UNIVERSITY OF CALIFORNIA UCRIVERSIDE | Environmental Health & Safety

Confined Space Program

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Be Smart About Safety

Table of Contents

PREFACE

Environmental Health and Safety (EH&S), recognizing the need to protect employees from actual and potential safety hazards that may be encountered during entry into a confined space, has developed this Confined Space Entry Program. This program is intended to assure that:

- All employees who are required to enter into a permit-required confined space are properly trained and supervised according to the Integrated Safety and Environmental Management (ISEM) "Follow the Five" Steps.
- Procedures are in-place to prevent employee exposure to hazardous atmospheres or conditions.
- Contractors' employees required to enter permit required spaces are included in a permit-required confined space entry program.

This program includes provisions for hazard identification and control, an entry permit system, employee training, and rescue procedures. Departments, as required by their Injury and Illness Prevention Plan, are responsible for the safety of their employees. It is the responsibility of each department to assure that the procedures described in this program are followed and those employees entering confined spaces are properly trained and equipped to perform their duties safely.

It is important that all employees understand and implement the Integrated Safety and Environmental Management (ISEM) process – "Follow the Five":

1) Define the scope of the work;
2) Identify hazards;
3) Select and implement controls;
4) Perform work safely; and
5) Collect feedback and continuous improvement

Additionally, departments that contract for work requiring employees of another employer to enter permit space(s), are required by Cal/OSHA regulation to inform the contractor of the:

- identified hazards;
- precautions or procedures used to protect employees in or near the permit space(s);
- requirement for a permit space entry program; and
- debrief the contractor at the conclusion of entry operations regarding any hazards encountered or created during entry operations.

Environmental Health and Safety will conduct annual reviews of all documented permit-required confined space entries within one year of entry, so that recommendations can be made to departments for correction of deficiencies and program improvement.

I. INTRODUCTION

The principle objective of the Confined Space Entry Program is to implement practices and procedures that will protect employees from hazards that may exist in permit-required confined spaces. This objective is met by:

- The survey, inventory and evaluation of the workplace to determine if any spaces are permit-required confined spaces.
- Posting appropriate signage and providing training to individuals so that they recognize and will not enter permit-required confined spaces unless authorized.
- Training individuals who will enter permit-required confined spaces.
- Developing written entry practices and procedures, and by establishing atmospheric testing requirements.
- Implementing a permit system to control and monitor entry into permit-required confined spaces.

This program has been designed to comply with CAL/OSHA Section 5157.

1. Who Should Participate

All departments that work in permit-required confined spaces will be impacted by this regulation. EH&S will, in cooperation with these departments, inventory and evaluate university confined spaces to determine if any of these spaces are permit-required. Each department shall designate an individual (Department Safety Coordinator) to assist with this inventory and evaluation. This individual will serve as a liaison with EH&S as the Confined Space Entry Program is implemented.

The UCR Confined Space Entry Program is administered by EH&S. EH&S will:

- Monitor the overall effectiveness of the permit system,
- Provide centralized recordkeeping,
- Assist with atmospheric testing and equipment selection as needed,
- Assist with employee training,
- Provide technical assistance to the departments as needed, and
- Provide contract specifications for confined space entry activities by employees of contractors.

Other key participants include:

- Employees who are entrants, attendants, or provide rescue services for permit-required confined spaces.
- Departmental supervisors (referred to in this document as the “Supervisor”), or their designees, who will evaluate and monitor entry conditions, issue and revoke entry permits, and who will coordinate work activities with EH&S.

2. Background

A ***confined space*** is a space that is:

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

A ***permit-required confined space*** means a confined space that has one or more of the following characteristics:

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

Hazardous Atmospheres: The lack of natural ventilation, the presence of stored materials (such as chemicals), or the work process to be performed in a confined space can result in one or more of the following:

Oxygen-deficient atmospheres.

- An oxygen-deficient atmosphere has less than 19.5% available oxygen. Any atmosphere with less than 19.5% oxygen shall not be entered. This is an atmosphere that is Immediately Dangerous to Life and Health (IDLH) without an approved self-contained breathing apparatus (SCBA).
- The oxygen level in a confined space can decrease because of work done, 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.
- The oxygen level can also decrease if oxygen is displaced by another gas, such as carbon dioxide or nitrogen (inerting).

Flammable atmospheres. For an atmosphere to be flammable, there must be:

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

Different gases have different flammable ranges. If a source of ignition (such as a sparking or electrical tool) is introduced into a space with a flammable atmosphere, an explosion will result.

Toxic atmospheres. Most substances (liquids, vapors, gases, mists, solid materials, and dusts) can present a hazard in a confined space. Toxic substances can come from the following:

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

Other Potential Safety Hazards

- Many campus confined spaces, such as the steam tunnels, may have greatly elevated temperatures which can increase the risk of heat stress or heat stoke.
- A permit space must be isolated, or removed from service, and completely protected against the release of energy or materials into the space. This is accomplished by:
    - Blanking, blinding, misaligning or removing sections of lines, pipes or ducts;
    - A double block and bleed system;
    - Lockout or blockout of all sources of energy, including mechanical, electrical, chemical, pressurized systems, thermal (e.g. systems which operate at a temperature, either hot or cold, that could cause physical injury upon contact) or potential (for example, elevated platforms that could shift and then lower upon an entrant);
    - Blocking or disconnecting all mechanical linkages to prevent movement.
- The material contained in the space may present a hazard to entrants. It may, for example, be flammable, corrosive, or toxic.

II. DEFINITIONS

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

"Atmosphere-controlled confined space" means a permit-required confined space in which potential or actual atmospheric hazards can be eliminated prior to entry or can be controlled with continuous forced mechanical ventilation.

"Attendant" means an individual stationed outside the permit spaces who monitors the authorized entrants and who performs attendant's duties as required by this program.

"CAL/OSHA" means California Department for Occupational Safety and Health.

"Confined space" is any space that is large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy.

- Confined spaces include, but are not limited to: storage tanks, pits, vats, vessels, environmental chambers, sewer manholes, electrical manholes, vaults, pump or lift stations, septic tanks, boilers, pipelines, tunnels, ventilation and exhaust ducts, trenches, and excavations.
- Common hazards associated with confined space entry include: oxygen deficient atmospheres, flammable/explosive atmospheres, toxic atmospheres, engulfment/ entrapment hazards, and/or chemical, electrical or mechanical hazards.

"Control Measures" means a system or device used, or action taken, to control or prevent the introduction of physical hazards into a confined space. Control measures include:

"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.

"Double block and bleed" means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

"Inerting" means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. ***Note that this procedure produces an IDLH oxygen-deficient atmosphere*** that can only be entered using self-contained breathing apparatus (SCBA).

"Isolation" means the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

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

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

"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.

"Department" means any University department that performs work in a confined space **or** permit required confined space. This includes, but is not limited to: Physical Plant, Office of Design and

Construction, College of Natural and Agricultural Sciences, Bourns College of Engineering, College of Humanities and Social Sciences, Agricultural Operations, Telecommunications, and EH&S.

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

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

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

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

"Entry" means any action resulting in any part of the employees' body breaking the plane of any opening of the permit-required confined space, and includes any work activities inside the confined space.

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

"Entry Supervisor" or "Supervisor" means the departmental person responsible for determining if acceptable entry conditions are present in a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this document.

