are present in a reclassified 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 must be trained on and is responsible for:

- Ensuring all serious hazards have been eliminated and the space has been reclassified to non-permit required confined space;
- Each entry is performed safely;
- Knowing potential hazards that may arise during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- Ensuring the permit space reclassification form is filled out completely and correctly;
- Verifying that the appropriate entries have been made on the reclassification for, that all required tests have been conducted and that all required procedures and equipment are in place before endorsing and allowing entry to begin;
- Ensuring all hot work is authorized through the Campus Fire Marshal on a separate hot work permit and has been reviewed by the program administer;
- Signing the reclassification form prior to allowing entry and ensuring that entry operations remain consistent with the terms on the form;
- Ensuring the reclassification form 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 reclassified permit space during entry operations to leave;
- Terminating the entry and canceling the permit space reclassification form when entry operations covered by the form have been completed, or when a condition that is not allowed under the form such as a serious hazard arises in or near the space; and
- Ensuring that after an entry is completed one copy of the completed permit space reclassification form is retained by the department and the original is submitted to the program administrator.

VII. Confined Space Program Procedures

A. Confined Space Entry Procedures

Personnel must notify their supervisor prior to entering and performing work in confined spaces and should work in pairs whenever possible. The following procedures must 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 entrance covers are removed, the opening must be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space. Appropriate vehicle and pedestrian barriers must be used.
- All safety policies and procedures must be followed.
- Metal ladders must not be used when working around electrical equipment.
- There must be no smoking in a confined space.
- Adequate lighting must be provided and used.
- Personal protective equipment must be provided and worn as necessary for safe entry into a confined space.

- Any use of chemicals must be pre-approved by the Supervisor, in consultation with the program administrator.
- Safety Data Sheets (SDSs) must 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 the program administrator 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 must be reevaluated by the program administrator prior to entry. Examples of actives requiring reevaluation are:

- Application or storage of solvents, paints, chemicals or other materials that could potentially create a hazardous atmosphere in a confined space;
- Hot work operations (welding, cutting, brazing, soldering, etc.);
- A physical hazard such as unguarded equipment is introduced into the space; or
- Any other real or potential hazards are introduced or discovered in the space.

B. Permit-Required Confined Space Reclassification and Entry Procedures

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

Reclassification of a Permit-Required Confined Space to a Non-Permit Required Confined Space

All permit-required confined spaces must 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 serious 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 serious hazards remain eliminated. Control of atmospheric hazards through forced air ventilation alone does not constitute an elimination of the hazard. The department must document the basis for determining that all serious hazards in a permit space have been eliminated on the permit space reclassification form. If it is necessary to enter the space to control any serious hazards, then the entry must not take place. If a serious hazard arises within a space, personnel must exit the space immediately. The entry supervisor and program administrator must be notified and the space reevaluated prior to reentry.

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

- The entry supervisor must designate the persons who are to have active roles (authorized entrants, attendants, and atmospheric testing personnel) in entry operations and ensure they have received documented PRCS entry training.
- A permit space reclassification form must be completed and signed by the entry supervisor. The permit space reclassification form must be kept outside of the confined space and made available to the authorized entrants for review. The permit space reclassification form must document the steps taken to mitigate hazards and reclassify the space to a non-permit space.
- Atmospheric testing is completed and documented in accordance with Subsection C.
- A tripod and/or other non-entry retrieval equipment is available during all vertical entries if it is possible that the equipment could be used to safely rescue entrants from the 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 must be stationed outside the space to 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 must cancel the form and end the entry if any of the following occur during the entry:
    - A serious hazard is detected within the space; or
    - A prohibited condition arises.

Additionally, the entry supervisor must ensure:

- The duration of the entry does not exceed the time required to complete the assigned task or job identified on the reclassification form.
- The permit space reclassification form must be terminated when:
    - The entry operations covered by the form have been completed; or
    - A condition that is not allowed under the form arises in or near the permit space.
- A copy of all completed permit space reclassification forms must be submitted to the departmental supervisor and program administrator.

