ORANGE COUNTY SANITATION DISTRICT	SOP-604 (Ver. 4) Confined Space Program
Standard Operating Procedure (SOP)	Effective: 1/25/2022 Supersedes: 11/02/2020
Approved By: James D. Herberg General Manager	

I. Purpose

The purpose of this Standard Operating Procedure (SOP) is to ensure safe practices are utilized by Orange County Sanitation District (OC San) staff and contractors prior to and during all work activities in or adjacent to confined spaces. The program is designed to prevent personal injuries, illness, and fatalities that can occur during confined space entry.

The program is intended to control and to protect employees from permit-required and non-permit required confined space hazards and to regulate employee entry into confined spaces. The program provides the basis for confined space identification, hazard assessment and control, training, and entry operations including procedures, permits, air monitoring, and rescue.

II. Background

The elements contained in this program must be implemented and followed in all work activities where entry into a confined space is necessary. Entry means the action by which any part of a person passes through an opening of a confined space. Entry includes work activities performed at the space and considered to have occurred as soon as any part of the Entrant's body breaks the plane of an opening, whether such action is intentional, or any work activities are performed in the space.

OC San is committed to protecting OC San staff and contractors working in or adjacent to confined spaces. This will be accomplished by ensuring the following occur:

1. Evaluate the workplace to determine if any spaces are a permit-required and non-permit required confined space and maintain an inventory of all confined spaces within the OC San treatment plants and pump stations.

2. Develop and maintain a written confined space program, including a confined space entry permit system. The program will be reviewed at least annually and in accordance with the program administration section of this standard. The confined space entry permit system warrants a space-specific hazard analysis.

3. Inform OC San staff and contractors of such confined spaces by posting signs, development, and review of Confined Space Job Hazard Analysis (JHA) for permitted spaces, Job Safety Analysis (JSA), and confined space entry permits.

4. Develop workplace specific entry procedures for permit-required confined spaces, including designation of personal protective equipment and implementation of engineering controls (i.e., control of hazardous energy, ventilation, fall protection).

5. Training and education for employees, primarily to understand and address critical confined space issues and provide practical skills for successful confined space work.

6. Review of canceled entry permits and incident reports to identify and correct, as necessary, inadequacies in the written confined space program.

OC San has developed this procedure in accordance with the state of California Occupational Safety and Health Administration (CALOSHA) regulations for Confined Spaces (Title 8, California Code of Regulations (CCR), Article 108, §5156 – 5159) and Confined Spaces in Construction (Title 8, CCR, Article 37, §1950 – 1962). The application of the required practices and procedures to protect employees from the hazards of entry into permit-required confined spaces has also been included in the program. This program also complies with consensus standard NFPA 350, *Guide for Safe Confined Space Entry and Work* (National Fire Protection Association 2016).

III. Applicability

This procedure applies to all work performed in a confined space at the OC San treatment plants, pump stations and the collection system by OC San staff and contractors.

This procedure does not apply to construction work regulated by Construction Safety Orders for Excavations (Article 6), Tunnels Safety Orders (Subchapter 20), and General Industry Safety Orders for Diving Operations (Article 152) and Pressurized Worksite Operations (Article 154).

IV. Definitions

Acceptable Entry Conditions – The conditions that must exist in a confined space, before an employee may enter that space, to ensure that employees can safely enter and work within the confined space. Acceptable entry conditions are listed in the program and entry permit.

Adjacent Space – Spaces in all directions from the subject space, including points of contact, internal and external, such as decks, sumps, floating roofs, secondary containment areas, interstitial spaces, under floors, supports, tanks tops and bulkheads.

Administrative Controls – Work procedures such as written safety policies, rules, supervision, schedules, and training with the goal of reducing the duration, frequency, and severity of exposure to hazardous situations.

Air Changes Per Hour – An amount of air equal to the gross volume of air passing through a confined space in an hour.

Air Moving Devices – Term that includes exhaust, fan, or blower systems.

Atmospheric Monitoring – The act of using a portable or fixed gas monitor to sample the atmosphere in or around a confined space to determine the level of hazardous, gaseous contaminants present.

Attendant – A person who is qualified to be stationed outside confined spaces, who monitors authorized Entrants, and who performs specific Attendant duties.

Blanking or Blinding – The absolute closure of 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 maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Breathing Air Quality – Uncontaminated air with an oxygen content between 19.5 and 22 percent. Sources of breathing air may be from the atmosphere or Grade D breathing air from a compressor or cylinder.

Bump Testing – A qualitative function check where a challenge gas is passed over the sensors of a gas monitor at a concentration and exposure time sufficient to activate all alarm indicators to present at least their lower alarm setting.

Carbon Monoxide – A colorless, odorless, and poisonous gas, produced by the incomplete combustion of natural and synthetic based fuels.

Chemical – Any compound, mixture, or solution in the form of a solid, liquid or gas that may be hazardous by virtue of its properties other than or in addition to flammability, or by virtue of the properties of compounds that might be evolved from hot or cold work.

Class 1 Division 1 – A location in which ignitable concentrations of flammable gases or vapors may exist under normal operating conditions or in which breakdown or faulty operation of equipment or processes and or maintenance work might release ignitable concentrations of flammable gases or vapors.

Class 1 Division 2 – A location where volatile flammable liquids or flammable gasses are handled, processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment.

Combustible Liquid – Any liquid having a flash point (open cup) at or above 80 degrees Fahrenheit (26.6 degrees centigrade).

Competent Person – One who can identify existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Confined Space – A space that (1) 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, and (3) is not designed for continuous occupancy.

Confined Space Entry – Includes ensuing work activities in a confined space and is considered to have occurred as soon as any part of the Entrant’s body breaks the plane of an opening into the space.

Confined Space Permit – A written record that authorizes specific work, at a specific work location, for a specific time. The permit is used for controlling and coordinating work to establish and maintain safe working conditions. The permit ensures that all foreseeable hazards have been considered and that the appropriate precautions are defined and carried out in the correct sequence.

Confined Space Rescue Service – The confined space rescue team designated by OC San or Contractor to rescue victims from within confined spaces.

Confined Space Rescue Team – A combination of individuals trained, equipped, and available to respond to confined space emergencies.

Continuous Human Occupancy – Intended as a place of regular work, where supplied with ventilation, lighting, and sufficient room to accomplish anticipated tasks.

Contractor – Organization or individual that provides goods and services to OC San under terms specified in a contract. The term contractor applies to contractors, subcontractors, consultants, service representatives and visitors.

Control – Action taken to reduce level of any hazard in a confined space using engineering methods, and then using these methods to maintain the reduced hazard level. Personal protective equipment is not a control.

Dangerous Air Contamination - An atmosphere presenting a threat of causing death, injury, acute illness, or disablement due to the presence of flammable and/or explosive, toxic, or otherwise injurious or incapacitating substances.

(A) Dangerous air contamination due to the flammability of a gas or vapor is defined as an atmosphere containing the gas or vapor at a concentration greater than 20 percent of its lower explosive (lower flammable) limit.

(B) Dangerous air contamination due to a combustible particulate is defined as a concentration greater than 20 percent of the minimum explosive concentration of the particulate.

(C) Dangerous air contamination due to the toxicity of a substance is defined as the atmospheric concentration immediately hazardous to life or health.

Degassing – The process of collecting, oxidizing, or treating vapors and gases expelled from tank or vessel to prevent or reduce the amount of volatile organic compounds released into the air during vapor and gas freeing operations.

Double Block and Bleed – Closure of a line, duct, or pipe by closing and locking two in-line valves and by opening a drain or vent valve in the line between the two closed valves.

Early Warning System – Method (i.e., alarm activated by sensor, lookout with communication device) used to alert Authorized Entrants and Attendants that an engulfment hazard may be developing.

Emergency – Any unexpected internal or external occurrence or event, which could endanger the confined space Entrants.

Engineering Controls – A method of reducing exposure to a chemical or physical hazard through the practice of elimination, design, redesign, isolation, or substitution.

Engulfment – The surrounding and effective capture of a person by a liquid or flowable solid that can be aspirated to cause death by filling or plugging the respiratory system, or that can

exert enough force on the body to cause death by strangulation, constriction, crushing or suffocation.

Entrant – Person authorized to enter a confined space and perform work.

Entry - The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry Permit – A written, or printed document provided by an employer (OC San or Contractor) to allow or control entry into a confined space.

Entry Supervisor – Qualified person responsible for determining if acceptable entry conditions are present at a confined space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by the program.

Explosionproof – Equipment enclosed in a case that can withstand an explosion of a specified gas or vapor that might occur within it and preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within and that operates at such an external temperature that surrounding flammable atmosphere will not be ignited thereby.

Fall Arrest – A system intended to stop a worker’s fall before the worker hits the surface below.

Fall Restraint – A system to prevent a worker from traveling to an edge from which the worker could fall.

Flammable Liquid – Any liquid having a flash point (closed cup) below 80 degrees Fahrenheit and a vapor pressure not exceeding 40 psi at 80 degrees Fahrenheit.

Gas Monitor – A direct-reading, portable instrument designed to detect hazardous gases and vapors, including, but not limited to, oxygen, combustible gas, and a variety of toxic gas components or volatile organic compounds.

Hazard – Biological, chemical, mechanical, electrical, atmospheric, environmental, or physical agent that has or may have the potential to result in injury, illness, property damage, or interruption of a process or an activity in the absence of a control measure. Hazards may be adjacent, inherent, or introduced.

Hazards, Adjacent – Hazards that may exist in the area surrounding the space.

Hazards, Inherent – Hazards that exist as a permanent, essential characteristic or attribute of the space.

Hazards, Introduced – Hazards not normally associated with the spaces purpose or process but an introduced into the space or adjoining areas deliberately or inadvertently.

Hazardous Atmosphere – Any atmosphere that is oxygen enriched or deficient, contains a toxic or contaminant, is potentially flammable or explosive, or is immediately dangerous to life and health (IDLH).

Hot Work – Any work that creates a source of ignition, including, but not limited to, welding, cutting, grinding, open flames, frictional heat or sparks, smoking, and operation of internal combustion engines. A written permit is issued by OC San or Contractor for all hot work.

Hydrogen Sulfide (H_2S) – A colorless, flammable, and extremely hazardous gas. At low concentrations, the gas has a characteristic odor of rotten eggs. With continuous low-level exposure, or at high concentrations, a person loses their ability to smell the gas even though it is still present (olfactory fatigue). The gas is heavier than air and may travel along the ground.

Immediately Dangerous to Life or Health (IDLH) – Any condition which poses an immediate threat to life, would cause irreversible or immediate to adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Inert – The displacement of gas or vapors and oxygen (air) using an inert gas to eliminate the possibility of potentially flammable atmospheres in a confined space. Inert gases, such as argon and nitrogen, are nonreactive, nonflammable, and noncorrosive.

Intrinsically Safe – Equipment and wiring that are incapable of releasing sufficient electrical energy under normal or abnormal conditions to cause ignition of a specific hazardous atmosphere mixture.

Job Hazard Analysis (JHA) – A safety management risk assessment that is used to define and control the actual or potential hazards associated with any process, job, or procedure. JHA's are completed by the Risk Management Division prior any permit-required confined space.

