Confined Space Entry Procedure

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1 **Purpose**

1.1 To establish a safe working procedure for District workers that meets or exceeds federal, state, or local rules and regulations. This program was developed in accordance with Cal/OSHA VPP Best Practices philosophy.

1.2 This Program is based on the regulatory requirements of the California Occupational Safety and Health Administration Title 8 California Code of Regulations (CCR) Article 108, Confined Space. The focus is to protect workers from exposure to hazards in confined spaces.

**NOTE:** This EMWD procedure meets and exceeds the requirements of Title 8 General Industry Safety Orders (GISO) and those of Title 8 Construction Safety Orders regarding Confined Spaces.

2 **Scope and Application**

2.1 This procedure contains specific requirements for work practices to protect workers from those hazards of entry into and work within a confined space. This procedure establishes that all confined spaces must be evaluated to determine whether it is permit or non-permit required prior to every entry.

3 **Definitions**

1 **Attendant** – An individual stationed outside the confined space who is trained as required by this procedure and who monitors the authorized entrants inside the permit required confined space. An attendant may not monitor more entrants or more permit spaces than the entry permit specifically authorizes.

2 **Authorized Entrant** – Any worker who is authorized by the District to enter a confined space to perform an assigned task. Authorized entrants may rotate duties, serving as attendants. Only trained persons may enter the confined space during the term of the permit.

3 **Blanking or Blinding** – The absolute closure of a pipe, line or duct, by fastening across its bore a solid plate or “cap” which completely covers the bore; which extends to at least the outer edge of the flange at which it is attached; and which is capable of withstanding the maximum upstream pressure.
4 Biological Hazards – Microbial agents presenting a risk or potential risk to the wellbeing of humans through inhalation, ingestion, skin absorption, or injection.

5 Bump Test – Testing an atmospheric monitoring device with a known concentration of gases that the monitor is intended to test. The test is used to verify that the monitor is within calibration parameters.

6 Calibration – A manual or electronic adjustment of an atmospheric monitoring device to ensure testing parameter requirements of the manufacturer are met or exceeded.

7 Confined Space – A location must have all three of the following definitions to be a “Confined Space.”

- Is large enough and so configured that an worker can bodily enter and perform assigned work; and
- Has limited or restricted means for entry or exit for example but not limited to: tanks, vessels, silos, storage bins, hoppers, vaults, pits, and ladder entry into pumping plants or subgrade facilities are spaces that may have limited means of entry; and
- Is not designed for continuous worker occupancy. (Its primary function is other than human occupancy.)

8 Double Block And Bleed – A method used to isolate a confined space from a line, duct or pipe by physically closing two main valves on a piping system, and opening a “vented to atmosphere” valve between them.

9 Emergency – Any occurrence, including a failure of monitoring device or hazard control, internal or external to the confined space, which could endanger the entrant or other workers.

10 Engulfment – The surrounding and effective capture of a person by a liquid or solid substance.

11 Entry – An act by which a person intentionally passes through an opening into a confined space. The entrant is considered to have entered as soon as any part of the entrant’s body breaks the plane of an opening into the space.

12 Entry Permit – A document established by the District, the content of which is based on the District’s hazard identification and evaluation for a confined space and is the instrument by which the District can verify that all precautions have been met prior to entry.
13 **Entry Permit System** – The written or printed document established by EMWD. The permit will be signed by the Entry Supervisor and posted at the entrance to the confined space.

The entry permit will include the name of the Attendant(s), the authorized Entrant(s), the work to be performed, the tools and equipment being taken into the confined space, the specific types of personal protective equipment to be used by the Entrants, air monitoring readings, the date of entry, time of entry, time the permit is issued and time the permit is scheduled to expire and be closed. Other information that the Attendant and/or Entry Supervisor deems to be necessary will be written on the permit.

14 **Entry Supervisor** – An appropriately trained worker who has been assigned the responsibility of ensuring a safe confined space entry. (An entry supervisor shall not enter the confined space as an entrant to perform work.)

15 **Evacuation** – An unaided emergency exit out of a confined space. This action may result from the entrant’s own decision or by a command from outside the space by the Attendant.

16 **Fall Arrest/Rescue Device** – A winch-type device that will quickly arrest a worker’s fall and absorb much of the free fall energy. The fallen worker may then be winched to safety using the hand crank system of the device. The cable from this device will attach to the safety harness. The type(s) of fall protection equipment, including personnel winches, will be determined by the Attendant and Entry Supervisor. The entrants will use the fall protection equipment when there is an exposure of a worker falling during entry or while exiting the confined space.