Alternate Procedures: Atmosphere-controlled Permit-Required Confined Space Entry

If the only serious hazard posed by the permit space is an actual or potential hazardous atmosphere that can be controlled by continuous forced air ventilation alone, then the space may be entered following the procedures outlined below. The program administrator must review and approve this type of entry. Upon approval the entry supervisor must ensure the following:

- Atmospheric testing is performed and documented in accordance with Subsection C
- Oxygen levels are between 20.5% and 21.5%.
- Flammable and toxic air contaminants are less than 50% of a hazardous atmosphere.
- There are no other hazardous atmospheres within the space.
- Personnel do not enter the space until the conditions above are met.
- Continuous monitoring is performed.
- Monitoring results are documented on the reclassification form every 15 minutes.
- Forced air ventilation is directed to ventilate the immediate areas where personnel is or will be present within the space and continues until all personnel have left the space.
- The air supply for the forced air ventilation is from a clean source and may not increase the hazards in the space.
- There are no hazardous atmosphere within the space whenever personnel are inside of the space. If a hazardous atmosphere is detected during entry:
    - Personnel leave the space immediately.
    - The space is reevaluated by the program administrator to determine how the hazardous atmosphere developed; and
    - Measures are implemented to protect personnel from the hazardous atmosphere before any subsequent entry takes place.
- The space is safe for entry and pre-entry safety precautions and air monitoring results are documented on the permit space reclassification form;
- All other applicable confined space and PRCS entry procedures are followed.

C. Atmospheric Testing Procedures

Atmospheric testing must be performed and documented when evaluating a new confined space, prior to and during a reclassified permit-required space entry, or when a potential atmospheric hazard is introduced into a space. It is also recommended before entering a non-permit space. Prior to performing atmospheric testing,

personnel must complete documented training provided or approved by EH&S covering all monitoring equipment used. Additionally, individuals performing atmospheric testing must:

- Review the manufacturer's product manual and heed all warnings and cautionary statements.
- Check the instrument's calibration records and ensure the instrument has been calibrated within the last 30 days or per the manufacture's requirements. If not, ensure the instrument is properly calibrated before use.
- Bump test instrument per the manufacturer's instructions. If the instrument fails the bump test it must be recalibrated prior to use.
- Measurement of values for each atmospheric parameter must be made for at least the minimum response time of the test instrument specified by the manufacturer.
- When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope must be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.
- A test for oxygen is performed first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere. Combustible gases are tested for next because the threat of fire or explosion is both more immediate and more life threatening, in most cases, than exposure to toxic gases and vapors. If tests for toxic gases and vapors are necessary, they are performed last.

Pre-entry Atmospheric Testing

The atmosphere in all permit-required confined space atmospheres must 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 must 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 must be used if a flammable atmosphere is present, or is suspected of being present. All atmospheric testing results must be recorded on the permit space reclassification form. If more than 15 minutes have elapsed between pre-entry atmospheric testing and the actual entry, all tests must be performed again prior to entry.

Non-Entry Conditions

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

- Oxygen levels below 20.5% or greater than 21.5% by volume;
- Combustible gas levels greater than 5% 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.

Post-entry Atmospheric Testing

Continuous monitoring must be conducted for oxygen, combustible gases, carbon monoxide, hydrogen sulfide and any other known or suspected toxic or hazardous substances during all reclassified permit space entries in the areas where entrants are located. All monitoring devices must be equipped with an audible alarm. Testing results must be recorded on the reclassification form at least every 15 minutes during entry.

Both the entry supervisor and the program administrator must be notified immediately if an unacceptable atmospheric condition is encountered during entry.

VIII. Telecommunications

All telecommunications work must comply with California Department of Industrial Relation Telecommunication Safety Orders. Entry into spaces that meet the definition of a confined space or a permit-required confined spaces must comply with the requirements of this document. **Permit-required confined spaces must only be entered after all serious hazards have been eliminated and the space has been reclassified to non-permit required confined space. If a space cannot be reclassified the entry must not take place.**

IX. Emergency and Non-Entry Rescue Procedures

When working in or around confined spaces emergency conditions may arise for a variety of reasons. No entries will take place under emergency conditions for any reason. If an emergency condition should arise during an entry, entrant(s) must exit the space immediately if possible and the reclassification form must be canceled. If entrants are injured, incapacitated, or cannot immediately self-extract for any reason, non-entry rescue procedures must be implemented. UCSB personnel must not enter confined spaces to perform a rescue under any circumstances unless properly trained and authorized to do so. If rescue is necessary during an entry the following procedures must be followed:

