UCI Environmental Health & Safety

Confined Space Management Program

Responsible Administrator: EHS Safety Specialist
Revised: February 2024

Summary: This section outlines the policy and procedures related to the Confined Space Management Program that is administered through the Environmental Health and Safety (EHS) Department.

1. Program Description

University of California, Irvine (UC Irvine) facilities have a variety of workspaces that have been identified as confined spaces. Limited groups of UC Irvine employees will encounter work that requires entry into a confined space. All employees that participate or have duties in the Confined Space Management Program will receive training to ensure that each individual has the understanding, knowledge and skills necessary to safely perform all permit-required confined space operations. Coordination of confined space work is the responsibility of the department performing the work and Environmental Health and Safety (EHS) and is governed by this Confined Space Management Program.

This Confined Space Management Program involves training, signage and safety equipment, as appropriate; to be sure that employees are kept vigilant in their work in and around confined spaces and do not inadvertently or innocently enter into a confined space. The potential for serious injury is high, thus it is important that UC Irvine employees who may enter any confined space work with EHS to ensure that all necessary safety precautions are considered and taken.

Employees who must enter confined spaces will receive training according to the following schedule:

- Before the employee is first assigned to perform or participate in confined space entry;
- Before the employee is expected to perform duties during confined space operations for which the employee has not previously been trained; and
- When it is determined that an employee has insufficient knowledge or skills to perform assigned duties.

2. Scope

The purpose of this program is to identify, document, evaluate, and properly label all confined spaces on the UC Irvine campus, and to allow only trained and authorized personnel enter such spaces. This program also provides guidelines for all entries into confined spaces on UC Irvine grounds and facilities to be accomplished in a safe and healthful manner. Coupled with the required training and skills, this program provides employees with the understanding, knowledge and skills necessary to perform permit-required confined space entries.

This program applies to all UC Irvine facilities and leased spaces and is designed for all UC Irvine employees that must enter confined spaces as part of their job duties. This program, via specific appendices, also applies to all personnel involved in confined space operations. Coordination of confined space work is the responsibility of both the department performing the work and EHS.

3. Definitions

The definitions of key words used in this document are provided below:

Acceptable Entry Conditions: Environmental conditions inside a permit-required confined space where there are no atmospheric component(s) potentially hazardous to health or safety.

Attendant: A person designated to remain outside the permit-required confined space and monitor conditions for any health or safety impacts and perform the attendant's duties as described on the entry permit.

Authorized Entrant: A person who has been determined to be medically and physically capable to perform work in a permit-required confined space and has the appropriate training and certification for that entry. An authorized entrant requires training when he or she is initially assigned to the job, and periodically, when there is a change in personnel or process.

Blanking, Blinding, Line Blank: The absolute closure of a gas or liquid filled line, pipe, or duct by the fastening of a solid plate that completely seals the bore and is capable of withstanding the maximum pressure of the line, pipe, or duct without leaking.

Confined Space: A space that has all of the following characteristics:

- It is large enough and so configured that a person can bodily enter; and
- It has limited or restricted means for entry or exit; and
- It is not designed for continuous occupancy.

Confined spaces can be classified into two categories:

- Low-hazard confined space; and
- High-hazard permit-required confined space.

Low-hazard confined spaces are those confined spaces that do not contain or have the potential to contain any atmospheric or other hazards capable of causing death or serious physical harm. A low- hazard permit-required confined space may become a high-hazard confined space if there are hazardous materials brought into the space or if hazardous activities are conducted in the space.

Permit-required confined spaces are those spaces that contain high hazards and are based on their inherent hazard potential. For a high-hazard permit-required confined space, an entry permit is used to ensure proper hazard evaluation, safe entry, safe work and safe exit.

Emergency: Any occurrence or event internal or external to the permit-required confined space that could endanger the entrants, or any condition not permitted on the entry permit. This includes any failures of hazard control, monitoring, communication, or lighting equipment.

Emergency Rescue: The procedures by which persons incapable of self-rescue are removed from a permit-required confined space.

Emergency Services: Local fire, police and ambulance departments are responsible for emergency response and emergency rescue efforts.

Emergency Conditions: Any permit-required confined space situation where any airborne material encountered that is measured or estimated to be at its Immediately Dangerous to Life and Health (IDLH) or 10% Lower Explosive Limit (LEL) value is considered an emergency condition - no entry will be made and the situation must be mitigated by trained emergency response personnel.

Engulfment*:* The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be inhaled to cause death by filling or plugging of the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry: (into a permit-required confined space) - When any part of a person's body passes through the plane of the opening of the space.

Entry Permit - The written or printed document that is used to allow and control entry into a permit- required confined space.

Entry Supervisor - The person who is responsible for contacting and working with EHS and determining if acceptable entry conditions are present for entry, for authorizing entry, overseeing entry operations, and terminating any permit-required confined space operations.