Job Safety Analysis (JSA) – A safety procedure which helps integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, each basis step of the job is to identify potential hazards and to recommend the safest way to do the job. A JSA should be completed for critical jobs, tasks, or activities.

Limited or Restricted Means for Entry or Exit – A condition that has a potential to impede movement into or out of a confined space, including but not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces and ladders.

Lockout – The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lower Explosive Limit (LEL) – The lowest volume concentration of a combustible gas or vapor that when mixed with air will ignite, creating a fire or explosion (as known as the lower flammability limit).

Non-Permit Required Confined Space (NPRCS) – A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Occupational Exposure Limit (OEL) – The maximum amount of a hazardous material that a worker should be exposed to for a given period, as known as the permissible exposure limit (PEL) (OSHA), recommended exposure limit (REL) (NIOSH), and threshold limit value (TLV) (ACGIH).

Oxygen Deficient Atmosphere – An atmosphere within a confined space containing less than 19.5 percent oxygen by volume.

Oxygen Enriched Atmosphere – An atmosphere within a confined space containing more than 23.5 percent oxygen by volume.

Parts Per Million (PPM) – Parts of air by volume of vapor or gas or other contaminants.

Permissible Exposure Limit (PEL) – The maximum permitted 8-hour time-weighted average concentration of an airborne contaminant or physical agent.

Peak Value – The highest measured concentration of a combustible or toxic gas components and the lowest measured level of oxygen as detected by a gas monitor.

Permit-Required Confined Space (PRCS) – A confined space that has one or more of the following characteristics: (1) contains or has potential to contain hazardous atmosphere, (2) contains a material that has potential for engulfing an Entrant, (3) has an internal configuration such that an Entrant could become trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-sectional area, or (4) contains any other recognized serious safety or health hazard.

Personal Protective Equipment – All clothing and other devices worn by a worker to protect against workplace hazards.

Qualified Person – A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to a particular subject matter, the work, or the project.

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

Rescue Attendant – A person who is qualified to be stationed outside a confined space to monitor rescue Entrants, summon assistance, and perform non-entry rescues.

Rescue Entrant – A person entering a confined space for the specific purpose of rescue.

Rescue Plan – A plan developed by the Entry Supervisor those details how a rescue will be conducted from a permit-required confined space entry.

Rescue Supervisors – The person(s) in charge of managing the actions of a team performing a rescue.

Rescue Team – OC San personnel qualified to perform rescue from permit spaces.

Retrieval Equipment – Life safety components that can include, but not limited to, harness, ropes, pulleys, cable winches, and portable anchors that can be assembled to create a retrieval system.

Retrieval System – Combinations of rescue equipment use for non-entry (external) rescue of persons from confined spaces.

Self-Contained Breathing Apparatus (SCBA) – A respirator worn by the user that supplies a respirable atmosphere that is either carried in or generated by the apparatus, and that is independent of the ambient environment.

Self-Rescue – The act of escaping unaided from a permit-required confined space.

Span Calibration – The adjustment of the gas monitor's sensor response to match the desired value compared to a known traceable concentration of test gas.

Standby Worker – Person assigned to perform work in support of confined space operations.

Supplied Air Respirator (SAR) – A respirator worn by the user that supplied as respirable atmosphere that is generated by a remote source and connected via a hose line.

Time Weighted Average (TWA) – An employee's calculated or measured exposure to an airborne contaminant during a workday.

Upper Explosive Limit (UEL) – Highest concentration of a gas or vapor in air capable of producing a flash of fire in presence of an ignition source. Concentrations higher than the UEL are too rich to burn. Also called the UFL or Upper Flammable Limit.

Ventilation – The changing of air within a compartment by natural or powered means.

V. Responsibilities

A. Risk Management is responsible for the development, documentation, and administration of this Confined Space Entry Program, which includes the following tasks:

1. Develop and update this program in accordance with applicable regulations and guidance documents.

2. Evaluate the program on an annual basis, including review of cancelled entry permits to verify conformance with this program.

3. Retain copies of cancelled entry permits for at least 12-months.

4. Provide confined space awareness training to District staff who may work adjacent to, but not make entry into a confined space.

5. Provide confined space Attendant, Entrant and Entry Supervisor training and annual retraining to employees who may enter a confined space.

6. Provide confined space Rescuer training to employee who are part of the Confined Space Rescue Team or provide a qualified training vendor.

7. Provide technical assistance regarding confined space entry protocol, atmospheric testing, personal protective equipment, hazard assessment and control, and rescue.

8. Complete a Confined Space JHA for all entries into a permit-required confined space.

9. Perform investigations of all incidents and near misses relating to confined space entry.

B. Supervisors or designee shall be responsible for the following:

1. Ensure that each employee participating in confined space entry has the required training.

2. Ensure that employees perform work in compliance with this procedure.

3. Ensure employees have obtained a Confined Space JHA from Risk Management.

4. Verify the confined space entry permit and procedure is completed prior to permit-required confined space entry.

5. Monitor and enforce employee compliance with this program during job operations.

6. Evaluate the work location periodically for any change in hazards that may require a modification to this procedure.

7. Notify employees of new and existing hazards in the workplace and provide the appropriate PPE and equipment for those hazards.

8. Ensure that all equipment and PPE required by this procedure is available to employees always.

C. All OC San staff, service vendors, and contractors must:

1. Follow all confined space program policies and related safety procedures.

2. Only work adjacent to or within a confined space where trained and in accordance with this program.

3. Immediately report unsafe conditions to the Attendant or Entry Supervisor, and Entrants shall either not enter the space or evacuate the space until the concern is addressed.

4. Immediately report near misses and incidents to supervision.

5. Never perform a confined space entry where workers cannot be protected from hazards.

D. Entry Supervisor

The Entry Supervisor does not have to be an employee working in the supervisor position classification. This person may be a lead worker or an experienced employee in any job classification approved for confined space entry. Duties of the Entry Supervisor include, but are not limited to the following:

1. Shall be competent to oversee and direct confined space entry and associated operations in accordance with this program, and entry work permits.

2. Shall verify that the confined space entry permit is accurate, and that all tests, requirements, procedures, and equipment specified on the permit have been satisfied or are in place before issuing the permit to authorize entry.

3. Shall remain at the confined space to control operations unless relieved by another competent, qualified, and authorized Entry Supervisor. The leaving Entry Supervisor should inform the replacement Entry Supervisor of current confined space personnel involved. The replacement Entry Supervisor shall be added to the permit.

4. Shall conduct a pre-entry safety meeting with all persons involved prior to the start of the confined space operations.

5. Shall coordinate activities where multiple employers are working on the same job or on nearby jobs that might affect confined space operations.

6. Shall terminate the entry and cancel the permit if permit requirements are no longer met, or if hazardous conditions inside or outside the space arise that were not anticipated.

7. Shall be able to recognize the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.

8. Shall identify appropriate rescue methods, verify methods for alerting Rescuers and verify that Rescuers are available for a timely response.

9. Shall verify acceptable entry conditions are met and that they remain constant with requirements of the entry permit, including whenever changes occur inside or outside the space.

10. Shall ensure that access to the confined space is prohibited when work is not in progress and there are no Attendants present or emergency response is not available.

11. Shall ensure that areas are barricaded, cordoned off, or otherwise protected to prevent exposure to hazardous atmospheres where gases, vapors or inert gas is vented.

12. Shall ensure that rescue service is qualified to act in the capacity of rescue.

13. May be designated on the entry permit as an Attendant or Entrant and shall be qualified to perform atmospheric testing and selection of ventilation systems.

14. Shall be trained and/or qualified with the respective requirements for each position.

E. Authorized Entrants

Duties of an Authorized Entrant include, but are not limited to the following:

1. Shall be competent, qualified, and authorized to enter and working within a confined space.

2. Shall enter the confined space only when designated by the employer and authorized by the Entry Supervisor and only after a pre-entry evaluation has been performed and the permit is issued (if necessary).

3. Shall know the hazards that may be encountered during entry, including information on the mode, signs or symptoms, and consequences of the exposure.

4. Shall be informed of known and potential hazards within the space prior to entry.

5. Shall demonstrate the proper use of approved equipment, tools, and materials, including, but not limited to personal protective equipment, respiratory protection, non-entry rescue devices, instruments, and decontamination materials.

6. Shall review the pre-entry atmospheric testing results to validate the confined space is safe to enter.

7. Shall communicate or alert the Attendant when the Entrant recognizes any warning sign or symptom of exposure, detects a prohibited condition or so that the Attendant may monitor the Entrant's status to initiate evacuation from the space.

8. Shall exit from the space as quickly as possible when ordered by the Attendant or Entry Supervisor, when the Entrant recognizes any warning sign or symptom of exposure, an evacuation alarm is activated, or a dangerous situation exists.

F. Authorized Attendant

Duties of an authorized Attendant include, but are not limited to the following:

1. Shall be competent, qualified, and authorized for planned confined space work.

2. Shall demonstrate the proper use of assigned equipment, including, but not limited to personal protective equipment, respiratory protection, non-entry rescue devices, tools, and communication devices, and be able to demonstrate such competency to the Entry Supervisor.

3. Shall understand and be able to communicate to the Entry Supervisor the hazards inside and outside the specific confined space that might occur during entry, including the modes, signs or symptoms, and consequences of exposure to Entrants.

4. Shall constantly observed, monitor, and evaluate the conditions in and around the confined space to ensure that compliance with the requirements of the permit is maintained throughout entry.

5. Shall monitor adjacent areas outside the confined space for changing conditions that might affect safe entry work.

6. Shall remain stationed outside confined space opening during entry operations until relieved by another assigned Attendant. The leaving Attendant should inform the replacement Attendant of current confined space entry and Entrant status. The replacement Attendant shall be added to the permit. The Entrant shall be notified of the transfer of duties.

7. Shall monitor Entrant status and direct Entrant evacuation as needed.

8. Shall continuously maintain an accurate count of Entrants in the confined space.

9. Shall take the following actions when unauthorized person(s) approach or enter a confined space while entry is underway:

a. Warn nonauthorized personnel not to enter the confined space.
b. Inform Entrants and Entry Supervisor when nonauthorized personnel enter or attempt to enter.
c. Prevent nonauthorized personnel from interfering with Attendant duties.

10. Shall summon rescue and other emergency services immediately upon recognizing that an Entrant's distress inside the confined space.

11. Shall perform non-entry rescue as trained and equipped.

12. Shall summon rescue services as soon as it is determined that the authorized Entrant(s) may need assistance to escape from hazards present in the confined space.

13. Shall never perform an entry rescue, except where trained and equipped and duties of Attendant are reassigned to another trained employee.

Attendants may perform other assigned duties that do not interfere with the primary duty to monitor and protect Entrants, or where competent and qualified, such as testing external atmosphere, summoning Rescuers, and performing non-entry rescue. The Attendant may monitor more than one confined space if they can track and identify the authorized Entrants entering the spaces.

G. Rescuers

Rescuers may include trained OC San staff, third-party rescue services, or contractor rescue teams. OC San staff will not provide rescue services to contractors. Local emergency medical services (i.e., Fire Department) shall not be relied on as a confined space rescuer, however, these services shall be summoned in the event of a confined space rescue to provide medical services to Entrants once rescued from the confined space.