1. The attendant must immediately call the UCSB police dispatcher (805-893-3446) if on campus, or 911 if off campus, to inform them that a confined space emergency has occurred. The program administrator should also be notified.
2. After notifying emergency services, the attendant will attempt to retrieve the entrant(s) using the retrieval line or other non-entry procedures if applicable, unless it is apparent that doing so would cause additional harm to the entrant(s). The attendant or any other person must not enter the confined space until emergency services have arrived and cleared the scene. All individuals participating in the rescue effort must have received documented training in confined space rescue techniques that was provided or approved by the program administrator.
3. If entry to perform the rescue is required, the attendant or entry supervisor must 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 must 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: March 2019
Next Review Date: Annually

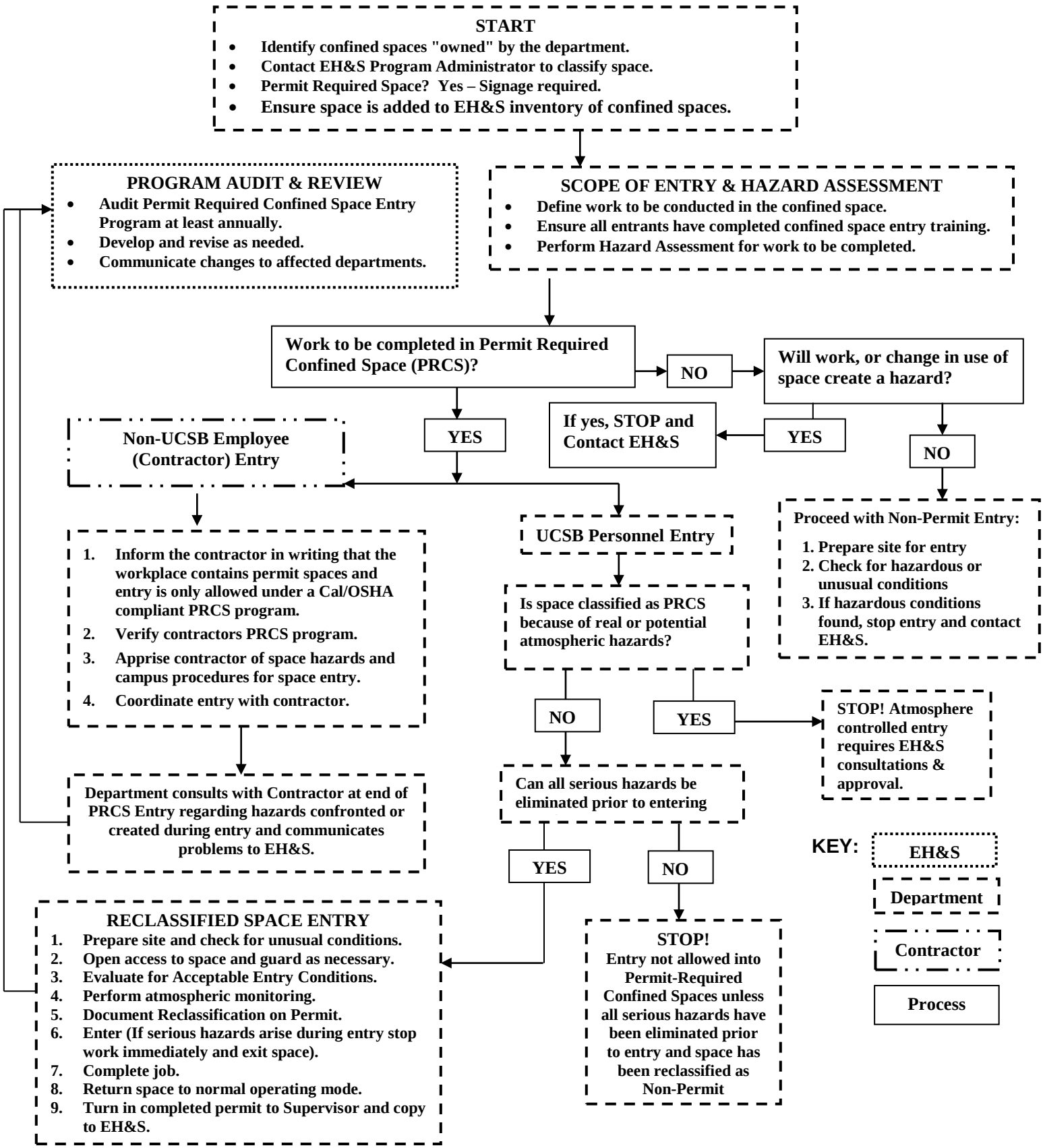
XII. Attachments

Attachment A: Confined Space Entry Flow Chart

Attachment B: Confined Space Evaluation Form
Attachment C: Permit Space Reclassification Form
Attachment D: Permit-Required Confined Space Training Outline and Documentation Form

Attachment A

UCSB Confined Space Entry Flow Chart



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) Space Owner: _____ Department: _____

3) Opening Type: Portal Size _____(inches) Configuration _____(round; oval; square; rectangle) Accessibility_____(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 personnel 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 occupancy: _____ **(Y/N)**

NOTE: If the 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 a 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 Permit Space Reclassification Form

I. Confined Space Location: _____ Emergency Telephone #: _____ Date: _____
Entry Supervisor (Name, Department): _____ Valid from: _____ **to** _____
Purpose of entry: _____

II. Known or Potential Hazards *(*Check and describe all known or potential hazards. All serious hazards must be eliminated prior to entry***)*:**

☐ Atmospheric: _____ ☐ Fall/Trip/Slip: _____