"Ground-fault circuit-interrupter" is a device designed to disconnect an electric circuit when it seeks ground through a person or grounded object, thus preventing electric shock and fires.

"Hazardous Atmosphere" means an atmosphere presenting a potential for death, disablement, injury, or acute illness from one or more of the following causes:

- A flammable gas, vapor or mist in excess of 10% of its' lower flammable limit (LFL)
- An oxygen deficient atmosphere containing less than 19.5% oxygen by volume or an oxygen enriched atmosphere containing more than 23.5% oxygen by volume
- Airborne combustible dust at a concentration that meets or exceeds its LFL (airborne combustible dust which obscures vision at five feet or less)

- An atmospheric concentration of any substance for which a dose is published in Group 14 for Radiation and Radioactivity, or a permissible exposure limit is published in Section 5155

for Airborne Contaminants which could result in an employee exposure in excess of its dose or permissible exposure limit, and that could cause death, incapacitation, impairment of ability to self-rescue, injury or acute illness.
- Any other atmospheric condition that is immediately dangerous to life or health (IDLH).

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

"Immediately dangerous to life or health (IDLH)" means any condition that poses an immediate or delayed threat to life, or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

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

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

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

"Permit-required confined space program" means the university's overall program for controlling and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

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

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

"Qualified person" means an entry supervisor who is trained to recognize and evaluate the anticipated hazard(s) of the confined space and who shall be capable of specifying necessary control measures to assure worker safety.

- The department shall designate an employee(s) as qualified person for the purposes of assuring safe confined space entry procedures and practices at a specific site. The qualified person may also be an entrant when permissible according to this standard.
- Where the department is unable to designate a qualified person, then the department shall coordinate work activities with the Safety Coordinator or their designee.

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

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

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

III. PROGRAM ELEMENTS

1. Training and Duties of Program Participants

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

- Training shall be performed before the employee is assigned duties in permit-required confined spaces.
- Training will be conducted by EH&S, or through an EH&S approved training provider.
- Initial training will be followed by refresher training at least annually.
- Training records will be maintained by the EH&S and the Department Safety Coordinator. These records shall include the date(s) of the training program, the instructor(s) of the training program, a copy of the written material presented, and the names of the employee(s) to whom the training was given.
- The costs associated with any necessary equipment or training contracted outside of EH&S shall be borne by the Department.

2. Training and Duties of the Authorized Entrant

All personnel involved in entry into permit-required confined spaces shall receive appropriate training which shall include, at a minimum:

- The requirements of this program and the conditions that must be met for entry into a permit-required confined space.
- The conditions or work practices that may produce a hazard in a non-permit confined space that may require that the space be reevaluated by the Supervisor prior to entry.
- Hazard recognition and use of atmospheric testing devices, including information on the mode, signs or symptoms, and consequences of exposure.

- The use of personal protective equipment including rescue harnesses, respiratory protection, and so forth.
- Entry procedures and precautions to include:

    - Maintaining communication with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space;
    - Alerting the attendant whenever:
        - The entrant recognizes any warning sign or symptoms of exposure to a dangerous situation, or
        - The entrant detects a prohibited condition.
    - Requirement to evacuate whenever so ordered by the entry supervisor or attendant, whenever the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, if the entrant detects a prohibited condition, or whenever an evacuation alarm is activated.
    - Emergency and non-entry rescue methods, and procedures for calling rescue services.

3. Training and Duties of the Attendant

The attendant shall receive the training detailed above and shall, in addition, receive training on the following:

- Hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- Possible behavioral effects of hazard exposure in authorized entrants.

The attendant shall:

- Continuously maintain an accurate count of authorized entrants in the permit space and ensure that the means used to identify authorized entrants accurately identifies who is in the permit space;
- Remain outside the permit space during entry operations until relieved by another attendant;
- Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space;
- Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:

    - If the attendant detects a prohibited condition;
    - If the attendant detects behavioral effects of hazard exposure in the authorized entrants;
    - If the attendant detects a situation outside the space that could endanger the authorized entrant; or,
    - If the attendant can not effectively and safely perform the requirements of this section.

- Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.

- Warns unauthorized persons to stay away from the permit space, advises the unauthorized persons that they must exit immediately if they have entered the permit space, and informs the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
- Performs non-entry rescues as specified herein.
- Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

4. Training and Duties of the Entry Supervisor

The entry supervisor shall receive training as for attendant, above, and additional training as required to evaluate confined space hazards. The entry supervisor shall:

- Know the hazard(s) that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure. This information will be contained on the Permit-Required Confined Space Evaluation Form for the space in question.
- Verify, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
- Terminate the entry and cancel the permit when either the entry operations covered by the entry permit have been completed or a condition that is not allowed under the entry permit arises in or near the permit space.
- Verify that rescue services are available and that the means for summoning them are operable.
- Remove unauthorized entrants.
- Determine, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

5. Training and Duties of Rescue and Emergency Services

Trained rescuers from the City of Riverside Fire Department will conduct rescues requiring entry into a permit-required confined space.

6. Contractor Awareness, Duties and Responsibilities

- When the Department arranges to have employees of another employer perform work that involves permit space entry, the Department shall:
    - Inform the contractor in writing that the workplace contains permit spaces and that permit space entry is allowed only 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 the elements, including the hazard(s) identified and the university's experience with the space, that make the space in question a permit-required confined space.
- Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of university employees in or near the permit space where contractor personnel will be working.
- Coordinate entry operations with the contractor when both university personnel and contractor personnel will be working in or near permit spaces.
- Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

- All records associated with the above section shall be maintained as a part of the permanent record with the terminated entry permit(s).
- Each contractor who is retained to perform work that will require permit space entry operations shall:

  - Obtain any available information regarding permit space hazards and entry operations from the Department,
  - Coordinate entry operations with the Department when both the contractor and university personnel will be working in or near permit spaces, and
  - Inform the Department of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either during a debriefing or during entry operations.

7. Identification of Confined and Permit Required Spaces

- A survey of the university is periodically conducted to identify, inventory and assess all confined spaces. The survey is conducted by the Space owner department(s) in coordination with EH&S.

  - The inventory is maintained by EH&S with updates initiated by the Space owner(s) as needed. The inventory shall include an assessment of the hazard(s) associated with each permit-required space.
  - EH&S will provide a current inventory of confined spaces and permit required confined spaces to all Departments.
  - The current inventory will be included in Appendix B of this document, which shall be maintained current by EH&S.
  - Permit-required spaces, which could be inadvertently entered, will be labeled as a permit-required confined space. Obvious confined spaces, such as manholes, or confined spaces that are not permit-required, will not be labeled. Signs shall read as follows:

DANGER
PERMIT-REQUIRED CONFINED SPACE
DO NOT ENTER

IV. ENTRY-RELATED WORK ACTIVITIES

1. Atmospheric Testing

- The atmosphere in all permit-required confined space atmospheres shall be tested for oxygen concentration, combustible gases, and any known or suspected toxic substances prior to entry. A properly calibrated direct reading gas monitor will be used. Direct reading gas detector tubes or other acceptable means may also be used to test potentially toxic atmospheres.
- Each atmospheric testing instrument shall be calibrated on a schedule and in the manner recommended by the manufacturer except:
    - Any atmospheric testing instrument that has not been used within thirty (30) days shall be recalibrated by the Department prior to use.
    - Each atmospheric testing instrument shall be calibrated at least annually [every twelve (12) months] by EH&S, or through the manufacturer.
    - Copies of calibration records will be forwarded to EH&S, IH/Safety Programs.
- Each atmospheric testing instrument will be field checked immediately prior to use to ensure that it is operating properly.
- Only personnel who have successfully completed training, provided or approved by EH&S, may perform atmosphere testing.
- Initial air sampling will be conducted from outside the structure, and will be performed when possible at various levels within the confined space (e.g. at least top, middle and bottom), and around all conduits, pipes, or cables.
- Where possible, sampling will be started at the top of the vessel or space to detect the presence of lighter than air combustibles and toxins. Sampling may be performed with a remote probe. Intrinsically safe equipment will be used if a flammable atmosphere is present, or is suspected of being present.
- The atmosphere will be tested in the following order: oxygen concentration, combustible gases, and toxic materials. Results will be written on the entry permit.
    - Atmospheric
        - ❖ Oxygen levels are less than 19.5% or greater than 23.5% by volume,
        - ❖ If a combustible gas is present at greater than 10% of its lower explosive limit (LEL),
        - ❖ If a toxic substance exceeds an OSHA or American Conference of Governmental Industrial Hygienists (ACGIH) limit 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.)
        - ❖ If an airborne combustible dust obscures vision to five feet or less, or,
        - ❖ If any atmospheric condition recognized as immediately dangerous to life or health (IDLH) is present.

- ❖ Unacceptable levels may be indicated on a scale or by a visual alarm and must be indicated by an audible alarm.

- EH&S and the Supervisor for the Department must be notified immediately if atmospheric conditions are unacceptable. Entry will be prohibited until:

  - Conditions are brought into acceptable limits by purging, cleaning and/or ventilating the space, or,
  - Appropriate respiratory equipment is worn. The respirator protection proposed for the entry must be approved and monitored by EH&S.
  - Re-testing will be required after purging of the space before entry will be allowed.

- Atmospheric Testing:

  - Testing will be repeated at least hourly or more often depending upon the conditions present in or around the space.
  - Continuous air monitoring will be performed if the potential for a hazardous atmosphere exists. An atmospheric testing device capable of simultaneously detecting and measuring the airborne concentrations of oxygen, carbon monoxide, flammable gases and hydrogen sulfide shall be carried, for example by the lead entrant during entry into sewers and during welding operations in confined spaces. This device shall be equipped with an audible alarm.
  - If more than 15 minutes have elapsed between the pre-entry atmospheric test and the actual entry, the test will be performed again and noted on the permit. Re-tests will be conducted any time the confined space has been vacated for more than 15 minutes.
  - All atmospheric test results must be recorded on the entry permit.

2. **Isolation**

- Electrical and mechanical sources in a confined space that could be hazardous will be tagged and locked out at the source by each individual or group prior to entry.
- Belt and chain drives and mechanical linkages on shaft-driven equipment will be disconnected when possible.
- Mechanical moving parts within a confined space will be secured with latches, chains, chocks, blocks, or other devices.
- All pumps or lines which convey flammable, injurious, toxic or oxygen displacing gases into a confined space shall be disconnected or shall be effectively isolated to prevent the introduction of a hazard into the space.

3. **Ventilation**

- Continuous forced mechanical ventilation shall be used in all permit-required confined spaces that contain a known or potential atmospheric hazard.

  - Mechanical ventilation must be used regardless of initial monitoring results if the potential for development of a hazardous atmosphere exists (e.g., all sewer entries). The

potential for a hazardous atmosphere to develop will be determined by the Supervisor in consultation with EH&S.
  - If a hazardous atmosphere is detected, employees will not enter the space until the hazardous atmosphere has been eliminated by continuous forced air ventilation.
  - The forced air will be directed to the immediate vicinity where an employee is or will be within the space. Ventilation shall continue until all employees have left the space. If mechanical ventilation should fail during entry operations, all employees shall immediately evacuate the space until ventilation is restored, and re-testing indicates acceptable entry conditions.
  - The method and equipment selected will depend on the size of the confined space and opening, the gases exhausted, and the source of make-up air. Ventilation systems used in flammable atmosphere will be explosion-proof and appropriately rated for the hazard.

- Local exhaust ventilation shall be used during welding, cutting or other similar operations in confined spaces as necessary to remove harmful gases, smoke and fumes. The confined space will be continuously ventilated if a toxic solvent is used in the space.
- Oxygen will not be used to ventilate a confined space.

4. **Entry Permits & Person In Charge**

- A fully completed entry permit will be prepared by a qualified person prior to entry into a permit-required confined space. The qualified person will be in charge of the entry and may not be the sole entrant. The qualified person must have successfully completed training provided or approved by EH&S.
- The qualified person will ensure that the permit specifies the location, type of work, personal protective measures, authorized entrants, monitoring equipment, hazards of the permit space, and control measures. If rescue equipment is required, it will be so noted on the permit. The procedure for contacting rescue services will also be included on the permit.
- The permit will be dated and carry an expiration time limiting the work. The permit will be updated as necessary, as long as acceptable entry conditions are maintained.
- The person in charge shall sign the permit prior to allowing entry and ensure that entry operations remain consistent with the terms on the permit. The entry will be terminated if a potential hazardous situation occurs which exceeds the conditions authorized on the permit.
- The permit will be available at the work site outside the confined space.
- All terminated/completed confined space entry permits will be turned in to the departmental supervisor after the work is completed.
  - A copy of these permits shall be provided to EH&S IH/Safety programs.
  - EH&S will keep the permits and related information for a minimum of thirty (30) years. [Exposure record per Section 3204 Access to Employee Exposure and Medical Records.]
- Hot work (potential ignition sources) will be authorized through the Campus Fire Marshal on a separate hot work permit and attached and noted on the entry permit.
- Individuals authorizing entry into the confined space may also serve as entrants or attendants if they receive the proper training.

- After entry has been completed the permit will be canceled by the entry supervisor. Cancellation of the permit indicates that the space is ready to be returned to its normal operation. A copy of the cancelled permit shall be provided to EH&S.
- Entry permits will be reviewed by the Department and EH&S yearly. The program will be revised as necessary to ensure that the health and safety of employees is not compromised.

5. **Attendants**

- An attendant will be assigned to remain outside the permit required confined space at all times during entry operations. The attendant will remain in constant communication with the entrants and order the workers to leave if a suspected hazard occurs or a toxic reaction is observed in a worker. The attendant will also warn unauthorized persons not to enter the confined space.
- The attendant will be equipped with a communications radio and know whom to contact in an emergency. The radio must utilize a frequency monitored by UCPD during and after normal working hours.
- Attendants will receive training in hazard recognition and outside-of-space rescue procedures. Training will be provided or approved by EH&S.
- The attendant will notify his/her Department prior to a permit-required confined space entry, and when the work is completed.
- The attendant will not enter the confined space for rescue purposes until help arrives.