Rescuer responsibilities include, but are not limited to the following:

1. Shall be competent, trained and equipped as required by the confined space entry.

2. Shall be designated and able to respond to emergencies the require the rescue of the Entrants from outside or from within the space.

3. Shall be available and always on alert for prompt rescue or notify the Entry Supervisor if rescue services become unavailable.

4. Be familiar with personal protective equipment and rescue necessary for making rescues.

5. Use PPE and rescue equipment necessary for making rescues from confined spaces.

6. At least one member of the Rescue Team shall be certified in basic first aid and cardiopulmonary resuscitation (CPR).

7. Shall be trained to perform assigned rescue duties, including training as an Authorized Entrant.

8. Shall be informed of hazards adjacent to and within the space when called to perform rescue, including development of appropriate rescue plans.

9. Practice making rescues once every 12 months for permit spaces, by means of simulated rescue operations in which they remove dummies, mannequins or people from actual permit spaces or representative permit spaces.

10. Shall attempt to rescue using non-entry methods, except where it was determined by the entry team that use of such retrieval systems would increase the overall risk of entry or would not contribute to the rescue of the Entrant, and as such entry rescue is required.

H. Contractor

Contractors' requirements include, but are not limited to the following:

1. Shall have a written confined space program in accordance with CALOSHA Construction Safety Orders. The contractor's confined space program shall not conflict with and may be used to supplement OC San's confined space program, whichever is more stringent.

2. Shall identify and designate those individuals who are educated, trained, competent and/or qualified to perform specific confined space-related duties, including but not limited to, Entry Supervisors, Attendants, Entrants, hazard identification and controls, entering confined spaces, conducting atmospheric monitoring, providing for rescue, and ventilation. Confined space responsibilities shall be listed on the entry procedure and/or permit.

3. Shall participate in a pre-job safety meeting with OC San to establish assignments and responsibilities associated with the confined space entry.

4. Submit for review their employee's training records and their work-specific confined space entry procedures to the Risk Management Division for review at least five days before the job start.

5. Shall not perform any work in a confined space until a Confined Space JHA is completed by OC San's Risk Management Division. Contractor shall submit proof of training, a copy of the contractor's written confined space program, entry procedures, rescue, and ventilation plan (where required), hazardous energy control procedures (LOTO), safety data sheets, and any other required documentation for confined space entry.

6. Shall review and evaluate the confined space to be entered, identify actual and potential hazards, and determine appropriate measures to eliminate or control hazards.

7. Shall implement effective measures to prevent personnel from entering the confined space (unless they are designated as Entrants or when the space is not occupied).

8. Shall provide required equipment for entry and ensure that it is properly inspected, tested, maintained, and used in accordance with manufacturer's instructions and applicable safety programs.

9. Ventilation plans shall be prepared by a Certified Safety Professional (CSP), Certified Industrial Hygienist (CIH), or Professional Engineer (PE), where required by this program.

10. Shall identify, evaluate, and qualify assigned Rescuers or outside emergency services and develop and implement procedures for summoning rescue.

11. Shall evacuate Entrants upon discovery of unanticipated hazards outside or inside the confined space.

12. Shall certify that employee training, education or qualification has been completed.

13. Shall review safety issues and report any near misses or incidents sustained during confined space entry with OC San.

14. Shall request clarification on this written program and/or the current confined space inventory list, particularly for issues which may impact a contractor's proposed fee, work method, safety procedures, or schedule for any project. Clarification must be submitted in writing as a bidder question to OC San for a response prior to bidding a construction project. Once selected for work, interpretation of this program can be provided upon request.

15. When a contractor employs a subcontractor for work that involves a confined space entry, the contractor shall provide the subcontractor with a copy of this program. The primary contractor is responsible for verifying that their subcontractors are maintaining compliance with this program.

VI. Confined Space Types

A. Confined Space Definition

For a space to be considered a confined space, the space must exhibit all three of the following conditions:

1. Is large enough and so configured that an employee can bodily enter and perform assigned work. *The space shall be large enough that a person can physically enter and perform work. Entry begins as soon as any part of the body breaks the plane of the entry portal.*

2. Has limited or restricted means for entry or exit. *Limited or restricted includes use of ladders to access or if a worker is required to crawl or contort their body to enter or exit. Travel distance to an exit could also be considered to have limited means of exit.*

3. Is not designed for continuous employee occupancy. *This is a space where an employee is not normally assigned for work. The space can be considered for employee occupancy when it is designed or redesigned with ventilation, lighting, sufficient room to accomplish anticipated tasks, etc.*

All confined spaces are classified as a Permit-Required Confined Space until the space is tested and/or evaluated to determine if the space may be reclassified for entry as a non-permit confined space or using alternative entry procedures. Reclassification must be approved by OC San Risk Management. Structures that are under construction and meeting the definition of a

confined space will be classified as a permit-required confined space until evaluated for potential reclassification.

B. Permit-Required Confined Space

A permit-required confined space (permit space) is a confined space that contains 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 that slopes downward and tapers to a smaller cross-section, or

4. Contains any other recognized serious safety or health hazard.

A permit space may be entered using alternative entry procedures provided that:

1. It can be demonstrated that the only hazard posted by the permit space is an actual or potential hazardous atmosphere,

2. Forced air ventilation alone is sufficient to maintain the permit space safe for entry, and

3. Monitoring and inspection data is provided to support removal of the hazardous atmosphere through ventilation. Safety and health hazards must be eliminated prior to entry. If entry is required to eliminate or control the hazards, then entry must first be performed under permit space requirements. Refer to Section XIII, Reclassification of a Permit-Required Confined Space for additional information.

C. Non-Permit Confined Space

A non-permit confined space is a confined space shall have the following characteristics:

1. Does not contain or have the potential to contain a hazardous atmosphere capable of causing death or serious physical harm. *Only atmospheric monitoring can confirm the absence of a hazardous atmosphere. Atmospheric monitoring must be performed in the confined space prior to and during the entry. Non-permit confined space status cannot be achieved through use of forced air ventilation (see alternative entry procedures for ventilation of spaces).*

2. Recognized serious safety and health hazards (i.e., chemical, mechanical, electrical, engulfment, etc.) are eliminated or controlled within the space and entry is not required for such elimination. *The space may be classified as a non-permit confined space for as long as the hazards remain eliminated or controlled. If hazards arise within the space, Entrants shall exit the space and the space shall be reevaluated.*

3. Does not contain an internal configuration such that an Entrant can be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.

4. Work activities performed in the non-permit confined space shall not introduce any new hazards which could cause death or serious physical harm (i.e., toxic atmospheres or asphyxiation from welding, torch cutting, use of solvents, or gas purging). *Work activities must be evaluated prior to entry. Work activities capable of causing death or serious physical harm, the space must be reclassified as a permit-required confined space.*

VII. Confined Space Identification and Evaluation

Confined spaces located at OC San's treatment plants and pump stations have been identified and documented as part of this confined space entry program. Inventoried confined spaces have been evaluated for anticipated hazards according to the intended service or use of the space.

It is important to note that the inventory of confined spaces does not account for the additional hazards introduced outside or inside the space because of construction and/or maintenance-related activities. As such, the confined space must be further evaluated to determine if reclassification is necessary. This supplemental evaluation is completed by Risk Management using the Confined Space Job Hazard Analysis (JHA). Refer to the Confined Space JHA section for additional information.

The inventory of confined spaces includes the following information:

1. Name of building or area where confined space is located.
2. Geographic Information System (GIS) identification number.
3. Location and description of the space.
4. Size, access, and design of the space.
5. Potential or anticipated atmospheric hazards, including oxygen deficiency or enrichment, flammable atmosphere, hydrogen sulfide, dust or mist, and gas or vapor.
6. Potential for engulfment (including wastewater flooding).
7. Configuration.
8. Other recognized safety hazards (i.e., mechanical, pressure, electrical, heat or cold, chemical).
9. Potential for classification as a non-permit confined space provided elimination or isolation of hazards is effective and verified.
10. Presence of labels.
11. Availability of entry procedures.
12. Latitude, longitude, and elevation of the entry point.
13. Additional comments about the space.

The latest version of the inventory is maintained on the Risk Management page of the San Box (intranet site). Risk Management updates the inventory as new spaces are added or existing spaces are modified to change the original classification. The original classification may only be changed based on review of cancelled permits, results of atmospheric monitoring and near miss or incident investigation reports, or if the space has been modified so it does not meet the definition of a confined space. Reclassification is temporary and must be determined on a project-by-project basis.

Sewer systems located throughout the OC San service area are subject to special entry requirements. As such, the collection systems have not been included on the confined space inventory, must be evaluated prior to entry and subject to the requirements of Section XIV for Live Sewer System Entry.

VIII. Confined Space Job Hazard Analysis (JHA)

The Confined Space JHA is completed by Risk Management to perform a supplemental task-based hazard assessment for permit-required confined spaces requiring entry for construction and/or maintenance-related activities. The Confined Space JHA evaluates inherent, introduced, and adjacent hazards to the confined space for the requisition of engineering and administrative controls, as well as the potential reclassification of the confined space from its original intended service or use classification.

The Confined Space JHA includes the following information:

1. Name and contract information for Contractor or OC San staff requesting the evaluation.
2. Location of confined space.
3. Initial confined space classification based on intended service or use (pre-work) as listed on the confined space inventory.
4. Description of work to be performed in the confined space, including estimated completion date.
5. Identification of inherent, introduced, and adjacent hazards.
6. Minimum mitigation controls required prior to entry, including personal protective equipment and other equipment required for safe entry.
7. Assignment of confined space classification based on work to be performed.
8. Review of work plans, including confined space entry permits, ventilation plan, job safety analysis (JSA), rescue plan, lockout/tagout procedures, hot work permits, energized electrical permits, fall plan and safety data sheets (where necessary).
9. Required policies and training.

IX. Confined Space Entry Permit

The OC San confined space entry permit (entry permit) is a standardized document used by OC San in the performance of a permit-required confined space entry. Contractors may use the OC San entry permit, or an equivalent form approved by OC San. The OC San entry permit can be downloaded from Risk Management's SharePoint site.

A. General

The entry permit must be completed and signed by the Entry Supervisor to authorize entry. The Entry Supervisor shall verify that appropriate hazard assessments and atmospheric testing are performed, and safeguards are in place prior to and throughout entry.

An entry permit is the document which allows and controls entry into a permit required confined space. The entry permit must include the following items:

1. The permit space to be entered.

2. The purpose of the entry.

3. The date and the authorized duration of the entry permit.

4. The Authorized Entrants within the permit space, by name or by such other means as will enable the Attendant to determine quickly and accurately, for the duration of the permit, which Authorized Entrants are inside the permit space.

5. Means of detecting an increase in atmospheric hazard levels in the event the ventilation system stops working.

6. Each person, by name, currently serving as an Attendant.

7. The individual, by name, currently serving as Entry Supervisor, and the signature or initials of each Entry Supervisor who authorizes entry.

8. The hazards of the permit space to be entered.

9. The measures used to isolate the permit space and to eliminate or control permit space hazards before entry.

10. The acceptable entry conditions.

11. The results of air monitoring performed, accompanied by the names or initials of the testers and by an indication of when the tests were performed.

12. The rescue and emergency services that can be summoned and the means (such as equipment to use and numbers to call) for summoning those services.

13. The communication procedures used by Authorized Entrants and Attendants to maintain contact during the entry.

14. Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment.