☐ Engulfment/Entrapment: _____ ☐ Thermal (extreme hot/cold): _____
☐ Hazardous Energy/Mechanical: _____ ☐ Other: _____

III. Hazard Mitigation Procedures *(*Indicate control measures implemented for hazards listed above. All serious hazards must be eliminated prior to entry***):***

☐ Ventilation/Air Monitoring: _____ ☐ Barriers/Fall Protection: _____
☐ Engulfment Hazard Mitigation: _____ ☐ Protective Clothing: _____
☐ Energy Isolation/LOTO: _____ ☐ Other: _____

IV. Equipment Required for Entry *(Check ALL that apply and describe where indicated):*

☑ Air Monitoring Equipment ☐ Guarding Equipment ☐ Fire Extinguisher ☐ GFI or Other Electrical Safety Devices
☑ Communication Equipment ☐ Harness/Rescue Equipment ☐ Other: _____
☐ Personal Protective Equipment (*Specify*):_____

V. Atmospheric Testing (*Continuous Monitoring May be Required*)

Order of Testing	Tests to Be Performed	Acceptable Entry Conditions	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
1	Oxygen (% Volume)	20.9% (20.5% to 21.5%)						
2	Flammable Gases (% LEL)	≤ 10% of LEL						
3	Hydrogen Sulfide (ppm)	≤ 5 ppm H2S						
4	Carbon Monoxide (ppm)	≤ 10 ppm CO						
		Performed By/Time:						
Instrument :	Make & Model:	Date Last Calibrated:						
Additional Tests								

VI. Authorized Personnel

Authorized Entrant(s) (Name, Department): _____
Attendant(s) (Name, Department): _____
Individual(s) Performing Atmospheric Testing (Name, Department): _____

VII. Emergency Rescue Procedures: 1. Call for emergency services 2. Entrant self-rescue if possible 3. Perform non-entry rescue

VIII. Form Review and Reclassification Certification: I certify atmospheric testing was performed as required and results were within acceptable ranges, and all other known serious safety or health hazards have been eliminated. Form not valid unless signed.

Name (print): _____ Signature: _____ Date _____ Time _____

IV. Permit Termination

Reason entry was terminated: _____
Was all work completed and space returned to normal operating mode? Yes No
Entry Terminated By: _____ Date: _____ Time: _____

******Entry Supervisor must send copy of completed form to UCSB Confined Space Program Administrator (nick.nieberding@ucsb.edu, MC: 5132)******