6. **Entry Procedures**

- All permit-required confined spaces:
    - The designated person at the Department and EH&S must be notified prior to entering the permit-required confined space.
    - An entry permit will be properly completed by a qualified person prior to entry into the permit-required confined space.
    - Only properly trained and authorized individuals will be allowed to enter a permit-required confined space. Authorized entrants will maintain contact with the attendant.
    - Each individual entering a permit required confined space will, whenever practical, have a safety or retrieval line attached to a chest, body harness or wristlets. The other end of the line will be secured to an anchor point or lifting device outside the entry portal. The anchor point will not be secured to a motor vehicle in a manner that would pull the line out of the space if the vehicle moved. A retrieval line is not required if:
        - A permit space has obstructions or turns that would prevent pull on the retrieval line from being transmitted to the entrant, or,
        - A permit space from which an employee being rescued with the retrieval system has projections which would injure the employee if forcefully contacted, or,
        - A permit space was entered by an entrant using an air-supplied respirator, and retrieval lines, if used, could not be controlled so as to prevent an entanglement hazard.
    - Any entry into a permit required confined space will require atmospheric testing for oxygen content, flammable gases, and potential toxic air contaminants by a properly

trained individual. Each individual may be required to wear an air monitoring instrument if the confined space is large enough or has a potentially hazardous atmosphere.

- During any confined space entry, all safety policies and procedures will be followed. Metal ladders will not be used when working around electrical equipment. There will be no smoking in a confined space. Any use of chemicals must be pre-approved by the Supervisor, in consultation with EH&S. Welding, soldering, cutting, or other hot work requires a Hot Work Permit approved by the Campus Fire Marshal. Adequate lighting will be provided.
- Personal protective equipment, including respirators, will be provided to workers as necessary for safe entry into the permit-required confined space.
  - All PPE must be approved by the Supervisor or EH&S.
  - An atmosphere supplied breathing apparatus will be used for entry into an unknown atmosphere. A rescue team (RFD), with self- contained breathing apparatus immediately available, must be present on-site if entry is into an atmosphere that is actually or potentially immediately dangerous to life or health.
- Electrical equipment used in the confined space will be appropriate for the hazard and meet the requirements of the National Electric Code if a hazardous atmosphere is present.
- Any condition making it unsafe to remove an entrance cover will be eliminated before the cover is removed.
  - When the cover has been removed, the opening(s) shall be promptly guarded to prevent accidental fall into the opening and prevent objects from falling into the opening.
  - Appropriate vehicle and pedestrian barriers will be used to protect workers.

- Contractors who send their employees into confined spaces under the control of UCR will be informed of the potential hazards, safety rules, and emergency procedures in effect at the university. A copy of UCR'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).
- Atmosphere-controlled Permit-Required Confined Spaces:

  - If the only hazard posed by the permit space is an actual or potential hazardous atmosphere that can be controlled by continuous forced air ventilation alone, then workers may enter the space without retrieval equipment. EH&S must be consulted and approve this type of entry.
  - Flammable and toxic air contaminants must be less than 50% of a "hazardous atmosphere" to qualify as an atmosphere-controlled space.
  - Continuous monitoring must be performed. Monitoring results must be documented on the entry permit every hour.
  - There may be no hazardous atmosphere within the space whenever any employee is inside of the space.
  - If a hazardous atmosphere is detected during entry:

    - Each employee shall leave the space immediately;

  - The space shall be evaluated to determine how the hazardous atmosphere developed; and,
  - Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
- The entry supervisor shall verify that the space is safe for entry, shall document pre-entry safety precautions taken and air monitoring results, and shall complete the form provided in Appendix A. This certification shall be made prior to entry, and shall be made available to each employee entering the space.

- Fully Regulated Permit Spaces:

  - Workers entering a permit space containing a hazardous atmosphere or other uncontrolled serious health or safety hazard will wear full retrieval equipment except as allowed otherwise in this document.
  - Full retrieval equipment must be worn if it is likely that a hazardous atmosphere will develop or return.
  - Retrieval equipment will be secured to an anchor point or lifting device outside of the entry portal. The anchor point shall not be a motor vehicle. When vertical retrieval may be necessary, a lifting device such as a tripod equipped with either a powered hoist or a manual hoist. Where a manual hoist is used, the hoist shall offer at least a three-to-one pull ratio.
  - A determination will be made by the Department and EH&S of situations requiring the Rescue Team (RFD) to be notified prior to entry.

7. **Reclassification of a Permit-Required Confined Space**

- A permit space that poses no hazard may be entered as a non-permit confined space with written approval from the Supervisor and EH&S if the permit space contains no actual or potential atmospheric hazard, and all other hazards within the space can be eliminated without entry into the space. Hazards may be eliminated, for example, by:

  - Following all designated lockout-tagout procedures for the space in question;
  - Emptying a vessel to remove an engulfment or other content hazard;
  - Draining chemical tanks of their contents, purging any residual chemicals with water, and ventilating the space after purging is complete;
  - Shutting boilers down, opening all access ports to allow for temperature reduction and natural ventilation, and by taking all appropriate designated measures to lockout/tagout, blank or block, and so forth to isolate the space.

- If it is necessary to enter the space to remove any residual hazards, then this entry shall conform to the full requirements of the permit entry program.
- If hazards arise within a permit space that has been declassified to a non-permit space, each employee shall exit the space. The Supervisor and EH&S shall then be consulted to reevaluate the space and determine reclassification as a permit space.
- The permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

8. Reclassification of a Confined Space to a Permit-Required Confined Space

- When there are changes in the use of a non-permit confined space that may increase the hazards, the space shall be reevaluated and classified as a permit-required space if necessary. Reclassification would be required, for example:

    - During application of solvents, paints, chemicals or other materials that could potentially create a hazardous atmosphere in a confined space.
    - During welding, cutting, brazing or soldering in some confined spaces with limited ventilation.

- The Supervisor and EH&S shall be consulted to reevaluate and reclassify confined spaces as necessary depending upon the work activities to be performed in spaces.

9. **Rescue Procedures**

- If it is necessary to rescue workers from a permit-required confined space, the attendant will immediately notify the appropriate base operator that a permit-required confined space emergency has occurred. UC police dispatcher will be notified after normal working hours. The base operator and/or UC police dispatcher will acknowledge the call and contact the City of Riverside Fire Department (Rescue Team). EH&S will also be notified.
- The City of Riverside Fire Department ranking on-scene officer will coordinate the rescue effort.
- After notifying the base operator, the attendant will attempt to retrieve the worker using the retrieval line. Under no circumstance will the attendant enter the confined space until help has arrived, and then only with the proper rescue equipment. Attendants participating in the rescue effort must have received specialized training in confined space rescue techniques provided or approved by EH&S.
- Rescuers entering an IDLH or unknown atmosphere will wear a self-contained breathing apparatus or a positive pressure airline respirator with a ten-minute escape bottle of air. Rescuers will, where practical, be connected to a safety line attached to a point outside the confined space. An attendant will remain outside the confined space during rescue efforts. Rescuers will wear appropriate protective clothing.
- Air-purifying respirators shall not be used in confined space rescues.
- Rescue breathing equipment will not be required if the emergency is not due to the presence of a hazardous atmosphere.