15. Any other information necessary, given the circumstances of the confined space, to ensure employee safety.

16. Any additional permits that have been issued to authorize work in the permit space (i.e., hot work, energized electrical permit).

The entry permit must be made available to all Authorized Entrants at the time of entry. The entry permit shall be posted at the confined space entrance or by any other equally effective means, so that the Entrant can confirm that pre-entry preparations have been completed.

Entry permits shall not exceed the time required to complete an assigned task or one work shift, whichever is less. If the work activity exceeds one shift or work is completed over multiple days, a new entry permit shall be generated and issued.

The entry permit shall be posted at the confined space during entry operations for inspection by employees. Any problems encountered during entry are noted by the Entry Supervisor on the permit.

B. Canceled Permits

The Entry Supervisor shall cancel a permit upon completion of work, at the end of the shift, or when a condition not allowed under the entry permit arises in or near the permit space and that condition is not covered by alternate entry procedures, whichever occurs first. If the prohibited condition is temporary in nature and does not change the configuration of the space or create any new hazards within it, the Entry Supervisor has the option to suspend the entry permit instead of canceling it, to fully reassess the space before allowing reentry.

The canceled entry permits must be submitted to the respected Division's Supervisor or designee to ensure the permit was completed properly and any corrective actions are implemented before another confined space entry can occur. If the entry permit was completed by the Division Supervisor, the entry permit shall be submitted to the Division Manager for review. Once the entry permit has been reviewed, the canceled permit shall be retained by OC San for at least four years.

Contractors shall submit the cancelled confined entry permits to the assigned OC San Resident Engineer. Copies of the cancelled confined space entry permits will be retained on the project files.

Risk Management will review cancelled confined space entry permits annually. After each review, the program will be revised as deemed necessary. For more information on OC San review process, see Section XIX for Program Administration.

If an unanticipated hazard arises during any part of the confined space entry, the space will be immediately vacated. The Entry Supervisor shall reevaluate the hazards and implement additional engineering and/or administrative controls to render the space safe prior to reentry. If the Entry Supervisor cancels the entry permit due to the inability to mitigate or control the unanticipated hazard(s), then the Entry Supervisor shall document on the canceled permit the reason for the cancellation.

X. Hazard Mitigation

Entry Supervisors should ensure that all identified inherent, introduced, or adjacent hazards in and around the confined space are eliminated, mitigated, or controlled to extent possible. Hazards that cannot be controlled shall be listed on the permit by the Entry Supervisor, who should then make sure that the required personal protective equipment is used, or other measures are taken to ensure safe entry. Hazard control steps include but are not limited to the following:

A. Control of Hazardous Energy (LOTO)

All sources of hazardous energy (i.e., electrical, mechanical, chemical, hydraulic, pneumatic, thermal, stored energy) that can impact worker safety must be controlled prior to entry into a confined space. The energy sources shall be controlled in accordance with the OC San Control of Hazardous Energy (LOTO) Program (SOP-605).

Prior to entry, an energy control procedure (ECP) must be generated by the Division who will be making the energy isolations. The entry team, which includes Attendants, Entrants and the Entry Supervisor will apply personal locks in accordance with SOP-605. The control of

hazardous energy must be verified prior to entry. The ECP must be posted at the confined space with the Confined Space JHA and entry permit.

Pipes and lines (i.e., chemical, air, hydraulic, electrical) located in the confined space with the potential for materials to enter (i.e., leak or as part of normal operation) into the space shall be disconnected and drained, blinded, double blocked, bled, flushed, purged, or otherwise isolated prior to entry.

Pipes and lines that run through a confined space that will be worked on as part of the entry need to be disconnected and drained, blanked, bled, flushed, purged, or isolated as needed before work begins. The disconnection or blind shall be so located or done in such a manner that inadvertent reconnection of the line or removal of the blind are effectively prevented.

Pipes and lines that run through the confined space but do not terminate within the space do not need to be disconnected or isolated if it is determined by the Entry Supervisor to not impact the work performed and does not create a hazard to workers in the space.

If it is necessary for any equipment to continue operation to perform work in the space, the Entry Supervisor shall ensure that the work is performed using approved alternative methods or that the control measures provide effective protection to workers in the space.

B. Ventilation

Ventilation can be used to supply breathing quality air, remove, or control atmospheric hazards, and/or control temperature for comfort. Comfort ventilation is used where heat or cold stress may be an issue and must be assessed by the Entry Supervisor. Ventilation is primarily used to establish initial safe entry conditions or maintain the safe entry condition throughout the duration of the confined space entry. Ventilation can be completed using natural or mechanical methods. The effectiveness of ventilation will be verified using gas detection equipment.

Ventilation systems must be designed by a competent person. The ventilation system must consider volume and configuration of the space, capacity of the air-moving device(s), and nature of the hazardous atmosphere. A ventilation plan must be developed where ventilation is used to control a hazardous atmosphere. See Section XVI for more information regarding a Ventilation Plan.

1. Natural Ventilation

Natural ventilation is when breathing quality air from outside the space mixes with air inside the space, generally though natural pressure differentials without mechanical assistance. Natural ventilation shall only be used when a documented hazard evaluation and risk assessment demonstrates that adequate mixing will occur.

If natural ventilation is solely relied on to provide breathing quality air, atmospheric monitoring within the space must be continuous throughout the entry. Natural ventilation is a cost-effective method, but it must not be relied upon to ensure stable atmospheric conditions. Internal configurations and physical properties of the hazardous atmosphere can interfere or impede air circulation. Mechanical ventilation must always be used for entry into OC San permit-required confined spaces.

Generally, natural ventilation is adequate for shallow open pits which are entered under alternate entry procedures. Open pits (i.e., drained basin or valve vault) with all hazards controlled and having an expansive open roof along the entire footprint of the structure should receive adequate natural ventilation for construction or maintenance work that does not generate significant dust, fumes, or vapors. Portable ventilation equipment should be used as needed during activities such as welding, grinding, or coating which generate dusts, fumes, or vapors.

2. Mechanical Ventilation

Mechanical ventilation involves using one or more powered air moving devices (i.e., fan, blower) to either push or pull air into the confined space to create a slight vacuum that allows breathing quality air to enter and circulate the space. In some cases, both a push and pull ventilation system working in tandem may be necessary to effectively control the level of contaminants.

Ventilation equipment can generate and accumulate static electric charges. The Entry Supervisor must verify that the equipment used is properly bonded and/or grounded whenever a flammable or combustible contaminant exists within the space.

Ventilation equipment must be intrinsically safe when used to remove flammable, toxic, or combustible gas and vapors. Exhaust ventilation used to control flammable and combustible atmospheres should be positioned at a height above ground level to provide for proper dissipation. Verification that sources of ignition or personnel in path (downwind) of hazardous exhaust shall be conducted. Entrants will not be allowed to enter a permit required confined space until atmospheric monitoring verifies that ventilation alone has eliminated any hazardous atmospheric conditions inside the confined space.

Atmospheric conditions within the confined space shall be continuously monitored by a properly calibrated direct reading atmospheric monitor to ensure that the continuous forced air ventilation is preventing the accumulation of hazardous atmosphere. Bends and kinks shall be avoided in the ventilation ducting.

Based on the volume of the confined space, capacity of air-moving devices and nature of the hazardous atmosphere within the space, the required time for ventilation and air changes necessary to ensure stable atmosphere shall be determined. Entry shall not be permitted until the space has been completely ventilated. All live sewers shall have and maintain forced air ventilation prior to and during confined space entry.

Mechanical ventilation can be achieved using the following methods:

a. General (Dilution) Ventilation

Uncontaminated breathing air can be supplied, removed or a combination of both using powered air-moving devices. Air being supplied into the confined space must be from an outside uncontaminated air source. Depending on the size and configuration of the space and air devices used, ducting may be necessary to direct the air supply. This method dilutes the air in the space with uncontaminated air. When removing air from the space, the air-moving device shall be oriented so that the air is pulled from within the confined space to create a vacuum which allows for outside uncontaminated air to enter the space. A push and pull method can be used to increase the rate of dilution. Ventilation shall be set up to avoid short circuiting and dead zones.

b. Local Exhaust Ventilation

Local exhaust ventilation is used to capture and collect localized or locally created (i.e., welding or painting) atmospheric contaminants. The local exhaust ventilation is generally used for specific work activities or for chemical residues remaining in the space to limit the release of contaminants and prevent further contamination within the space. This ventilation method is only effective when it is located and maintained as closed as reasonably possible to the source.

C. Cleaning and Purging

Cleaning or purging might be required to remove chemical or atmospheric hazards from within the space. Cleaning and purging can only be performed after the process materials or chemicals have been removed from the pipe or space. Cleaning shall be performed to the extent possible from outside the space without need for entry. Cleaning may involve hosing or the pressure washing of surfaces.

Purging generally will be performing with an inert gas or water. Steam is not permitted for purging flammable atmospheres due to a possible result in fire or explosion. If the hazard cannot be removed through purging, then additional controls will need to be implemented.

Even after cleaning, harmful residues may remain in the confined space. Safety data sheets shall be reviewed to determine if residues are harmful to Entrants by inhalation or absorption in the skin.

Purging with an inert gas is used to control ignition hazards in a confined space by displacing the oxygen in the atmosphere with the inert gas. If entry is required after inerting, the confined space shall be purged with water or ventilated with breathing quality air, and the atmosphere tested to verity acceptable entry conditions. Whenever a confined space is purged, discharge points of evacuated ignitable atmospheres shall be considered. The confined space shall be labeled with signage remarking the lack of oxygen when an inert gas is used as a purge method.

Entry into an inert atmosphere should not occur except under well controlled situations where no other option for entry is available. If entry into an inert atmosphere is required, a combination full face-pressure demand supplied air respirator with auxiliary self-contained breathing apparatus (SCBA) escape mechanism shall be provided to Entrants. Leakage or exhaust of breathing quality air into the inert atmosphere may create a hazard by reducing the effectiveness of the inert concentration and increasing oxygen levels.

D. Area Secured and Marked

When standard covers are removed for purposes of confined space entry, approved fall protection systems shall be installed. Fall protection systems may include a controlled access zone, fall restraint, or arrest system, or guardrails. The fall protection systems shall be installed, maintained, and inspected according to the OC San Elevated Work and Fall Protection Program (SOP-626).

When covers are removed, signs or labels shall be posted at the entrance to the confined space. The signs or labels shall notify the person that unauthorized entry is prohibited and that a danger exists in the space. A sign reading “DANGER -- PERMIT-REQUIRED CONFINED

SPACE, DO NOT ENTER" or using other similar language would satisfy the requirement for a sign.

Walking and working surfaces located in and adjacent to the confined space shall be clean and free of trip hazards to the extent possible. Trip hazards that cannot be controlled shall be flagged or marked. Hoses, tubing, ducting, cords, etc. that are brought into the confined space shall be setup and secured to minimize trip hazards.

E. Approved Illumination

Only approved lighting can be used inside a confined space. Lighting shall consider flammable or combustible liquids, vapors, or gases in the space. Lighting may be in the form of headlamps, portable lighting, flashlights, or other approved equipment.