Hazardous Atmosphere, Potentially Hazardous Atmosphere - An atmosphere that has the potential to cause death, incapacitation, impairment of ability for self-rescue, acute illness, delayed illness, or effects that can result in injury from one or the combined effects of the following causes:

- A potentially flammable gas, vapor or mist in excess of 10% of the lower explosive limit that has no toxic quality other than dilution of available breathing air (e.g., methane);
- An airborne dust at a concentration such that it obscures vision within a distance of five feet or less;
- A measured oxygen concentration inside the permit-required confined space that differs (+/-) from the measured oxygen concentration in the ambient air outside the permit-required confined space. The precise value of normal oxygen in air is 20.946% oxygen by volume, however, most instrumentation will display this value as 20.9% or 21%;
- An atmospheric contaminant that may cause an acute illness (as set by the lowest limit value listed in the following standards) in a concentration in excess of:

- Its assigned action level or ceiling values as identified in the current Local, State and Federal regulations for chemical contaminants and/or radioactive contaminants; or
- The latest edition of ACGIH Threshold Limit Values booklet.
- A physiologically inert gas that has only a simple asphyxiant quality and is present in a concentration that reduces the available oxygen in the breathable air below 19.5% (e.g., nitrogen, argon, helium, but not carbon dioxide).

Hot Work - Any work that involves burning, welding, riveting, or similar fire producing operations, as well as work which produces a source of ignition, such as drilling, abrasive blasting, and space heating.

Hot Work Permit - The written authorization to perform hot work operations.

Immediately Dangerous to Life and Health (IDLH)- Any condition that poses an immediate or delayed threat to life and would cause irreversible adverse health effects or interfere with an individual's ability to escape unaided from a space. The IDLH also represents a maximum concentration from which, in the event of respiratory failure, a person could escape within 30 minutes without experiencing any irreversible health effects.

- IDLH can be used to describe three environmental conditions in a permit-required confined space.
- It is the legal upper limit of use for air purifying respirators (if the protection factor of the face piece is not the limiting factor). There are IDLH values available for only a limited number of chemicals. The concentration of a material at its IDLH value is usually so large, conventional instruments used for permit-required confined space entry work will not be capable of measuring this large value directly;
- It can represent a condition where the oxygen is less than 16% by volume at which point the effects of low oxygen can impair self-rescue;
- For those chemicals where the lower explosive limit (LEL) is lower than the IDLH value for toxic or incapacitating effects, the LEL will be considered as the true IDLH value. ANY PERMIT-REQUIRED CONFINED SPACE SITUATION WHERE ANY MATERIAL ENCOUNTERED THAT IS MEASURED OR ESTIMATED TO BE AT ITS IDLH OR 10% LEL VALUE IS CONSIDERED AN EMERGENCY SITUATION - NO ENTRY WILL BE MADE AND THE SITUATION MUST BE MITIGATED BY TRAINED EMERGENCY RESPONSE PERSONNEL.

The only source for accepted IDLH values will be the National Institute for Occupational Safety and Health (NIOSH) Pocket Guide To Chemical Hazards, latest edition.

Inerting - The process of filling a space with an inert non-flammable material for the purpose of displacing or diluting oxygen to remove the flammable potential of the permit-required confined space atmosphere.

Isolation, Isolating - The process by which a permit-required confined space is removed from service and completely protected against releasing material into the space. This process includes such means as double block and bleeding of all lines, misalignment of all lines, lockout of all energy sources, blocking of energy sources, or removing mechanical linkage as described in the UC Irvine Electrical Safety Program.

Line Breaking - The process of physically opening a line that contains or previously contained a hazardous material or hazardous pressure. Two physical in-line blocks are required between the source of hazardous energy and the point where the line is broken. Refer to the UC Irvine Electrical Safety Program.

Non-Permit Required Confined Space - Also Referred to as a Low-Hazard

Confined Space - A confined space that does not contain or have the potential to contain any atmospheric or other hazard capable of causing death or serious physical harm. A low-hazard permit-required confined space may become a high-hazard confined space if there are hazardous materials brought into the space or if hazardous activities are conducted in the space.

Oxygen Concentration of Ambient Air - Normal ambient air contains 20.946% (+/- 0.002%) oxygen by volume.

Oxygen Deficiency - Any measured oxygen concentration that is less than normal ambient air. For permit-required confined space entry purposes, any measured oxygen concentration that is less than that measured in the ambient air outside the permit-required confined space (i.e., 20.9%) indicates an oxygen deficiency. The cause of this oxygen deficiency must be known before entry will be allowed and controls on this potential hazard will be put in place before entry is allowed. The oxygen deficiency can be caused by:

- An intrusion of an unknown material into the space that has diluted or displaced the available oxygen; or
- The presence of something that has consumed the oxygen such as oxidation (rust), chemical reactions (including combustion), absorption (on wet activated carbon), or biological action.

Oxygen-Deficient Atmosphere - An atmosphere that has less than 19.5% oxygen by volume. When the oxygen content is below 19.5%, an air-purifying respirator cannot be worn, and a supplied air respirator must be used for entry.

Oxygen Enrichment - Any measured oxygen concentration that is greater than normal ambient air (20.9%). Any measured concentration measured greater than 20.9% is indicative that there is an oxygen source inside the permit-required confined space (leaking welding hose, chemical reaction). Special precautions must be taken to understand and control this hazard potential before space entry is allowed.