APPENDIX A – UCR CONFINED SPACE ENTRY PROGRAM FLOWCHART

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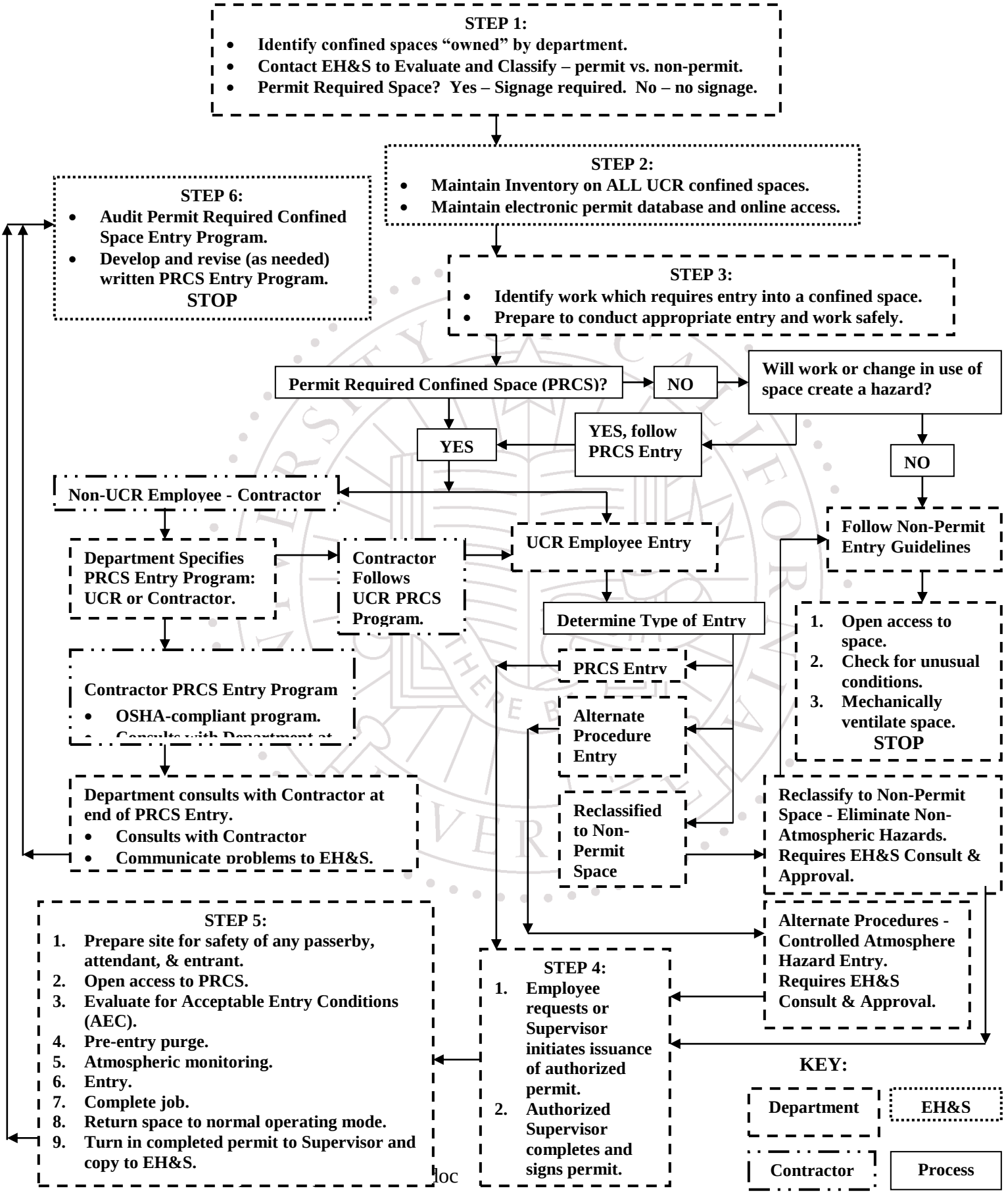
STEP 1:
Identify confined spaces "owned" by department.
Contact EH&S to Evaluate and Classify – permit vs. non-permit.
Permit Required Space? Yes – Signage required. No – no signage.
STEP 2:
Maintain Inventory on ALL UCR confined spaces.
Maintain electronic permit database and online access.
STEP 3:
Identify work which requires entry into a confined space.
Prepare to conduct appropriate entry and work safely.
Permit Required Confined Space (PRCS)?
NO
Will work or change in use of space create a hazard?
YES, follow PRCS Entry
YES
NO
Non-UCR Employee - Contractor
Follow Non-Permit Entry Guidelines
Department Specifies PRCS Entry Program: UCR or Contractor.
Contractor Follows UCR PRCS Program.
UCR Employee Entry
Determine Type of Entry
1. Open access to space.
2. Check for unusual conditions.
3. Mechanically ventilate space.
STOP
PRCS Entry
Alternate Procedure Entry
Reclassified to Non-Permit Space
Contractor PRCS Entry Program
OSHA-compliant program.
Reclassify to Non-Permit Space - Eliminate Non-Atmospheric Hazards. Requires EH&S Consult & Approval.
Department consults with Contractor at end of PRCS Entry.
Consults with Contractor
Communicate problems to EH&S.
STEP 6:
Audit Permit Required Confined Space Entry Program.
Develop and revise (as needed) written PRCS Entry Program.
STOP
STEP 5:
1. Prepare site for safety of any passerby, attendant, & entrant.
2. Open access to PRCS.
3. Evaluate for Acceptable Entry Conditions (AEC).
4. Pre-entry purge.
5. Atmospheric monitoring.
6. Entry.
7. Complete job.
8. Return space to normal operating mode.
9. Turn in completed permit to Supervisor and copy to EH&S.
STEP 4:
1. Employee requests or Supervisor initiates issuance of authorized permit.
2. Authorized Supervisor completes and signs permit.
Alternate Procedures - Controlled Atmosphere Hazard Entry. Requires EH&S Consult & Approval.
KEY:
Department
EH&S
Contractor
Process

APPENDIX B – UCR CONFINED SPACE (CS) EVALUATION FORM

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☐ **NEW Evaluation** ☐ **Re-evaluation of existing space** **Confined Space# _____**

SPACE LOCATION / PHYSICAL CHARACTERISTICS

1) Confined spaces are identified by location: _____/_____/_____/_____
Location / Building / Room / # Within Room

2) Identify Space Owner: _____ Department: _____

Opening Type: Portal Size _____Configuration _____Accessibility_____
(inches) (round; oval; square; rectangle) (vertical top or bottom; horizontal)

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

HAZARD IDENTIFICATION and EVALUATION

Describe Past and Current Uses: _____

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

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

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

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

Space contains or has potential to contain "Hazardous Atmosphere"(<19.5 ->23.5 oxygen; >10% LEL; Toxics > PEL/TLV; combustible dust > or = to LFL; IDLH): ____ **(Y/N)**

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)**

Space contains material that can engulf entrant: ____ **(Y/N)**

Welding/burning will take place in confined space: _____ **(Y/N)**

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

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

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

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

CONCLUSION / SUMMARY

CS Classification: _____ Select: (**PRCS** =Permit-Required CS / **NPCS**= Non-Permit CS / **NC**= Not a CS)

Comments: _____
_____

EVALUATOR: _____ **DATE:_____**

Distribution: Original – UCR EH&S; Copy – Space Owner

APPENDIX C – UCR CONFINED SPACE ENTRY PERMIT (CSE-001)