F. Animals and Insects

The confined space shall be visually inspected prior to entry, and any potentially dangerous animal or insect removed or eliminated. If extermination chemicals are used, hazardous atmosphere and dermal hazards shall be evaluated prior to entry.

G. Energized Electrical Work

Entry into a confined space with exposed energized electrical equipment must be performed by a qualified person in accordance with the OC San Electrical Safety Program (SOP-205). Any work performed on the energized equipment or where the Entrant is within the arc flash boundary shall be completed under an energized electrical work permit.

H. Hot Work Permit

When hot work is required in or adjacent to a confined space, the Entry Supervisor shall obtain a hot work permit from Risk Management. Where possible, cold work options shall be evaluated during entry. Cold work options may include mechanical cutting, cold cutting, scraping, hand grinding, and filing with equipment that minimizes the potential for sparks and heat. For example, cutting with hand saws, hydraulic shears, pneumatic chisels, or pipe cutters. Mechanical joining can be achieved by using nuts and bolts, screwed fittings, or couplings. Even though sparks may be generated by some of the cold work operations the risk is generally lower since they are typically not hot enough to cause ignition.

Grounding and bonding requirements shall be evaluated for equipment used in the confined space. For example, ventilation and cleaning operations could generate an electrostatic charge. Hot work shall be conducted in accordance with the OC San Hot Work Program (SOP-118).

I. Fall Protection

Fall protection shall be provided and maintained for all personnel working in and around the confined space where a fall hazard exists. Fall hazards shall be evaluated and addressed in accordance with the OC San Elevated Work and Fall Protection Program (SOP-626).

During confined space entry, any covers that are removed shall be adequately guarded to prevent falls. If workers need to work around the opening, a restraint system can be used where conventional guardrails are restrictive. Fall arrest systems shall be used for personnel entering

or working from within the confined space. If Entrants are lowered vertically into a confined space, a secondary independent form of protection shall be used.

J. Personal Protective Equipment

PPE shall be selected according to hazards present within the confined space. Required PPE shall be marked on the entry permit. The Entry Supervisor shall be aware of the various levels of protection offered and the suitability of existing PPE.

PPE shall be worn according to Section X – Entry Equipment and Personal Protective Equipment, as well as the OC San Personal Protective Equipment Program (SOP-102). Respiratory protective equipment must be worn in accordance with the OC San Respiratory Protection Program (SOP-109).

K. Equipment and Tools

Intrinsically safe (explosion proof) equipment and non-sparking tools shall be used when performing entries into a confined space that has been identified with a potential flammable or combustible atmosphere.

Entry Supervisor shall ensure that the electrical and mechanical equipment used in a confined space is approved, listed, labeled, and authorized as required for its intended use. All approved equipment that be inspected prior to use to ensure that it is in safe operating condition, including:

- Lighting
- Communication equipment
- Battery-operated tools
- Ventilation equipment and systems
- Portable electric and pneumatic tools
- Welding and cutting equipment
- Mechanical equipment
- Extension cords
- Compressors, pumps, and hoses
- Lifting equipment, including hoists, pulleys, and ropes
- Rescue equipment
- Scaffolding and other aerial equipment, including ladders

Electrical equipment used in a wet or damp location shall be equipped with ground-fault circuit interrupters and inspected by a qualified person prior to use.

L. Traffic Control

Protection from vehicle and pedestrian traffic hazards, both in the plants and in the collection system, can be provided using effective traffic control plans. Traffic control devices can control the hazards posed by vehicular traffic, but they cannot eliminate them. It is important to pre-plan the work site for traffic control device placement and use work vehicles and natural barriers as protective devices to the fullest extent possible.

M. Mechanical Lifting Devices and Lines

Appropriate retrieval equipment or methods must be used if a person must be lifted out of a confined space that is at depths greater than or equal to five feet. A qualified person must determine what rescue equipment will be needed to ensure a safe and prompt rescue, the proper type and availability of the equipment if retrieval lines are used.

If vertical extraction is required, then a tripod or other lifting device must be set up at the time of entry. Mechanical lifting devices must be installed and used in compliance with the manufacturer's installation and operation procedures.

Mechanical devices must be certified by a nationally recognized testing laboratory for such use. A tripod or davit arm system must be capable of supporting all imposed loads within the design limits set by the manufacturer or be designed with a 4:1 safety factor. Lifelines must have a breaking strength of 5,000 pounds or with a 2:1 safety factor. The mechanical device must have a manual cranking system and be operable by one person in additional to any power system. The mechanical device must have a primary and secondary braking system. All lifting devices must be marked with their rated load capacity and maximum cable length.

XI. Confined Space Notification and Prevention of Unauthorized Entry

OC San has similar, recognizable, or multiple confined spaces located throughout the treatment plants and pump stations. To provide a safe work environment and to prevent accidental entry of a permit space, OC San enacts the following methods to inform OC San staff, contractors and the public regarding the existence and danger posed by confined spaces at the OC San facilities:

1. Facility signage is posted at all entrances to the treatment plants. The facility signage posted at all entrances state: "DANGER – THIS FACILITY HAS MULTIPLE PERMIT REQUIRED CONFINED SPACES. DO NOT ENTER WITHOUT AUTHORIZATION".

2. Where feasible, individual signs or labels are posted at the confined space points of access. Individual confined space signs and labels including wording similar to the following: "DANGER – CONFINED SPACE", "DO NOT ENTER WITHOUT AUTHORIZATION".

3. OC San staff working adjacent to or in confined spaces are trained regarding this program, including the confined space inventory.

4. OC San will communicate confined space requirements to Contractors as part of the Job Site Safety Analysis process.

Confined spaces located at the pump stations shall be locked, guarded, protected, or barricaded to protect against unauthorized entry.

Moreover, Entry Supervisors and Attendants have duties to ensure that Entrants are authorized and that unauthorized persons are kept away or removed from permit spaces. See the Roles and Responsibilities section of this program for details.

XII. Entry Procedures

A. Pre-Entry Operation Procedures

The following actions are completed (as necessary) prior to entry:

1. The written confined space program is made available for inspection by employees.

2. Obtain Confined Space JHA for permit-required confined spaces from Risk Management.

3. Develop a confined space entry procedure.

4. The permit space is isolated and physical hazards within the space are eliminated or isolated in accordance with OC San Control of Hazardous Energy Program (SOP-605). This includes obtaining or developed an energy control procedure.

5. Complete a job safety analysis, identify, and evaluate all existing and potential hazards associated with the confined space.

6. Complete an entry permit for the confined space.

7. Entry Supervisor shall verify that rescue services are available, that the means for summoning them is operable, and notification for when these rescue services become unavailable is manageable.

8. All equipment listed in the PPE and equipment section of the permit is provided and maintained near the permit space or otherwise made available to employees. This includes non-entry rescue equipment if non-entry rescue is feasible.

9. Equipment, such as ladders, needed for safe ingress entry into, safe exit from, and rescue from the permit space is provided.

10. Any conditions (e.g., high pressure) that could make it unsafe to remove an entry cover are eliminated.

11. Pedestrian, vehicle, or other barriers necessary to protect Entrants from external hazards are made available and put in place, if possible, at this pre-entry operation stage.

12. If engulfment hazards (e.g., storm drain) cannot be isolated, an early-warning system that continuously monitors non-isolated engulfment hazards is provided that would alert Authorized Entrants and Attendants in sufficient time for the Authorized Entrants to safely exit the space. The early-warning system may be an alarm activated by remote sensors or lookouts with equipment for immediate communication with the Authorized Entrants and Attendants.

13. If atmospheric monitoring is done from outside the confined space, initial testing should be performed with all ventilation controls turned off to ensure testing of a static atmosphere and to determine the background gas concentration levels in the even that ventilation fails during entry.

14. If atmospheric hazards are eliminated or controlled by purging, cleaning, or ventilating the permit space, then the space shall be retested for acceptable entry conditions.

15. If isolation of the space is infeasible because the space is large or is part of a continuous system (e.g., live sewer), then pre-entry testing is performed to the extent feasible.

16. Each Authorized Entrant must be provided the opportunity to observe any testing of the permit spaces. Each Authorized Entrant must immediately be provided with the result of any testing conducted. Testing results must be recorded on the entry permit.

17. The permit space must be reevaluated in the presence of any Authorized Entrant who request that such a reevaluation be conducted when there is some indication that the evaluation of that space may not have been adequate.

18. If it is not possible to reduce the atmosphere below 10% LEL with ventilation, then the permit space shall be purged with an inert gas to render the entire atmosphere in the space non-combustible.

19. If it is not possible to eliminate other hazardous atmospheres in the space, then employees are provided with appropriate and effective PPE to address the atmospheric hazards.

20. Atmospheric hazard monitoring procedures must be reviewed to ensure that if the ventilation system stops working during entry, the procedures are sufficient to detect an increase in atmospheric hazard levels in sufficient time for Entrants to safely exit the permit space. The entry permit will specify the means of detecting an increase in levels.

21. The Entry Supervisor completes entries on the entry permit and ensures that all tests specified by the permit have been conducted and recorded on the permit and that all procedures and equipment specified by the permit are in place.

22. Conditions in the permit space are reviewed by the Entry Supervisor to confirm they are acceptable for entry.

B. Entry Operation Procedures

1. Entry Conditions

Authorized Entrants are only allowed to enter a permit space to perform work specified on an entry permit. The Authorized Entrants may only enter the permit space after all the following conditions are met:

- Pre-entry procedures have been completed.
- Acceptable permit conditions specified on the entry permit are achieved.
- An Attendant is present outside the permit space.
- An Entry Supervisor is present.
- The Entry Supervisor authorizes entry by signing or initialing the entry permit.

Entry Supervisors may serve as an Attendant or Authorized Entrant if the Entry Supervisor is trained for those roles. If only two employees are present, entry may not take place unless

either: (1) an Authorized Entrant and Entry Supervisor (serving as the Attendant) are present, or (2) an Attendant and the Entry Supervisor (serving as the Authorized Entrant) are present.

The Entry Supervisor shall ensure that acceptable entry conditions specified on the permit are maintained throughout entry.

2. Attendant Provision

One Attendant must be positioned outside the permit space where entry is authorized for the duration of the entry. The Attendant may be stationed at any location outside the permit space.

3. Proceeding with Entry

Once the entrance cover is removed, if present, any remaining pedestrian, vehicle, or other barriers necessary to protect Entrants from external hazards shall be immediately put in place. These barriers are specified in the entry permit to prevent an accidental fall through the opening and to protect each employee working in the space from foreign objects entering the space.

4. Hazardous Atmosphere Protections

Employees are not allowed to enter or remain in a space with a hazardous atmosphere unless appropriate PPE is used and will provide effective protection for each employee in the permit space.

Throughout entry operations, the space shall be monitored continuously in areas where Authorized Entrants are working, except that employers may use periodic monitoring if it can be demonstrated that equipment for continuous monitoring is not commercially available or periodic monitoring is sufficient. The monitoring equipment shall be equipped with an alarm that will notify all Entrants if a specified atmospheric threshold is achieved or that an employee will check the monitoring with sufficient frequency to ensure the Entrants have adequate time to escape.

If continuous monitoring is not used, periodic monitoring is required with sufficient frequency to ensure that acceptable entry conditions are being maintained. When monitoring for atmospheric hazards, monitor first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors. Monitoring shall be performed from the outside of the space. All levels and areas of the space shall be tested initially.