Oxygen-Rich Atmosphere - An oxygen concentration in the space of greater than 23.5% oxygen by volume.

Permit-Required Confined Space - A confined space that has a high Hazard potential because: It can contain a hazardous atmosphere;

- It can contain a hazardous atmosphere;
- It contains a material that can engulf a person;
- It has an internal configuration such that a person could become trapped or asphyxiated due to inwardly converging walls or floors; or
- It may contain other health or safety hazards.

The overall program for controlling and protecting employees from permit space (i.e., high-hazard type spaces) hazards and for regulating employee entry into permit spaces.

Permit-required confined space Monitor: A person who has responsibility to oversee the status of a particular permit-required confined space and to ensure that any changes that affect the space are documented and incorporated into future permit-required confined space work.

Permit-required confined space Profile: A document that summarizes the facts about a permit- required confined space that may have bearing on safe entry, work and egress from that space. The profile will also document any necessary emergency response actions or phone numbers unique to the space.

Permit System - The written procedure for obtaining, preparing, issuing, and retrieving entry permits for entry into permit-required confined spaces and returning the space to service following termination of entry.

Prohibited Condition - Any condition in permit-required confined space that is not allowed by the permit during the period when the entry is authorized.

Purging: The method by which gases, vapors, or other airborne hazards are initially displaced, diluted, or removed from a permit-required confined space. Purging is the initial step in controlling atmospheric hazards before entry into the permit-required confined space. (See VENTILATING).

Rescue Service: See EMERGENCY SERVICES.

Retrieval System: System for conducting non-entry rescue of persons from permit-required confined spaces. This system includes retrieval or extraction devices (a rated tripod, davit, or other anchorage plus winch) and a full body harness. Wristlets may be used to aid in a difficult extraction; however, wristlets cannot be used to support a person's weight.

Testing: The process by which the hazards that may confront entrants of a permit space are identified and evaluated.

Ventilating: The process where clean fresh air is blown into the permit-required confined space while persons are in the space. (See also PURGING). In some cases, local exhaust ventilation may be required to remove contaminants from the space generated at a point source. An example of this would be if welding is being conducted in the space, local exhaust ventilation would be used to remove the welding fumes and noxious gases.

4. Responsibilities

The following individuals have responsibilities as part of the UC Irvine confined space program.

4.1 UC Irvine Employees

- Observe and obey all “Confined Space Permit-Required Do Not Enter” warning signs and postings;
- Observe and obey all warning signs, postings and barriers for permit-required confined spaces in which work is being performed; and
- Directly contact EHS with any concerns regarding work being performed in permit-required confined spaces.

4.2 Authorized UC Irvine Employee Confined Space Entrants

- Ensure that any permit-required confined space entry is coordinated with all appropriate parties (EHS, Facilities Management, Housing, etc.) sufficiently ahead of time so that all monitoring and safety equipment can be prepared, calibrated, or otherwise assured to be functioning properly;
- Contact the lead or supervisor of the department performing the work and EHS for any permit- required or non-permit required confined space entry prior to entry of the space;
- Assist and/or perform air monitoring for permit-required confined space entry when required;
- Complete all training as required prior to entering a permit space or whenever conditions or processes change;
- Know potential hazards and hazard controls of the space to be entered and of all operations to be performed in a particular space;
- Evacuate the space if there is an alarm condition or the monitoring equipment malfunctions;
- Be alert for signs and symptoms of exposure to hazardous atmospheric conditions. Be alert for personal and behavioral problems in other entrants that may indicate medical distress, claustrophobia, or panic;
- Participate in any lockout of hazardous energies required to enter the permit-required confined space. Ensure that all persons who enter the space have their own personal lock on all energy isolating devices;
- Know how to use personal protective equipment, clothing and equipment correctly and how to inspect for damaged equipment;
- Clean up work areas when work is finished;
- Be aware of and watch for potential conditions that could change and rapidly become hazardous;
- Know the hazards that may be faced during entry including information on the mode, signs or symptoms and consequences of exposure to a hazardous condition;
- Directly contact EHS with any concerns about situational changes in a permit-required confined space that could affect the safety or health of any entrants;
- Post danger signs or label (by equally effective means) all of the non-permit required spaces and the permit-required confined spaces;
- Ensure that hazard information for each space is current and adequate at all times by overseeing each space so that any space changes, space modifications, or installations in and around the space that could have a health or safety impact are documented and reported to EHS;
- Assure that standard safe entry procedures are developed for all permit-required confined spaces on-site;
- Provide pre-entry checklist for each entry into a non-permit-required confined space and when necessary, serve as an active participant in filling out this form. The person needing to enter the space is responsible for filling out the pre-entry checklist and returning it to EHS upon completion of the entry;
- Maintain pre-entry checklists, training records and copies of training certifications for a minimum of three years;

- Assure that all personal protective equipment is appropriate for each entry and that adequate rescue capability is present at each space, in good working order, and is current in its inspection period (within six months of the last certifying inspection);
- Provide information on all hazards for a particular permit-required confined space that a contractor might be required to enter;
- Participate in any post-entry debriefing;
- Oversee and support the overall Confined Space Management Program with EHS; and
- Provide assistance to EHS in meeting the requirements of this program.