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Department/Contractor: _____ **Date:** _____
Emergency Telephone#: _____

I. Confined Space Location: _____ **Description of work:** _____

II. Past, Present, and Expected Hazards (Check off and describe applicable hazards.)

❑ Atmospheric: ❑ Hazardous Energy
❑ Thermal (hot/cold): ❑ Radioactive: ❑ Engulfment/Entrapment
❑ Hazardous Materials: ❑ Other: _____

III. Special Requirements: ❑ **Alternate Procedures (c)(5)** ❑ **Reclassification (c)(7)**

❑ Energy Isolation ❑ LOTO ❑ Fall Arresting
❑ Ventilation ❑ Special Safety Instructions ❑ Other permits

Required Equipment (Check **ALL** that apply and describe where indicated):

❑ Barricades, Barrier Tape ❑ First Aid Kit ❑ Fire Extinguisher
❑ Gloves (canvas. Rubber, leather?) ❑ LOTO ❑ Blower and hose
❑ Eye Protection (safety glasses; face shield) ❑ GFI Device ❑ Hearing Protection
❑ Body Protection (work coveralls, Tyvek) ❑ Head Protection (hard hat?)

IV. Atmospheric Tests *(Continuous Monitoring Maybe Required)*

Tests to Be Performed	Acceptable Entry Conditions	ACCEPTABLE? (Circle One)		Time Initial Test	1	2	3	4	5	6
OXYGEN (% Volume)	20.9% (19.5% to 23.5%)	Y	N							
FLAMMABILITY (% LEL)	<10% of LEL	Y	N							
CARBON MONOXIDE	<25 ppm	Y	N							
HYDROGEN SULFIDE	<10 ppm:	Y	N							

Make & Model: Conditions Measured: Serial No.:

V. Personnel

Entry Personnel Name(s) _____
Attendant Personnel (Name, Department): _____
Individual Performing Calibration & Testing of Space (Name & Initials): _____
Field Calibration Results: **O_2** _____ % **LEL** _____ % **CO** _____ ppm **H_2S** _____ ppm
Calibration Date & Time: _____

VI. Permit Acceptance – Supervisor Authorizing Entry: _____ Date: _____

Certifying Supervisor is responsible for ensuring that all necessary procedures, practices, and equipment for safe entry are in place before and during entry. Time _____

❑ EH&S has reviewed the entry Name _____ Date _____ Time _____

Additionally, the Space Owner (if applicable) has authorized this entry. Name _____

Job Completion:

Confined Space Entry completed and space returned to normal operating mode ❑ Yes ❑ No

Cancellation of Permit (Supervisor Authorizing Entry): Name _____ Date _____ Time _____

After permit activity is completed, please send copy to EH&S. fax 951-827-5122, ehs@ucr.edu

APPENDIX D: GUIDANCE FOR COMPLETING CONFINED SPACE ENTRY PERMIT (UCR CSE-001)

General Information

Obtaining the Permit:
A Confined Space Entry (CSE) Permit (UCR CSE-001 form) may be obtained through the EH&S Web site or through your Department. The permit requester must be a knowledgeable individual capable of providing detailed operational information and identifying potential hazards and the appropriate safeguards associated with the entry activity.

The Department Supervisor will be the only one authorized to issue and cancel permits. In the case of Alternative Procedures or Reclassifying a space, approval will be required from the Department Supervisor **AND** EH&S.

Each Department has its own permit numbering system, and will issue a **unique permit number** to each authorized permit when a permit is requested. The permit number is used for tracking and recordkeeping purposes.

Emergency Response:
NOTE: Provide the **emergency telephone number** for landline and **cellular** phones on the Permit.
The **UCR written Emergency Rescue Plan** must be attached to the permit, so confined space personnel are informed of current emergency procedures and contacts. If necessary, the plan may be modified for specific locations and activities. Contact EH&S for assistance as necessary.

Technical Support:
As necessary, contact the EH&S for technical assistance, regulatory interpretation and guidance for specific confined space entry activities.

PERMIT SECTION I

The **Confined Space Number** is typically identified on the upper left-hand corner of the confined space sign. The confined space number is derived in the following manner:
Location / Bldg. / Room / # within room : example; "A1-0858-1920-C". In situations where the space is located outside, "OUT" is listed for Room. "C" denotes that there are (3) confined spaces within the identified room. If the posted sign does not have an assigned confined space number, contact the Space Owner or EH&S.

Distinguishing Between Permit-Required and Non-Permit Confined Spaces:

- "Permit Required Confined Spaces" should have signs posted indicating [**DANGER** – PERMIT REQUIRED FOR ENTRY].
- "Non-Permit Confined Spaces" should have signs posted indicating [**DANGER:** ENTRY BY AUTHORIZED PERSONNEL ONLY].
- NOTE: In questionable areas which appear to qualify as a confined space, the absence of appropriate signage should not be interpreted to mean that the area is not a confined space. Contact EH&S if there are any questions regarding the status of a possible confined space.

Identify the period of time that the **permit** will remain **valid**.
Identify the **location** of the confined space (bldg. room, type of space) and provide a **description of the work** to be performed within the space.

PERMIT SECTION II – PAST, PRESENT, AND EXPECTED HAZARDS

Identify and briefly describe any **past, present, and expected hazards** which may be encountered during the entry activity.
Considerations include but are not limited to:

- Will the work being performed or the materials being used generate additional hazards which could impact the entry?
- Have past activities created new potential hazards which must be identified and controlled?
- Are there potential atmospheric hazards which require monitoring?
- Is hazardous energy present, either mechanical or electrical, which requires isolation and lockout/tagout?
- Will the past use(s) of the confined space create a hazard which requires additional safeguards?
- Does the configuration of the confined space create a potential engulfment or entrapment hazard?
- Are operations being performed in close proximity to the confined space which may impact the entry activity?

PERMIT SECTION III – SPECIAL REQUIREMENTS

The primary objective of Section III is to correlate potential hazards with effective safeguards and suitable equipment to ensure a safe entry. Identify any **special requirements** which apply to the entry activity. For each potential hazard identified in Section II, the appropriate **safeguard(s) and equipment** to control or eliminate the potential hazard(s) needs to be identified in Section III.
For example: if "hazardous energy" is marked as an expected potential hazard, the associated safeguards, i.e., energy isolation and LOTO, may be marked in Section III depending on the applicability to the specific activity. Similarly, if "hot work" is scheduled to be performed in a confined space, a Hot Work Permit would be identified under the block "other permits required". The "ventilation" block may also be marked with a description indicating that exhaust ventilation would be used at the source of contaminant generation rather than supply or dilution ventilation. Required equipment for this operation may include ventilation blower and hose, eye protection, fire extinguisher, respiratory protection, and protective clothing, again depending on the specific conditions of the space and the activity.
The equipment which has been selected and identified in Section III must be inspected by the personnel using the equipment to ensure proper working condition. The individual performing the **inspection** will **initial the space** on the permit after completing the inspection. Report any defective equipment to your Supervisor.