Each Authorized Entrant or his or her authorized representative is provided the opportunity to observe any testing or monitoring of permit spaces and is immediately provided with the monitoring results. Monitoring results are also recorded on the entry permit. The permit space is reevaluated in the presence of any Authorized Entrant or that employee's authorized representative who requests that such a reevaluation be conducted if there is some indication that the evaluation of that space may not have been adequate.

5. Engulfment Hazard Protection

If engulfment hazards cannot be isolated, an early-warning system with a mechanism for continuous monitoring shall be provided to alert Authorized Entrants and Attendants with

sufficient time for the Authorized Entrants to safely exit the space. Early-warning systems may include alarms that activate by remote sensors, or lookouts with communication devices to notify Entrants and Attendants. Entrants must evacuate the space as soon as the early-warning system detects a potential engulfment hazard.

6. Conditions for Prompt Evacuation

If any of the following conditions occur during entry operations, Entrants must evacuate the permit space:

- An order to evacuate is given by the Attendant or the Entry Supervisor.
- There is a warning sign or symptom of exposure to a dangerous situation.
- An injury or illness occurs during entry.
- An evacuation alarm is activated.
- The Entrant detects a prohibited condition.
- There is a change in the use or configuration of the permit space.
- A permit space hazard not covered by the permit is detected.
- An unauthorized person enters the permit space.
- The designated rescue service or emergency service becomes unavailable.
- The duration specified on the entry permit is about to expire.

Prohibited condition means any condition in or near a permit space that is not allowed by the permit during the period when entry is authorized. A hazardous atmosphere is a prohibited condition it can be demonstrated that personal protective equipment (PPE) will provide effective protection for each employee in the permit space, and we provide the appropriate PPE to each employee.

C. Suspended Entry Operation Procedures

If a prohibited condition is temporary in nature and does not change the configuration of the space or create any new hazards within it, the Entry Supervisor has the option to suspend the entry permit instead of canceling it. Suspension of the permit allows the Entry Supervisor to fully reassess the space before allowing re-entry.

D. Post-Entry Operation Procedures

After entry operations covered by an entry permit have been completed with or without incident, and all Authorized Entrants have exited the permit space:

- The Entry Supervisor will ensure the permit space portal is closed off properly.
- The Entry Supervisor terminates entry and cancels the entry permit.
- The Entry Supervisor will note on the entry permit any problems encountered during an entry operation so that appropriate revisions to the confined space entry program can be made.
- Contractors shall provide copies of the entry permit to OC San to be retained for at least one year to facilitate review of the confined space entry program.

XIII. Reclassification of a Permit-Required Confined Space

Alternative entry procedures must be approved by Risk Management.

A. Conditions for Alternate Entry

Permit-required confined spaces may be entered with alternate entry conditions provided that the following can be demonstrated:

- All physical hazards in the space are eliminated or isolated through engineering controls so that the only hazard posed by the permit space is an actual or potential hazardous atmosphere.
- Continuous forced air ventilation alone is sufficient to maintain the space safe for entry.
- The monitoring and inspection data is developed to demonstrate that the only hazard posed is an atmospheric hazard, which alone can be controlled by forced air ventilation. *Note: If initial entry of the permit space is necessary to obtain the data, the entry must be performed under permit conditions. Data must be substantial for employer and employees, as well as OSHA, to be able to determine that the space can be maintained safe for entry with use of ventilation alone. Risk Management must approve monitoring and inspection data. Contractor CIH or CSP must submit written approval for entry under alternate entry procedures.*

The determinations and supporting data required above are documented and available to each employee who enters the permit space under the specific alternate entry procedures. Entry into the permit space is performed in accordance with the alternate entry procedures listed below.

If ventilation shuts down for any reason (e.g., loss of power), Entrants must have enough time to recognize the hazard and exit the space or restore ventilation. Work within the space must not introduce any new hazards, such as working with flammable or toxic substances, hot work, etc.

The confined space inventory contains permit spaces currently identified at OC San, including location, hazards based on intended service or use, atmospheric hazards for monitoring, and whether it is possible for the space to meet alternate entry criteria. Only those spaces that are listed as such will be allowed for entry under the alternate entry procedures. A space that is designated only as a permit-required confined space is not eligible for reclassification unless if the space can be modified so that it would no longer be classified as a confined space.

B. Alternate Entry Certification

Prior to any alternate entry operation, the Entry Supervisor shall verify that the space is safe for entry and that the pre-entry measures within the specific alternate entry procedures listed below have been taken. This person then certifies his or her verification in writing. The written certification contains the date, the location of the space, and his or her signature. The certification is then made available to each employee entering the space. A copy of the certification is maintained with the Confined Space JHA near the confined space entry location.

C. Specific Alternate Entry Procedures

The following specific alternate entry procedures must be followed for entry into the permit space demonstrated and documented to meet the criteria for alternate entry:

- Before an entrance cover is removed, eliminate any conditions making it unsafe to remove an entrance cover.
- When entrance covers are removed, immediately guard the opening by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
- Before an employee enters the space, test the internal atmosphere, with a calibrated direct reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order.
- Provide any employee who enters the space an opportunity to observe the pre-entry testing required above.
- Do not permit a hazardous atmosphere within the space whenever any employee is inside the space.
- An employee must not enter the space until the forced air ventilation has eliminated any hazardous atmosphere.
- Direct the forced air ventilation to ventilate the immediate areas where an employee is or will be present within the space and continue this ventilation until all employees have left the space.
- Ensure the air supply for the forced air ventilation is from a clean source and does not increase the hazards in the space.
- The atmosphere within the space must be continuously monitored. The monitoring must ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Entrants must have adequate time to escape should a specified atmospheric threshold be triggered.
- If a hazard is detected during entry, each employee must leave the space immediately. The competent person will evaluate the space to determine how the hazard developed, and the Entry Supervisor will implement measures to protect employees from the hazard before any subsequent entry takes place.
- Ensure a safe method of entering and exiting the space.

D. NON-PERMIT CONFINED SPACES

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

Confined spaces identified as non-permit confined spaces must also be evaluated prior to entry to verify that anticipated work activities will not introduce new hazards that could cause death or serious physical harm. The space evaluation will be performed by Risk Management, through completion of the Confined Space JHA. The Entry Supervisor must verify that the hazards have been eliminated prior to entry.

Atmospheric monitoring must be conducted prior to entry to confirm the absence of a hazardous atmosphere. The non-permit confined space checklist must be completed prior to entry and provided for review to all exposed employees.

It is the responsibility of employees entering confined spaces to notify the Entry Supervisor when:

- there are changes in the use or configuration of a non-permit confined space that might increase the hazards to Entrants, or
- there is some indication that the initial evaluation of the space may not have been adequate.

When notified of the situation, the Entry Supervisor must reevaluate the non-permit space, and if necessary, reclassify it as a permit space.

In addition, it is permitted to reclassify a permit space as a non-permit space if the Entry Supervisor determines that requirements have been met for such reclassification. If such is the case, the Entry Supervisor documents the basis for determining that all hazards in a permit space have been eliminated or isolated, through a certification that contains the date, location of the space, and signature of the person making the determination. The certification must be approved by the Risk Management Supervisor. The Entry Supervisor is then responsible for making the certification available to each employee entering the space or that employee's authorized representative.

If hazards arise within a permit space that has been reclassified as a non-permit space, each employee in the space must exit the space, and the Entry Supervisor will notify a competent person at the site, who in turn, reevaluate the space and reclassify it as a permit space as appropriate.

XIV. Live Sewer System Entry

Entry into a live sewer system differs in respect to other confined space entries. Live sewers can rarely be isolated, or the isolation cannot be guaranteed as complete. As such, the atmosphere may suddenly become hazardous from causes beyond control of the Entrant. Employees entering a live sewer system shall be trained and demonstrate knowledge of sewer entry procedures.

The atmosphere within the sewer shall be tested by first placing the atmospheric monitor probe into the pick hole of the manhole cover or by removing the manhole cover back about one inch and placing the probe into the gap.

Ventilation must be established within the sewer to remove present or any potential atmospheric hazard. Live sewers must never be entered without ventilation, except under special conditions approved by OC San Management.

Entrants shall be equipped with a self-contained breathing apparatus (SCBA) or supplied air respirator (SAR) that delivers grade (D) breathing air to the user. Entrants must be equipped with an escape respiratory with at least 10-minute air supply.

Entrants must maintain 100% tie-off (i.e., full body harness, lifeline or rope, mechanical retrieval device) when working inside the live sewer.

Rescuers must be positioned outside the live sewer system. Rescuers must be equipped with a SCBA and retrieval equipment.

Entrants must be trained and equipped with atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout. Atmospheric monitoring equipment needs to be calibrated according to the manufacturer's instructions. Substance specific devices should be

used whenever actual contaminants have been identified. The instrument should be carried and used by the Entrant in sewer line work to monitor the atmosphere in the Entrant's environment, and in advance of the Entrants' direction of movement to warn the Entrant of any deterioration in atmospheric conditions. Where several Entrants are working together in the same immediate location one instrument may be used by the Lead Entrant.

Other special equipment is required when working in a live sewer, which can include Tyvek coveralls or fully encapsulating suits, waterproof flashlights, rope, and rafts.

XV. Atmospheric Monitoring

The Confined Space JHA and entry permit shall include recognized and potential atmospheric hazards related to the confined space entry. Atmospheric testing equipment must be selected based on the anticipated hazards. It is impossible to detect a hazardous atmosphere without instruments designed for that purpose. It should never be assumed that a confined space is safe or that an employee will be fine if he or she doesn't stay in a confined space for long periods of time or no dangerous work is performed in the space.

1. Bump Test and Calibration

Monitoring equipment must be bump tested prior to each use. Equipment calibrations shall be performed at manufacturer recommended intervals or if a bump test fails. OC San staff will perform bump tests and calibrations through equipment docking stations.

Testing equipment shall only be maintained by an approved manufacturer or the Instrumentation Division (OC San equipment only). Entry team members must never use instruments which are not properly calibrated. The entry shall be terminated if there is any question concerning the accuracy of the monitoring instrumentation.

2. Equipment Requirements

The direct-reading atmospheric monitors must always be used to determine acceptable entry conditions. The monitors shall meet the following minimum requirements:

- Must be capable of measuring for: %oxygen, %LEL, hydrogen sulfide, and carbon monoxide.
- Must be intrinsically safe (explosion proof).
- Must be splash, heat and shock resistant.
- Must be equipped with audible and visual alarms.
- Must be equipped with an external or internal pump capable of drawing a sample of the existing atmosphere from a depth of 50 feet.

3. Equipment Operation

Atmospheric monitoring must be performed for pre-entry testing and continuous monitoring of the atmosphere within the space. Pre-entry testing involves measuring the atmosphere for all potential hazardous atmospheres identified in the initial hazard evaluation before each entry. Monitoring equipment should be used to determine that the atmospheric conditions are within the range of acceptable entry conditions.

Atmospheric testing performed from outside the space, initially should be performed with all ventilation controls turned off to ensure testing of a static atmosphere and to determine background concentrations if ventilation fails. After initial testing is complete, the atmosphere shall be continuously monitored with the ventilation controls turned on if ventilation is necessary to mitigate the hazard.