4.3 Environmental Health and Safety (EHS)

- Oversee and manage the implementation of the intent of this program and resolve any situations not directly addressed by this program;
- Assist the department performing the work in the identification and initial evaluation/risk assessment of all permit-required confined spaces using the Permit-required confined space Hazard Analysis form. Assist in classifying each space as either Permit-required confined space or non-permit-required confined space using the as documentation;
- Work with the department performing the work in classifying each space and in creating a comprehensive list of all non-permit required confined spaces and permit-required confined spaces. This list must be provided to EHS with a current list onsite at all times;
- Ensure that the Confined Space Management Program is routinely audited. Ensure that the program is audited if any irregularities develop that would compromise employee safety or if non-permitted actions are taken;
- Serve as technical consultant on personal protective equipment, fall protection, and extraction equipment;
- Advise the department performing the work on the appropriate instrumentation to purchase and use for all types of permit-required confined space operations;
- Calibrate air monitoring equipment on a monthly basis for the departments performing the work and maintain calibration records of all devices. Coordinate and/or provide training on how to perform air monitoring in confined entry spaces using the gas monitor (Bio systems Inc., PhD5).
- Assist and/or perform air monitoring for permit-required confined space entry when required;
- Review and approve content of training programs for the use of monitoring instruments and information on health effects of exposure to hazardous atmospheres;
- Provide (or coordinate the provision of) general and specialized training on all aspects of permit-required confined space entry as defined in this outline;
- Assist in evaluating any materials brought into a permit-required confined space that will add to the existing hazards of a space;
- Assist emergency response personnel, as necessary, by providing technical assistance on various aspects of use of instruments, evaluation of readings, and mock training exercises;
- Maintain pre-entry checklists, training records and copies of training certifications for a minimum of three years; and
- Be available to advise contractors on the potential hazards posed by permit-required confined spaces on site.

5. Program Components

5.1 Identifying Confined Spaces and Permit-Required Confined Spaces

UC Irvine identifies and evaluates workspaces to determine if any are confined spaces.

The following three questions must be asked about each space being evaluated for the purpose of determining if it is a confined space. To meet the definition of a confined space, it must meet all three of the following criteria:

1. The space is large enough and so configured that an employee can bodily enter and perform assigned work;
2. Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults); and
3. Is not designed for continuous employee occupancy.

If the answer to any of the three criteria is “NO”, the space is not considered a confined space and the regulation does not apply to that situation.

If the space is deemed a confined space according to the criteria above (answering “YES” to all three above questions), it then must be determined if it meets the definition of a permit-required confined space. If the space is deemed to be a permit-required confined space, employee entry is covered by Cal/OSHA (8 CCR 5157 (California Code of Regulations)) unless it is a telecommunications utility manhole or electrical vault. Telecommunication utility manholes/vaults are regulated under Cal/OSHA 8 CCR 8616.

The employer must determine the hazard potential of a confined space by asking these four additional questions about the space to determine if it is permit-required. A permit-required confined space means a 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;
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.

If the space meets ANY of the four criteria, then the space has a “high hazard potential” and is a permit-required confined space. A permit system must be implemented according to Cal/OSHA regulations.

If all four criteria can be answered “NO”, then the confined space is not considered permit-required, and a permit system is not required for a space of that type under the California regulations.

These questions are generally applied to any hazards inherent in the space or hazards in the surrounding area that may affect conditions in the confined space. If entrants are to bring hazardous materials into the space (e.g., welding gear, chemical cleaners, paints) then a non-permit-required confined space may be temporarily reclassified as a permit-required confined space.

5.2 Evaluating Permit-Required Confined Spaces

After identifying the spaces, the department performing the work and EHS are also responsible for performing and documenting an initial evaluation/risk assessment. A Confined Space Hazard Analysis form can be used to document this information (Appendix A - Confined Space Hazard Analysis Form). Current copies of the permit- required confined spaces list are to be kept in the department performing the work and EHS files. This list will be included in the written Confined Space Management Program. Spaces should be re-evaluated annually.

5.3 Labeling Confined Spaces

Based on the hazard evaluation, confined spaces are designated as either:

- Permit-required confined spaces (regulations apply); or
- Non-permit required confined spaces (regulations do not apply).

All spaces that are designated as permit-required confined spaces must be posted with danger signs or by any other equally effective means. The department performing the work and EHS should work together to label all permit-required spaces:

DANGER

PERMIT-REQUIRED CONFINED SPACE

DO NOT ENTER

It is also advisable to secure each permit-required confined space in a manner such as an enclosure, lock, or fence to restrict unauthorized persons from entering the space. EHS and the department owning the space shall make this determination and ensure that this is carried out, if deemed necessary.