Alternate Procedures and Temporary Reclassification of Permit-Required Confined Spaces:

During specific entry conditions it may be possible to use the CSE Permit for the initial entry, downgrade the confined space to non-permit, and then use either the Non-Permit Confined Space Checklist – Alternate/C5 or the Non-Permit Confined Space Checklist – Reclassification/C7 for documenting subsequent entries. In situations where qualifying conditions exist, marking the C5 or C7 box on the permit will indicate that entries conducted after the initial entry will be documented on the Alternate/C5 or Reclassification/C7 Checklist. The majority of entry activities will use either the permit for the duration of the activity or the appropriate checklist; a combination of the two is generally infrequent.

The **Non-Permit Confined Space Checklist – Alternate/C5 (UCR-CSA)** is used for entry activities where it has been established that the only hazard posed by the space is an actual or potential hazardous atmosphere, and where it can be demonstrated that continuous forced air ventilation alone is sufficient to maintain the space safe for entry.
The **Non-Permit Confined Space Checklist – Reclassification/C7 (UCR-CSR)** is used for entry activities where it has been established that the space poses no actual or potential atmospheric hazards, and all hazards within the space may be eliminated without entry.

NOTE: Both Checklists are available from the EH&S Web site. Additional guidance on the completion of the checklists is provided directly on the forms.

PERMIT SECTION IV – ATMOSPHERIC TESTS

- Perform **atmospheric tests for oxygen and flammability**. Monitoring for **toxic materials**, such as carbon monoxide, hydrogen sulfide, and chlorine, is necessary when it has been identified that specific contaminants are present during the entry. When applicable, specific toxic materials must be identified and written on the permit.
- **Record the date, time, and measurements** of the initial atmospheric tests collected prior to entry.
- Ensure that all atmospheric measurements are within the **Acceptable Entry Conditions (AEC)** indicated on the Permit. If measurements are within the AEC, indicate yes by marking the "Y" block; if measurements are not within the AEC, indicate no by marking the "N" block. Entry must not proceed if atmospheric measurements are unacceptable or levels cannot be accurately established. If measurements are not acceptable, contact the Supervisor and EH&S immediately.
- **Continue to monitor** the atmosphere and **record the measurements** at an interval not to exceed 90 minutes.
- **Record the Instrument Make and Model, Serial Number, and the Factory Calibration Due Date**. The factory calibration date is found on a sticker placed on the monitoring instrument.
- For an entry activity that may continue for multiple days, personnel may use additional Permit forms attached to the intial sheet containing ALL the permit information.

PERMIT SECTION V – PERSONNEL

- The **Entry and Attendant personnel sign the Permit** and thereby certify that the required training has been received.
- The **individual performing calibration** (field function test) and testing **signs and initials the permit.** The atmospheric monitoring person may be a separately dedicated individual or may be either the entrant or attendant.
- The atmospheric monitoring person must document the following information on the permit: the **field calibration standard** used; the **results** obtained during the **instrument function check**; and the **date and time** of calibration.

PERMIT SECTION VI – PERMIT ACCEPTANCE / SUPERVISOR AUTHORIZING ENTRY (SAE)

The **Supervisor Authorizing Entry** (SAE) is the individual who has the responsibility of delegating and overseeing the work activities of others. The SAE, a designation which may include but not be limited to the Lead or crew chief, is responsible for:

- determining if acceptable entry conditions are present at a permit space

where entry is planned;
- certifying that all the requirements of the CSE Permit have been met;
- ensuring that the necessary procedures and equipment are in place and will remain in place to ensure safe work conditions throughout the entry;
- authorizing entry and overseeing entry operations; and
- terminating entry activity by signature

The SAE may also serve as an attendant or entrant as long as that individual is properly trained and equipped. All pertinent requirements relating to the duties of attendants and entrants would still apply to the entry supervisor who serves as an attendant or entrant. The Department Manager or Supervisor typically selects the SAE who may vary with each entry activity.

The **SAE signs the Permit** (Permit Section VI) which initiates the entry activity.

PERMIT SECTION VII – JOB COMPLETION

The workers involved in the confined space entry activity mark either the "yes" or "no" block indicating the **entry activity is completed and the confined space is clean, safe, and has been returned to normal operating mode.** The entry activity cannot be finalized until the space has been returned to normal operating mode. **The Supervisor Authorizing Entry signs** in Permit Section VII to **terminate the permit activity and finalize job completion.**

NOTE:
- The CSE permit must be available at the jobsite for the duration of the operation and personnel must be briefed by the SAE on the contents.
- When conditions or work activities, which could introduce a new hazard, are different than those specified on the permit, the original permit is revoked and a new permit becomes necessary. Return the completed permit to your Department and a copy to EH&S.

APPENDIX E: RESCUE OF PERSONNEL IN CONFINED SPACES

(Non-Entry Rescue and City of Riverside Fire Dept. Assisted Rescue)

Should it become necessary to rescue personnel from a confined space, it is essential that all personnel involved know exactly what to do and what not to do. There have been several instances where persons who were trying to rescue an individual in a confined space also became victims, because of failure to follow the proper procedures. The Attendant may retrieve a victim wearing a retrieval line from a confined space if this is possible without additional help **and does not require entry by the Attendant.** Typical rescue equipment includes tripod, wincher (mechanical lifting device), retrieval line, and body harness.

The hazards associated with work in confined spaces include possible exposure to the following:

1. Oxygen deficient atmospheres (Less than 19.5%)
2. Oxygen enriched atmospheres (Greater than 23.5%)
3. Atmospheres containing flammable gas or dust
4. Atmospheres containing toxic substances or biological hazards
5. Mechanical or physical hazards (electrical, steam, etc.)

A person who is down or who appears to be experiencing difficulty while working in a confined space could be affected by any of the conditions listed above, from a heart attack, or other illness. Rescuers must recognize these potential problems and protect themselves by wearing appropriate respiratory and personal protective equipment.

RULES FOR RESCUE OF ENTRANTS FROM CONFINED SPACES:

1. Ensure that a means to summon rescuers (telephone, cellular, 2-way radio, etc.) is operable and readily available at the entry site. Call for help. The City of Riverside Fire Dept. provides rescue/responder service for confined spaces at UCR. Never attempt to enter a vessel or confined space, even in an emergency, until help has arrived. If the victim is wearing a retrieval line, retrieval should be attempted from outside the vessel or confined space to the extent possible until additional help arrives. The UCR emergency phone number is 9-1-1.
2. Unless you are 100% sure that you know the cause of the incident, you must treat it as if it resulted from an abnormal or hazardous atmosphere and wear SELF CONTAINED BREATHING AIR (SCBA) EQUIPMENT if performing entry for rescue. This can only be attempted if you are:
   - Trained to do rescue;
   - Have relief if you are the attendant; and
   - Have a "Buddy" on stand-by wearing SCBA.

3. If the victim is unconscious remove the victim from the area immediately. In doing so, be as gentle as possible so as not to aggravate any injuries the victim may already have sustained.
4. If the victim is conscious and not suffering from an abnormal or hazardous atmosphere, check for injuries and treat life-threatening conditions immediately, if possible. Prepare the victim for removal so as to avoid further injury and remove the victim from the area as soon as possible.
6. Once outside the confined space render whatever first aid you are qualified to give, until Medical help arrives.