Gases and vapors within a confined space can become stratified or layered. Therefore, initial air monitoring must be conducted from outside the confined space starting at top of and every four feet of travel vertically and horizontally into the space. It is recommended that tubing for atmospheric monitoring be marked or labeled at 4-foot intervals.

The depth of the confined space will have an impact on the amount of time necessary to draw a representative sample. Most atmospheric monitors require 2-4 seconds for every foot of tubing before the meter receives a representative atmospheric sample. Depending on the size of the meter and its pump capacity, this sample can take longer. It is up to the end user to reference the manufacturer's data for the time required.

If it is not feasible to conduct the pre-entry atmospheric testing from outside the confined space, then the Entrant shall enter the space wearing either a supplied airline respirator or self-contained breathing apparatus to complete the atmospheric testing.

Once the entire area of the confined space has been checked and atmospheric conditions inside the confined space have been determined to be safe, Entrant(s) may enter the confined space without any respiratory protection if the confined space is continuously monitored by a calibrated direct reading atmospheric monitor.

If it is not feasible to conduct continuous atmospheric monitoring of the confined space from outside the confined space, the Entrant shall wear a direct reading atmospheric monitor when working within the space.

The deployment of multiple portable calibrated direct reading instruments both inside and or outside the confined space is often used to conduct continuous monitoring. The advantage of using mutable meters is that it increases the area being monitored and can be beneficial in that it gives the Attendant the capability to alert the Entrant(s) to a potentially hazardous atmospheric condition before it impacts the area where they are working.

Direct reading instruments placed outside the confined space shall have the capability to be equipped with an external or internal pump, extension hose and hydrophobic filter. The monitor must be capable of drawing a sample of the existing atmosphere from a depth of 50 feet.

When using a single direct reading instrument outside the space, the probe shall be in such a manner that the atmosphere being sampled is from the Entrants breathing zone, an area one foot above or below the Entrants head. *Note: If an Entrant moves away from the area where the atmosphere is being sampled and monitored. The Attendant shall redirect the Entrant back to the monitored area or the Entrant must exit the PRCS and be fitted with a direct reading atmospheric monitor.*

Testing shall be performed in the following order:

- Oxygen deficiency or enrichment.
- Flammable gases and vapors.
- Toxic air contaminants (i.e., hydrogen sulfide, dust, mists, etc.).

If an unidentified contaminant source is determined to be present, then the entry will be stopped, and the permit will be cancelled. Risk Management will work with Division staff or contractor to determine the unidentified contaminant with appropriate direct-reading instruments or integrated sampling methods.

XVI. Ventilation Plan

A written ventilation plan shall be required for confined spaces based on scope of work (e.g., welding or cutting operations, chemical use, sandblasting, asbestos, or lead abatement) or for reclassification under alternate entry procedures. There may be a need for multiple ventilation plans for each confined space based on the tasks that are being performed. Anytime a hazardous atmosphere (i.e., vapor, gas, fume, dust, mist, aerosol) is present or produced, ventilation shall be provided to reduce the concentration in the environmental regardless of respiratory protection used.

The ventilation plan shall ensure engineering and administrative controls are evaluated to provide adequate protection of the Entrants, such as respiratory protection, local exhaust ventilation and continuous gas monitoring.

The need for a ventilation plan by task will be determined during the confined space JHA process. Ventilation plans shall be provided to the Risk Management Division for review prior to start of the confined space entry. The approved ventilation plan shall be maintained at the confined space throughout the duration of the work in which the plan was approved for. The plan shall be retained by the Risk Management Division for a period of four years.

The plan shall include, but is not limited to the following information:

- Location and description of confined space.
- Scope of work to be performed in the confined space.
- Hazards associated with work to be performed inside the confined space.
- Volume and configuration of the confined space.
- Duration of operations to be performed in the space.
- Concentration of specific toxic contaminates (if known).
- Natural air flow and atmospheric conditions.
- Relation of workers breathing zone to the contaminate.
- Ventilation rate of equipment in cubic feet per minute (CFM).
- Ventilation method(s) to be implemented.
- Atmospheric monitoring and PPE requirements.

XVII. Communication

Communication is imperative not only during rescue operations but also during normal course of work. Communication must be established and work from the inside of the space to the outside, and vice versa. Some confined spaces do not have a direct line of sight or where voice commands work without communication devices such as approved cell phones and two-way radios. Communication methods used between teams should provide backup in the event of a

communication system failure. Communication to be used for entry must be listed on the entry permit.

XVIII. Rescue and Emergency Services

Rescue and emergency services shall be provided for all permit-required confined space entry. Rescue procedures shall be developed for rescuing entrants from permit spaces, for providing necessary emergency services to rescued services, and for summoning additional rescue and emergency services.

Employees performing rescue and emergency services must:

- Be trained to properly use personal protective equipment and rescue equipment.
- Be trained to perform assigned rescue duties, including training as an Authorized Entrant.
- Practice making permit space rescues at least once every 12 months by means of simulated rescue operations; and
- Be trained in basic first aid and cardiopulmonary resuscitation (at least one member of rescue shall hold current certification).

A. Rescue Response Rate

Anticipated confined space hazards will determine the degree and quickness of rescue response. Confined spaces with no recognized hazards require a different level of rescue than those with life-threatening hazards.

For all permit-required confined spaces, at least one Rescuer shall be onsite who is trained and immediately available at the permit-required confined space to perform rescue services. The Rescuer can also be the Attendant or Entry Supervisor, but in the event the Rescuer initiates rescue, the Attendant position shall be filled by another trained and authorized employee. The Attendant will summon additional rescue team or service members in accordance with the confined space rescue plan, which must be capable of responding in accordance with the following:

- If the confined space poses no recognized hazards but may require entry rescue should a worker become incapacitated, rescue shall be summoned to perform and respond to the emergency in no more than 5 minutes, with entry made no more than 15 minutes after arrival to the work site.
- If the confined space poses an immediately dangerous to life and health (IDLH) atmosphere, rescue must be onsite throughout the duration of the work and be capable of providing immediate action to rescue the Entrant(s) within 2 minutes. The rescue team shall be dedicated to this singular entry with no other responsibilities.

B. Types of Rescues

There are three types of rescues: self-rescue, non-entry rescue and entry rescue. Non-entry rescue retrieval systems are always required unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the Entrant.

A rescue service shall be designated regardless if non-entry rescue or entry required rescue is the selected approach. When non-entry or entry rescue is selected, retrieval systems or other approved methods shall be used whenever an Authorized Entrant enters a permit space, and shall confirm, prior to entry, that emergency assistance would be available if non-entry rescue fails.

1. Self-Rescue

Entrants may self-rescue themselves when they recognize a critical condition or symptom of exposure and exits the space on their own. Alternatively, an Attendant or Entry Supervisor who is outside of the space may recognize a new hazard and order Entrant to vacate the space before the Entrant is affected. Self-rescue is the preferred rescue method as confined space hazards can quickly incapacitate or kill an Entrant but is prohibited from being the only rescue method.

The Entry Supervisor must reevaluate the space after a self-rescue to determine if the hazards can be controlled and implement the appropriate engineering controls.

2. Non-Entry Rescue

In a confined space emergency, hazards may exist that would affect those who would enter the space to provide rescue. It is best to extract the Entrant without entering the space, so as not to expose the Rescuers to the hazards causing more persons who require rescue. In most cases, approved and appropriate non-entry rescue provisions (retrieval systems) shall be used to allow this option.

In permit spaces where the use of retrieval systems is feasible, the Entrant(s) will wear a full-body harness, retrieval line, and respiratory protection (depending on atmospheric hazards). Retrieval systems must comply with industry standards. The retrieval line may be of rope or a retracting-cable system.

As soon as the Attendant determines that non-entry rescue must be performed, they will use the device to retrieve the Entrant from the permit space. Once the in-house or outside rescue service arrives, if the victim(s) are not yet rescued from the permit space, the rescue service will continue non-entry rescue if feasible. If non-entry is no longer feasible, entry required rescue will be executed.

Unless the requirement is waived, retrieval systems should maintain independent lines on each Entrant, to allow independent retrieval of any Entrant should an incident occur. Unless the entry qualifies for waiver of retrieval systems, they should be attached to the Entrant prior to entry and maintain attached at all times until the Entrant has left the space.

The need for retrieval systems must be evaluated by the Entry Supervisor. It must be recognized that retrieval is not always prudent or even possible. Spaces that contain internal configurations that could entangle or trap a person against a structure, a line attached to the Entrant might not function at all or, even worse, cause further harm to the Entrant during the retrieval attempt. In such cases where the retrieval system is waived, entry required rescue is required.

No Attendant will attempt an entry rescue unless he or she has been relieved by another Attendant and has received the specified rescue training and is equipped for rescue operations.

3. Entry Rescue

When non-entry rescue is infeasible, entry into the permit will be performed by the designated rescue service or team. At all times during the entry rescue operation, an Attendant will be stationed outside the permit space to monitor activity in the space.

Generally, if the cause of the incident prompting rescue cannot be determined to be unrelated to the atmosphere in the space (regardless of gas monitor readings), appropriate atmosphere-supplying respirators shall be worn by rescuers and provided to victims.

This type of rescue is the most hazardous type of rescue because it requires rescue personnel to enter a permit-required confined space that contains an IDLH environment or hazardous situation to extract the injured Entrant(s).

The configuration of the space, work conducted, and the quantity of Entrants will have an impact on the number of Rescuers, types and amount of safety equipment and retrieval devices. Where arranged, third-party rescue services shall be informed of hazards they may confront when called onto perform rescue and be provided access to all permit spaces from which rescue may be necessary so that appropriate rescue plans can be developed.

C. Outside Rescue Services

Outside rescue and emergency services must be arranged prior to confined space operations. The following shall be considered for outside rescue and emergency service designation:

- Evaluate the outside services ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified.
- Evaluate the outside services ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing Entrants from the permit spaces.
- Select a rescue team or service from those evaluated that:
    - Has the capability to reach the victims(s) within a time frame that is appropriate for the permit space hazard(s) identified,
    - Is equipped for, and proficient in, performing the needed rescue services, and
    - Agrees to notify the controlling employer immediately if the rescue service becomes unavailable.
- Conduct an evaluation to determine that the outside rescue services selected are equipped for and proficient in performing the needed services for the permit spaces identified in this written program and has the capability of reaching the victim(s) at OC San within a time frame that is appropriate for the permit space hazards identified.

For purposes of outside rescue services, it is prohibited from stating in the rescue plan that dialing 9-1-1 will meet this requirement. If the local fire department is listed in the rescue plan, the Entry Supervisor must verify each of the above requirements with the local fire department. It is OC San's experience that local 911 will only provide medical services once the injured employee has been rescued from the confined space.

The outside service organization must be informed about the nature of the hazards associated the confined space(s). The organization shall provide access to permit spaces requiring services so that it can develop appropriate rescue plans and practice operations.

Prior to conducting the permit space entry, the rescue service must be contacted to verify rescue services will be available during the planned entries. The outsides service organization must contact the controlling employer as soon as rescue services become unavailable. In such case, the controlling employer must immediately notify the Attendant(s) or Entry Supervisor(s), at which time the Attendant(s) or Entry Supervisor(s) will alert all Entrants to evacuate any occupied permit spaces. A written agreement with the outside organization shall be maintained by the controlling employer.