Although non-permit required confined spaces are not regulated, all spaces at UC Irvine classified as such must be labeled as non-permit required confined spaces. The label serves to remind all entrants that although the space does not require a permit in its' current condition, the introduction of hazards into the space could change the status of the space and require a permit for entry.

CAUTION

NON-PERMIT REQUIRED CONFINED SPACE

DO NOT BRING HAZARDS INTO SPACE

5.4 Entry into Confined Spaces

5.4.1 Permit-Required Confined Space Entry

Entry into a designated permit-required confined space is regulated and can be accomplished by fulfilling all the requirements on the Permit-Required Confined Space Entry Permit (Appendix C - Permit-Required Confined Space Entry Permit). For Facilities Management activities, the permit must be completed and signed by the job site's Supervisor, signed by the Trade's Supervisor, and reviewed and signed by EHS. For all other departments, the permit must be completed and signed by the entrants' supervisor and reviewed and signed by EHS. The permit must be posted at the job site throughout the duration of the project and returned to the department performing the work and to EHS at the end of the project.

5.4.2 Non-Permit Required Confined Space Entry

Entry into a designated non-permit-required confined space is not regulated and can be accomplished without a permit if the following conditions are met:

- Prior to entry, a pre-entry checklist for non-permit required confined space must be filled out by the person intending to enter the non-permit-required confined space (Appendix B - Pre-Entry Checklist Non-Permit Required Confined Spaces). This is to ensure that the space still meets the definition of a

non-permit required confined space. The form is also available through EHS.

- If hazardous operations are to be conducted in the space (e.g., welding, painting), the entrant must notify EHS, who will evaluate the operations and determine if entry will need to be conducted as an entry into a Permit-required confined space. No UC Irvine employees are permitted to enter the space under these conditions, and the entry must be performed in accordance with this permit-required confined space program.
- The opening of the confined space shall be guarded by a railing, temporary covers, or other barriers to prevent an accidental fall and to protect workers in the space, as well as people who are passing by the space.
- Proper personal protective equipment will be used when EHS deems necessary. Entrants have completed all training as required in Section Six.
- All persons participating in the confined space entry program understand and fulfill their respective Confined Space Management Program responsibilities.

5.4.3 Permit-Required Confined Space Entry – Alternate Entry Procedures

If the space is defined as a permit-required confined space and the only hazard posed by the permit space is an actual or potential hazardous atmosphere, steps can be taken to enter this space under "Alternate Entry Procedures." Contact EHS for assistance in determining if alternate entry procedures may be used to enter a permit-required confined space.

5.4.4 Permit-Required Confined Space Entry – Reclassification

- An area classified as a permit-required confined space may be temporarily reclassified as a non- permit space, if it poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into it.
- Contact EHS to assist in the reclassification of a permit-required confined space.
- A written reclassification shall be created, signed, and kept on file by the department performing the work and EHS.
- If all hazards are completely eliminated (i.e., no remaining potential), the space can be considered a non-permit-required space for the duration of the entry as long as the hazards remain eliminated.
- Any change in the space resulting in re-introduction of hazards will require the space to be vacated and re-assessed. Entry will not be allowed until all hazards are eliminated.

5.5 Rescue Procedures and Emergency Services

5.5.1 Entry Rescue

- In case rescue is needed for a permit-required confined space entrant, emergency services must immediately be called by dialing 911 from a campus or external telephone. The nearest available Fire Department will respond to the call. UC Irvine has coordinated with the campus Orange County Fire Authority (OCFA), and they have trained staff in permit-required confined space rescues.
- Rescue services must be made immediately available for all confined entries as UC Irvine employees in various departments may be required to enter Permit-required confined spaces on campus.
- If a contractor decides to enter a permit-required confined space under their own Confined Space Management Program, they must comply with the requirements for an immediately available and properly trained rescue capability.
- Rescue equipment will be stored in the area where the work performed by employees in that area will most likely change the status of a confined space.

5.5.2 Non-Entry Rescue

- Although not required for non-permit entries, UC Irvine has non-entry extraction equipment to be used over the most-commonly-entered spaces (electrical vaults, manholes and pressure vessels).

- When performing a vertical non-permit-required entry (after reclassification of a permit space), the person entering the space must wear a four-point full body harness with a D-ring attached to the back.

- The extraction device would be connected to the D-ring and would be attended by a second person (a buddy, who is present for the non-permit entry and has been trained in the operation of the extraction device).

- Should an unforeseen event occur (medical, injury, etc.), the extraction equipment can be used to safely and quickly remove a person from the space.

- The extraction device(s) must be regularly inspected, certified, and maintained as required.