APPENDIX F – HOT WORK PERMIT PROCESS

UCR Campus Hot Work Permit Process

Applicability:

This process applies to all activities at UCR-controlled sites involving hot work, such as operating welding equipment or cutting torches, including:

- Work in designated welding shops.
- Use of portable welding machines, including those on vehicles.
- Use of welding or cutting torches in research and development laboratory work.
- Use of oxygen-fuel gas torches and arc welders.
- Use of open flame torches for operations, such as brazing and soldering.
- Use of open flame torches and hot air blowers in roofing operations.

Roles and Responsibilities:

Departments shall ensure that personnel who perform hot work activities are qualified to perform the specific type of hot work through one of the following:

- Union qualifications;
- Apprentice program; or
- Documentation of appropriate training or certification through a recognized training program.

EH&S will provide guidance on appropriate training and hot work permit procedures. The UCR Campus Fire Marshal may waive any or all permit requirements.

Hot Work Permits:

Must be obtained and posted for the duration of the activity, not to exceed the period for which the permit is issued, for the following operations:

- All hot work, including open-flame work in areas where flammable or combustible liquids are handled, where explosives are used or stored, and in confined spaces.
- Open-flame soldering operations. A permit is not required for soldering operations that do not involve open flames.
- Welding and cutting operations performed in garages or sheds.
- Soldering, welding, or cutting operations on used containers.

The Campus Fire Marshal will authorize and approve work, or waive any or all requirements for any of the situations below:

- Any hot work in an area where explosives are used or stored.

- Any hot work that must be performed within 35 feet of flammable liquids or motor vehicles, other than equipment being used on the job.
- Approval before performing soldering, welding, or cutting operations on used containers.
- Waiver for hot work operations, if it is deemed that a hot work permit is not required to be obtained and posted at the hot work site.

Individuals shall weld or cut in a designated welding or cutting area that satisfies requirements of the hot work permit.

Personal Protective Equipment:

- Impact and heat resistant goggles or eye protection, in many cases, helmets and eye protection that resist heat, fire, impact, and electricity.
- Lenses and filters in eye wear to protect against intense light or ultraviolet (UV) radiation.
- Gloves to be thermal and flame-resistant (leather preferred).
- Protective clothing to protect exposed skin form thermal and UV radiation.
- Overhead Hot Work Operations require head caps, sleeves, or shoulder covers with bibs made of leather or other flame-resistant material.
- Flame-resistant leggings may be appropriate for additional leg protection.
- Other personal protective equipment, such as hearing protective devices may be appropriate, but should not create a potentially hazardous situation. Consult EH&S for guidance.

Oxygen-Fuel Gas Welding and Cutting:

- All manifold systems and gas handling equipment must meet the CAL/OSHA welding standard.
- Hoses must be properly rated for the designed service, properly connected, and do not use clamps or wire for connections.
- All oxygen-acetylene or other fuel gas torch systems have a:
    - Pair of check valves (which automatically limit the flow in a piping system to a single direction) mounted between the hoses and the mixing barrel on the torch.
    - Flashback protection device between the hoses and the regulator on the bottle side to prevent flashback from passing the point where the protection device is installed on a torch. (It's recommended that flashback protection devices and check valves be installed in both the oxygen and acetylene lines).
- Operators shall use the manufacturer's recommended procedure for shutting off the torch being used.
- Operators shall inspect hot work equipment, including ppe, before use and replace defective equipment before proceeding.

Hot Work Operations:

- Waste

High Fire-Risk Locations:

The Campus Fire Marshal must be contacted during the planning stage of activities that require hot work to be conducted in one of the following locations:

- Fuel gas generator tanks and piping in rooms where fuel gas is generated.
- Exhaust ducts attached to wood, rubber, or fiber working machines and other ducts that may be coated on the inside with a flammable residue.
- Ducting in which flammable, toxic, or explosive vapors have been, or may be, present.
- Area where combustible fibers are used or stored or in woodworking areas.
- Impregnating tanks where flammable liquids are involved.
- Any area where wet-cell batteries are present.

Combustible Metals (or Alloys):

- Weld combustible metals, and alloys of combustible metals, only in areas specifically established for that purpose and equipped with inert arc welding equipment and special magnesium fire-fighting equipment.
- Place combustible metal dust, filings, and chips in closed, noncombustible containers, or remove them from the welding area before any welding begins.

Fire Watching:

- Individuals performing hot work at other than a permanent hot work location shall station at least one person (fire watcher) to watch for and extinguish any blaze that starts.
- If hot work is being performed in an unoccupied area where combustible materials are present, a person shall remain for 30 minutes after completion of the operation and during operator's breaks (lunch, coffee) to ensure that sparks do not start a fire.
- Fire Watchers shall warn the operator if hazardous conditions develop in the area effecting fire safety or personal safety of the operator.
- Fire Watchers shall have the appropriate fire extinguisher and shall be knowledgeable in its use.
- Fire Watchers shall be familiar with the operation of fire alarms, and be able to activate an alarm in the event of a fire.

University of California, Riverside
PERMIT

Cutting – Welding – Open Flame

Number: _____ Date: _____

Issued to: _____

Building or Location: _____ Room: _____

Job: _____

Special Conditions of Permit

☐ Smoke Detectors Impaired Daily ☐ Fire Resistive Blankets Needed

☐ Remove Combustibles ☐ Relocate work to Safe Location

☐ Fire Watch Required During and 30 Minutes After Operations

☐ Others: _____

Duration Of Permit
Start date: _____ Time: _____
Expiration Date: _____ Time: _____

Extinguishing Agents Needed

☐ Water ☐ Dry Chemical ☐ Dry Powder ☐ Other: _____

All conditions noted on the permit are considered minimum and mandatory.
Operators must take additional precautions as necessary to ensure a fire safe work area.

Operator's Name: _____
(Print)

Operator's Signature: _____

Campus Fire Marshal Signature: _____

Fire Watch

Fire watch (if checked above) will be provided during all work, lunch, and coffee breaks, and for 30 minutes after all work has been complete. Fire Watch shall be knowledgeable in use of fire extinguishers and fire emergency procedures.

Fire Watch Name: _____
(Print)

Fire Watch Signature: _____

APPENDIX G – CONFINED SPACE TRAINING

Overview: The information and training provided in this course will introduce individuals to the requirements for safe entering, exiting, and work in confined spaces on university-controlled properties. Upon completion of this course, the individual will have the knowledge to identify and evaluate the hazards and implement controls so that confined spaces can be entered with minimal risk. In addition, the material addresses information found in the regulatory requirements of the California Code of Regulations, Title 8, Sections: 5156 Scope, Application, and Definitions; 5157 Permit-Required Confined Spaces; and 5158 Other Confined Space Operations.

Topics covered in the training course include:

- Integrated Safety and Environmental Management (ISEM) – "Follow the Five"
- Confined Space Definition and Examples.
- Permit-Required Spaces vs. Non-Permit Required Spaces.
- Alternate Procedures for Entry.
- Hazardous Atmospheres.
- Signs and Symptoms of Exposure to Hazardous Atmospheres.
- Other Hazards.
- Hazard Isolation.
- Permit-Required Confined Space Operations.
- Atmospheric testing equipment and proper use.
- Ventilation for sufficient oxygen and contaminant control.
- Equipment for entry and personal protection.
- Communications.
- Emergencies and Rescue.
- "Confined Space Entry – Permit Required!" video [Coastal Video Communications Corp. 21 minutes).

Review Log

Date	Reviewed by	`Revision	`Approved by