In the event an injured Entrant(s) is/are exposed to a chemical substance, the Safety Data Sheet (SDS) must be kept at the worksite and be made available to the emergency medical responder and the treating medical facility. This is to ensure appropriate medical treatment of the victim(s) and to avoid unnecessary exposure to medical personnel.

D. In-House Services

If the contractor elects to use in-house rescue services, the in-house rescue team must be evaluated and subject to the same requirements as outside rescue services. The in-house rescue team must provide training records to OC San for review and approval. Each member of in-house rescue team shall be informed of the hazards they may confront when called on to perform at this site. At least one member of the in-house services team shall possess current first aid and CPR certification and be always made available during permit space entry.

The contractor must thoroughly evaluate the rescue team to ensure that it is proficient in performing the needed services for the permit spaces identified in this written program and has the capability of reaching the victim(s) at OC San facilities. The rescue team must be capable of being onsite, setup, and provide rescue within the time frame specified in Section XVIII(A) – Rescue Response Rate.

The Attendant and/or Entry Supervisor shall be notified by the contractor if the in-house service becomes unavailable, at which time the Attendant(s) or Entry Supervisor(s) will alert all Entrants to evacuate any occupied permit spaces.

E. Retrieval Systems

Mechanical retrieval devices are required for all permit-required confined space entries. If the confined space is designed and configured that a mechanical device cannot be installed or used without presenting an increased hazard or danger to the Entrant or entry team, then an alternate method must be developed by the confined space Entry Supervisor prior to entry. Alternate methods may incorporate the use of lifelines, ladders, pulleys, and man baskets. Alternate methods must be approved by Risk Management.

Retrieval systems shall meet the following requirements:

- Each Authorized Entrant shall use a full body harness, with a retrieval line attached at the center of the Entrant’s back near shoulder level.
- The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than five feet deep.

- Equipment that is unsuitable for retrieval shall not be used, including, but not limited to, retrieval lines that have a reasonable probability of becoming entangled with the retrieval lines used by other Authorized Entrants, or retrieval lines that will not work due to the internal configuration of the permit space.

F. Emergency Services

Emergency services shall be notified soon after rescue services are initiated. When working at OC San's Plant 1 or 2, the Control Center shall be notified immediately via two-way radio, cell phone or from an OC San landline. The Control Center can be reached by calling 714-593-7025 or dialing 2222 from an OC San landline. The Control Center once briefed with the location and nature of the emergency will contact local emergency services. The Control Center will dispatch the OC San Medical Response Team to assist with medical services until emergency services arrive.

When working at OC San's pump stations or other off plant location, local emergency services shall be contacted by dialing 911.

Medical services shall be provided as soon as the victim(s) reach the outside of the space. The victim(s) will be transported to the hospital by local emergency services. If victim(s) rescued from the permit space have been exposed to a substance for which a safety data sheet (SDS) or other similar written information is required to be kept at the site, the pertinent SDS(s) or written information shall be made available to the medical facility or personnel treating the exposed victim(s).

G. Rescue Plans

A plan shall be developed prior to entry for persons conducting rescue operations. The rescue plan shall be developed by a person competent in rescue. The plan shall include the following at a minimum:

- Characteristics of the confined space (e.g., type, function, configuration, construction, size, entry points).
- Assignment of roles.
- Retrieval systems.
- Rescue systems.
- Personal protective equipment (including atmosphere supplying respirators).
- Communication and communication equipment.
- Ventilation and atmospheric monitoring requirements.
- Control of all sources of energy.
- Rigging required for rescue (e.g., slings, rescue basket, ropes, stabilizers, winches).
- Perimeter control, if needed (e.g., may need police, barrier tape, control traffic, limit access).
- Potential intervention team (e.g., standby team to assist during rescue).
- Debrief and documentation after rescue, including post incident analysis.

XIX. Program Administration

After each entry, a Division Supervisor shall review canceled entry permits and all supporting data. The permits will be reviewed to determine if any problems were encountered requiring immediate or future corrective action and discrepancies in how the permits were completed. The Division Supervisor will retain copy of the permit and communicate any problems with the program directly to Risk Management. Risk Management will update inadequacies in this written Confined Space Entry Program to ensure that employees participating in entry operations are protected from hazards.

To accomplish this responsibility, Risk Management will conduct a single review at least annually or prior to successive entries performed since the previous review. OC San will then revise the written program as necessary. If no entries were performed during a review period, no review is necessary.

However, OC San will also review entry operations sooner whenever there is reason to believe that the measures taken under the permit space program may not protect employees. Risk Management will then revise the program to correct deficiencies found to exist before subsequent entries are authorized.

Examples of circumstances requiring review of the permit space program include:

- Any unauthorized entry of a permit space.
- The detection of a permit space hazard not covered by the permit.
- The detection of a condition prohibited by the permit.
- The occurrence of an injury or near miss during entry.
- A change in the use or configuration of a permit space.
- Employee concerns about the effectiveness of the program.

Affected employees will be retrained in any program revisions that reflect changes in duties, hazards, and/or entry procedures. Employee training records are maintained in the computerized Training Management System Database.

The program will also be evaluated annually by Risk Management to ensure that it is effective in providing adequate protection from hazards associated with confined spaces during Entrant activities.

The following steps shall be followed to conduct this program review:

- Shall determine if regulations or national consensus standards have changed since the last annual program review.
- Review Federal and California OSHA Regulations, interpretations, and documents.
- Review ANSI standards.

The Risk Management Division shall review the current PRCS program, proposed changes to State and Federal Regulations and national consensus standards and recommend changes to the OC San Permit Required Confined Space Program as required.

XX. Recordkeeping

All records created or generated during this procedure shall be legible and stored in a way that they are readily retrievable in facilities or electronic document/content management systems that provide a suitable environment to prevent damage, deterioration, or loss. Records may be in the form of any type of media, such as hard copy or electronic media. The OC San Records Retention Schedule is the official procedure governing the retention, retirement, and destruction of OC San records. Document owners should use these schedules to determine the item and series that best fit their records. Document owners are responsible for ensuring that documents are properly marked, indexed, and filed for their projects or area of responsibility.

XXI. Training

Employee training is an integral component of the Confined Space Entry Program. District staff and contractors who job duties requires him or her to participate in a confined space entry shall be trained to a level of understanding, knowledge, and skills necessary for the safe performance of the duties assigned to them.

A. OC San Staff

1. Permit-Required Confined Space Training

District staff participating in permit-required confined space entries must complete all the prerequisite training classes. OC San entry teams must comprise of an Entry Supervisor, Attendant and Authorized Entrant. Prerequisite training includes but is not limited to the following:

- Permit Required Confined Space Entry
- Atmospheric Monitoring
- Self-Contained Breathing Apparatus (SCBA)
- Fall Protection
- Personal Protective Equipment (PPE)

Additional training is required whenever:

- There is a change in the permit space operations that presents a hazard(s) that the entry team has not encountered in previous confined space entries.
- Whenever an entry team member has reason to believe that there is a deviation in the permit space entry procedures.
- Whenever there are inadequacies in an entry team member’s knowledge or use of the permit space entry procedures.
- Whenever there are new revisions are made to the permit space entry procedures and or the OC San Confined Space Entry Program.

OC San employees must pass the confined space entry test with a score of 80% or attend an annual confined space entry training class to remain qualified. Failure to do so will make them ineligible to participate in permit required confined space entries.

2. Non-Permit Confined Space Training

OC San provides general confined space awareness training for entry into non-permit confined spaces. OC San staff who have non-permit confined space training may only enter confined spaces that have been temporarily reclassified by Risk Management as a non-permit confined space.

OC San staff participating in non-permit confined space entries must complete all the prerequisite training classes listed below before they can become permit required confined space entry qualified.

- Confined Space Awareness Training
- Atmospheric Monitoring
- Personal Protective Equipment (PPE)

Confined Space Awareness training is provided to employees whose job classification does not require them to enter confined spaces or be involved in any aspect of entry. The purpose of the awareness training is to educate employees to be able to recognize a confined space, to understand limitations of working around a confined space, and to recognize and avoid hazards associated with a confined space.

3. Confined Space Rescue Training

Rescue training is required for employees who are profiled or volunteer to be part of an Entry Rescue team. The following prerequisite training is required for rescue team employees.

- Permit Required Confined Space Entry
- First Aid and CPR
- Atmospheric Monitoring
- Mechanical Retrieval Equipment
- Personal Protective Equipment
- Communication Equipment
- Self-Contained Breathing Apparatus (SCBA)

In addition, the rescue team members must simulate a rescue at least every 12 months rescue team must satisfy the requirements described in the CALOSHA safety orders.

B. Contractors

Contractors shall provide training to its employees that are expected to enter permit spaces, as regulated by the confined spaces in construction standard, to ensure that each employee possesses the understanding, knowledge, and skills necessary for the safe performance of the duties assigned to him or her as they relate to the standard. The training program shall be provided at no cost to the employee and in a language and vocabulary that the affected employee can understand.

Training must result in an understanding of the hazards in a permit space and the methods used to isolate, control, or in other ways protect employees from these hazards. Those employees not authorized to perform entry rescues must also understand the dangers of attempting such rescues.

Confined space training records for all Authorized Entrants, Entry Supervisors, Attendants, and Rescuers must be provided to OC San prior to entry operations. The contractor must provide training and retraining to affected employees at the following times:

- Before the employee is first assigned duties under the standard.
- Before there is a change in assigned duties under the standard.
- Whenever there is a change in permit space entry operations that presents a hazard about which an employee has not previously been trained.
- Whenever there is any evidence of a deviation from the permit space entry procedures.
- Whenever there are inadequacies in the employee's knowledge or use of permit space entry procedures.
- When new or revised entry procedures are introduced.

After an affected employee has completed training, the contractor will determine whether the employee has proficiency in and can safely perform his or her respective and required duties. The contractor shall provide the name, role, and listed trainings in a training record. The training record shall be made available for inspection by for the period the employee is employed by the contractor.

XXII. Exceptions/Conditions/Provisions

Contractors shall request clarification on this written program, including the current confined space inventory list, particularly for issues which may impact a contractor’s proposed fee, work method, safety procedures, training requirements, or schedule, in writing as a bidder question to OC San for a response prior to bidding. Risk Management will provide technical assistance to contractors regarding this program prior to or during confined space entry.

XXIII. References

Injury and Illness Prevention Program

NFPA 350, Guide for Safe Confined Space Entry and Work

SOP-102, Personal Protective Equipment

SOP-109, Respiratory Protection Program

SOP-118, Hot Work Program

SOP-205, Electrical Safety Program

SOP-605, Control of Hazardous Energy (LOTO)

SOP-608, Contractor Safety

SOP-626, Elevated Work and Fall Protection Program

Title 8, California Code of Regulations, Article 37, Confined Spaces in Construction, Sections 1950 - 1962

Title 8, California Code of Regulations, Article 108, Confined Spaces, Sections 5156 - 5158

XXIV. Revision History

Version	Date	By	Reason
1.0	11/21/2013		
2.0	08/09/2018	Frattali, John	Program Update
3.0	07/05/2020	Frattali, John	Periodic Update – Refer to Program Change Log
4.0	09/24/2021	Lam, Brian	Annual Program Review – Refer to Program Change Log