6. Reporting Requirements

Required documentation for the Confined Space Management Program at UC Irvine is maintained by the department performing the work and EHS and includes;

- Written Confined Space Management Program;
- A comprehensive list of all permit-required confined spaces and non-permit-required confined spaces at UC Irvine;
- Confined Space Hazard Analysis Form for each confined space;
- Permit-Required Confined Space Entry Permits for all permit-required confined spaces at UC Irvine;
- Copies of training certificates for all employees trained in permit-required confined space entry operations; and,
- Pre-entry checklists for each entry into a non-permit-required confined space

7. References

Code of Federal Regulations, Title 29 (29CFR), Section 1910.146, Permit-Required Confined Spaces

California Code of Regulations, Title 8 (8CCR), Section 5157, Permit-Required Confined Spaces

Appendix A - Confined Space Hazard Analysis Form

Appendix B - Pre-Entry Checklist Non-Permit Required Confined Spaces

Appendix C - Permit-Required Confined Space Entry Permit

Appendix A - Confined Space Hazard Analysis Form

UC Irvine Confined Space Analysis

Name of Confined Space: _____

Space Location: _____

In order to determine if the space is a confined space, please answer "Yes" or "No" to the following questions:

A. IS IT A CONFINED SPACE?

1. Is the space large enough and so configured that a person can bodily enter and perform work?
   - ❑ Yes
   - ❑ No

Description: _____

_____

_____

2. And, does the space have limited or restricted means for entry or exit (e.g., tanks, pits, vessels, silos, storage bins, hoppers, vaults, and pits)?
   - ❑ Yes
   - ❑ No

Description: _____

_____

_____

3. And, is it not designed for continuous occupancy?
   - ❑ Yes
   - ❑ No

Description: _____

_____

_____

If you answered "No" to any one of the three questions above, then the space is NOT considered to be a confined space.

If you answered "Yes" to all three of the above questions, then the space is considered a confined space. Proceed to the section B and answer "Yes" or "No" to the following questions:

B. IS IT A PERMIT-REQUIRED CONFINED SPACE?

1. Is the internal configuration such that an entrant could be trapped or asphyxiated by converging walls or floors that slope downward and taper to a smaller cross-section?
   - ❑ Yes
   - ❑ No

Description: _____
_____
_____

2. Or, does it contain any other recognized serious safety or health hazard?
   - ❑ Yes
   - ❑ No

Description: _____
_____
_____

Or, contains a material that has potential for engulfing an entrant?

- ❑ Yes
- ❑ No

Description: _____
_____
_____

Or, contains or has the potential to contain a hazardous atmosphere?

- ❑ Yes
- ❑ No

Description: _____
_____
_____

Or, is there anything hazardous that will be brought into the confined space?

- ❑ Yes
- ❑ No

Description: _____
_____
_____

If you answered "No" to <u>all</u> five of the above questions, then the confined space is considered a <u>non-permit required confined space</u>.

If you answered "Yes" to <u>any</u> of the above questions, then the confined space is considered a <u>permit-required confined space</u>.

For both space classifications, (permit-required <u>or</u> non-permit required confined space), complete the following hazard assessment checklist to determine if other hazards are present in the space:

C. SAFETY HAZARDS

- ❑ Animals or insects (stinging, biting, snakes, skunks)
- ❑ Low ceilings (ergonomics, sharp objects, visual obstructions)
- ❑ Sharp objects
- ❑ Electrical hazards (live circuits, metal rope around electrical devices)
- ❑ Adverse temperatures (steam lines, coolant lines)
- ❑ Slippery ladder rungs
- ❑ Rusty surfaces (cuts, hides chemicals, poor footing)
- ❑ Chemical coated walls/surfaces
- ❑ Biological residue/slime (exposure, slippery surfaces, sewage)
- ❑ Loud ambient noise - traffic, etc. (annoyance, communications interference)
- ❑ Vibration (discomfort, noise)
- ❑ Poor lighting (can't read meters, can't perform critical tasks)
- ❑ Radiation
- ❑ Other extreme ergonomic conditions including those that may occur because of PPE limitations: respirators, fall protection harnesses, connection to retrieval equipment
- ❑ Liquids on floor/walking surface (standing water)
- ❑ Hazards external to the hole that could affect operations--combustion exhaust, possible precipitation, vehicle traffic, overhead electrical wires, chemical/hazardous materials lines nearby
- ❑ Others: _____
  _____
  _____
  _____
  _____

D. HEALTH HAZARDS

Chemical Hazards: _____
_____
_____

MSDS available?

- ❑ Yes
- ❑ No

Asphyxiation Potential: _____
_____
_____

E. GETTING TO THE CONFINED SPACE

Is the entrance easily accessible?

- ❑ Yes
- ❑ No

Is a ladder or scaffold required?

- ❑ Yes
- ❑ No

Describe entrance: _____
_____
_____

Is there plenty of workspace available to set up all equipment at entrance?

- ❑ Yes
- ❑ No

Limitations: _____
_____
_____

Type of entry:

- ❑ Vertical
- ❑ Horizontal

F. INTERNAL CONFIGURATION

- ❑ Are there low ceilings--how low?

  Can a person:

- ❑ Walk in or crawl in?
  - o On Hands & Knees
  - o On Stomach/Back
- ❑ Erect or stooped?
- ❑ Footing conditions inside space:
- ❑ Flat surface
- ❑ Cramped or limited space
- ❑ Round (horizontal pipe)
- ❑ Uneven surface
- ❑ Slippery footing surfaces
- ❑ Obstructions that have to be stepped Over
- ❑ Sharp objects
- ❑ Spilled chemicals
- ❑ Other: _____
- ❑ Structural cross members
- ❑ Low ceiling
- ❑ Head hazards
- ❑ Climb over required
- ❑ Has a configuration that will prevent adequate purging.

G. ENGULFMENT HAZARDS?

- ❑ Liquid
- ❑ Water always present?
- ❑ Powder/grains
- ❑ Sludge/Sewage

H. FALL POTENTIAL

- ❑ How far?
- ❑ Fall directly onto concrete/level surface?
- ❑ Fall onto something sharp?
- ❑ Any place to tie off/secure lanyard or winch?
- ❑ Extraction device available?

I. ENTRY CONDITIONS

Vertical Entries

- ❑ Portable (Straight)?
- ❑ Stairs in place?
- ❑ Industrial stairs?
- ❑ Ship's ladders?
- ❑ Ladders Used?
  - o Fixed ladders?
  - o Straight portable?
- ❑ No ladders used
- ❑ Tripod accessible?
- ❑ Even surface, tripod okay?
- ❑ Uneven surface, tripod not okay? Describe:

  _____

  _____
- ❑ Tripod available--has chain on legs, or not??
- ❑ Tripod unusable due to inability to place legs, cylindrical surface?
- ❑ Requires some other method?
- ❑ Davit?
- ❑ Secure to overhead beam? (Beam structurally okay?)
- ❑ Some other method?
- ❑ Horizontal support beam available over hole?
- ❑ Need eccentric support or davit?

Horizontal Entries

- ❑ Elevation above ground?
- ❑ Work platform provided to upper elevation?
- ❑ Place to secure lifeline?
- ❑ Location to place mechanical device?
- ❑ Cut hazards can damage rescue rope?

J. ENTRANCE/EXIT CONFIGURATION

- ❑ Opening?
- ❑ Type: _____

_____

Round

- ❑ Yes What diameter? _____
- ❑ No

Vertical

- ❑ Yes How far? _____
- ❑ No

Horizontal

- ❑ Yes How far? _____
- ❑ No

Both Vertical and Horizonal?

- ❑ Yes How far vertical? _____ How far horizontal? _____
- ❑ No

K. INTERNAL FEATURES

- ❑ Pipes with mechanical joints or possible openings inside space?
  - o Materials in pipes/lines?
- ❑ Electrical equipment that needs servicing?
- ❑ Possibility of engulfment?
- ❑ Entrapping features (converging walls, wedging situations)?
- ❑ Pipe/lines going through the space?
  - o Any mechanical joints (flanges, valves)?

L. CONTAMINANTS TO SAMPLE FOR

- ❑ Oxygen
- ❑ Combustible gas? Type: _____
- ❑ Toxics
  - o Direct reading instrument available/type
  - o Use Draeger/Colorimetric

M. KNOWN USE OF SPACE

- ❑ Original
- ❑ Present Use
- ❑ Contained Chemicals
- ❑ Oxygen consumers? (Rust, decay, wet carbon, chemical reactions, combustion)

N. HAZARDS/FEATURES OF THE SURROUNDING AREA

- ❑ Piping or chemical containers?
  - o What chemicals? _____
  - o How far away? _____
  - o Possibility of spill into Confined Space? _____
- ❑ High noise levels? (Communications interference)
- ❑ Soil methane?
- ❑ Parking lot, loading area or parking spaces close by?
- ❑ Can anything fall into the hole?
- ❑ Poor lighting in the area?
- ❑ No electrical services?
- ❑ No ground point?
- ❑ Traffic hazards (in surrounding area)?

O. SEASONAL WEATHER EFFECTS

- ❑ Must the entry be made in bad weather?
- ❑ Could precipitation create a hazard - subject to rapid flooding?

P. OTHER

- ❑ High ambient noise (or anything that can hamper communications)?
- ❑ Ambient temperature extremes (heat stress, direct employee exposure, cold stress, ice formation on working surfaces)?

Q. HAZARDOUS ENERGY HAZARDS

- ❑ Moving machinery hazards?
  - o Written lockout procedures in place?
- ❑ Electrical energy hazards?
  - o Lockout procedures in place?
- ❑ Lockout points identified?
  - o Tagged/labeled?
  - o Described in procedures only?
- ❑ Chemical hazards - line breaking required?
- ❑ Identified shutoff valve?
- ❑ Line blanking required?

R. SITE SUPPORT FEATURES

- ❑ Certified grounding point available or in proximity?
- ❑ Electrical services present?
  - o How many outlets? (two separate circuits recommended) _____
  - o Generator required?
- ❑ Telephone nearby?
- ❑ Rope anchorage points available for rescue use?
- ❑ Other: _____

S. EQUIPMENT

- ❑ Type of equipment needed to enter/exit space
- ❑ Portable Ladders?

T. VISUAL

- ❑ Poor lighting?
- ❑ Entrants cannot be visually observed by attendant?

U. VENTILATION

- ❑ Space has configuration that will hamper effective ventilation/purging
- ❑ Convoluted Space
- ❑ Large Volume
- ❑ Second or additional opening
  - o Exits Close Together
  - o Favors Flow through Ventilation
  - o Distance Openings Apart
- ❑ Estimate of Internal Volume of Space: _____

V. COMMUNICATIONS

- ❑ Internal Available
- ❑ Radio Required
- ❑ Voice Only Adequate
- ❑ Intrinsic Safety Design Required
- ❑ Radio Interference
  - o Inside Space
  - o Outside Space

W. DISTANCE INTO SPACE

- ❑ Greater than 50 feet? (Greater than length of extraction cable)
- ❑ Will require extra internal attendant(s)?

X. SEWER/MANHOLE WORK

- ❑ Telecommunications/Electrical?
- ❑ Sewer?
  - o Sanitary?
  - o Storm?
  - o Combined?

Once the hazard assessment checklist is complete, file the completed form with the department performing the work and EHS. Ensure that all necessary actions are completed before work commences. If necessary, consult EHS for assistance.

- ➢ **For entry into non-permit required confined spaces, use the Pre-Entry Checklist for Non-Permit Required Confined Spaces (**Appendix B - Pre-Entry Checklist Non-Permit Required Confined Spaces**) and consult EHS if necessary.**
- ➢ **For entry into permit-required confined spaces, use the Permit-Required Confined Space Entry Permit (**Appendix C - Permit-Required Confined Space Entry Permit**) and consult EHS for assistance.**

Appendix B - Pre-Entry Checklist Non-Permit Required Confined Spaces

This form must be completed by any person intending to enter the non-permit required confined space. This applies to authorized UC Irvine employee entrants as well as contractors.

Date: _____
Name of Person Filling Out This Checklist:_____
Space Name and Location _____
Reason for Entry into This Space _____
_____

- Obtain a copy of the Confined Space Hazard Analysis of this space from the department performing the work or EHS and review it before continuing with this checklist.
- Verify that there have not been any changes to this space since the last hazard evaluation.
- Answer the following questions:

1. Will there be any activities conducted inside the confined space (e.g., welding) or any chemicals (e.g., solvents) brought into the confined space that could create a hazardous atmosphere inside the space?

   No_____ Yes_____ If yes, DO NOT ENTER. Contact EHS for assistance.

2. Are there conditions in and around this confined space that could adversely affect anyone entering the confined space?

   No_____ Yes_____ If yes, DO NOT ENTER. Contact EHS for assistance.

If the answers to both questions are "No", then take the following precautions before entering the space:

1. Secure the work site.
2. Install barriers and post warning signs.
3. Take measures to prevent any hazards on the outside of the space.
4. Control vehicular and pedestrian traffic.

Note: Any indication of an abnormal atmosphere inside the space is cause to evacuate the space immediately.

After entry into the space, return this completed form to both the department performing the work and EHS. Debrief EHS of the entry procedures and obtain signature.

Entrant Signature _____ Date_____

EHS Signature _____ Date_____

Appendix C - Permit-Required Confined Space Entry Permit

Date & Time Issued: _____ Date & Time Permit Expires: _____
Job Site/Space ID: _____ Job Supervisor: _____
Equipment to be worked on: _____
Description of Work to be Performed: _____
Entry Personnel: _____
Standby Personnel: _____

1. Atmospheric Checks BEFORE isolation and ventilation

Time	Oxygen (≥19.5%)	LEL (≤10%)	H_2S (≤1 ppm)

2. Source isolation (No Entry)? Yes_____ No_____
3. Pumps and/or lines blinded, disconnected, and blocked? Yes_____ No_____
4. Ventilation Modification? Mechanical or Natural Ventilation
5. Atmospheric Checks AFTER isolation and ventilation

Time	Oxygen (≥19.5%)	LEL (≤10%)	H_2S (≤1 ppm)

6. Method of Communication? Verbal/Line of Sight/2-way Radio
7. Rescue Procedures in place? Yes_____ No_____
8. Entry, Standby, & Backup persons successfully completed required training?
   Yes_____ No_____ **AND** Current_____ Not Current_____
9. Equipment:
   a) Direct reading gas monitor used? Yes_____ No_____
   b) Safety harness and lifelines for entry and standby persons? Yes_____ No_____
   c) Hoisting equipment? Yes_____ No_____
   d) Powered Communications? Yes_____ No_____
   e) SCBA's for entry and standby personnel? Yes_____ No_____
   f) Protective Clothing? Yes_____ No_____
   g) All electric equipment listed Class I, Division I, Group D and non-sparking tools?
      Yes_____ No_____

10. Periodic Atmospheric Tests (taken every 10 minutes of work)

Time	Oxygen (≥19.5%)	LEL (≤10%)	H_2S (≤1 ppm)

We have reviewed the work authorized by this permit and the information contained herein. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any items are marked as "No" responses. This permit is not valid unless all appropriate items are completed.

Permit Prepared By (Supervisor's signature): _____

Approved By (Trade's Supervisor signature): _____

Reviewed By (EHS signature): _____

This permit is to be kept at the job site. Return job site copy to EHS following completion of the job.