17 **Gas Detector (Monitor)** – Direct reading, four-gas monitor which measures oxygen content, LEL, carbon monoxide, and hydrogen sulfide. This also includes specialty monitors used to measure specific hazards (photo ionization detectors, metal oxide probes, radiation detectors, etc.).

18 **Hazardous Atmosphere** – An atmosphere which exposes workers above established exposure guidelines, to risk of death, incapacitation, injury or acute illness from one or more of the following causes:

- A flammable gas, vapor, or mist in excess of 10% of its lower explosive limit (LEL). Atmospheres that read >0% LEL up to 10% can still present a hazard and the source of the atmospheric reading must be determined and addressed;
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- An airborne combustible dust at a concentration over the permissible exposure limit or that presents an explosion hazard by being above the minimum explosible concentration (estimated by visual observation as completely obscuring vision at a distance of 5 feet or less);
- An atmospheric oxygen concentration below 19.5% or above 23.5%;
- Carbon monoxide in excess of 25 PPM;
- Hydrogen sulfide in excess of 10 PPM;
- An atmospheric concentration of any substance for which a Cal OSHA permissible exposure limit is exceeded and could result in worker exposure in excess of the permissible exposure limit. When an air contaminant for which OSHA or Cal/OSHA has not determined a permissible exposure limit which may be present in the permit space atmosphere, the District shall consult other sources of information, such as Safety Data Sheets which comply with the Hazard Communication Standard guidance in establishing the acceptable environmental conditions for entry by their workers; and
- Any atmospheric condition recognized as immediately dangerous to life or health (IDLH).

19 **Hot Work Permit** – The District’s written authorization to perform operations which could produce a source of ignition, such as riveting, welding, cutting, use of abrasive tools, burning, or heating.

20 **Immediately Dangerous To Life or Health (IDLH)** – Immediately dangerous to life or health (IDLH) means any condition which poses an immediate threat of loss of life; may result in irreversible injury and/or immediate-severe health effects; may result in eye damage; irritation or other conditions which could impair escape from the permit space.

21 **Immediate-Severe Health Effects** – Any acute clinical sign(s) of a serious, exposure-related reaction manifested immediately or within 72 hours after exposure.

22 **Large Enough And So Configured That A Worker Can Bodily Enter** – The entryway and space is large enough for any part of the worker’s body to enter in a manner that could cause harm. The entire body of a worker does not need to enter for harm to occur.

23 **LEL – UEL** – LEL: Lower Explosive Limit. Minimum concentration of a particular gas or vapor necessary to support its combustion in air.
UEL: Upper Explosive Limit. Maximum concentration of a particular gas or vapor necessary to support its combustion in air.

24 Non-Entry Condition – Any condition or set of conditions whose hazard potential exceeds the limits stated in the entry permit.

25 Non-Entry Rescue Team – A group of two or more workers designated and trained to perform non-entry rescues at confined spaces within the District.

26 Non-Permit Confined Space (NPCS) – A confined space that does not contain or, with respect to atmospheric hazards, would not normally contain any hazard capable of causing death or physical harm, and where all other serious hazards have been controlled.

Before declaring a confined space, a NPCS, the confined space is to be treated as a Permit Required Confined Space, including testing of the atmosphere in the confined space.

27 Oxygen Deficient Atmosphere – An atmosphere containing less than 19.5% oxygen by volume.

28 Oxygen Enriched Atmosphere – An atmosphere containing more than 23.5% oxygen by volume.

29 Permissible Exposure Limit (PEL) – PELs are the allowable 8-hour time-weighted average air contaminant concentrations established by the U.S. Department of Labor, Occupational Safety and Health Administration, and Cal/OSHA regulations, or adopted by Cal OSHA

30 Permit Required Confined Spaces (PRCS) – A confined space which must include one or more of the following conditions:

- Contains or has a known potential to contain a hazardous atmosphere;
- Contains a material with the potential for engulfment of an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor, which slopes downward and tapers to a smaller cross-section; and/or
- Contains any other recognized serious safety or health hazard.

31 Rescue Service – Third party personnel designated to rescue workers from permit spaces. It may include rescuer entry into the confined space. District personnel shall not perform entry rescue.
32 Retrieval – Aided assistance in exiting the confined space not requiring entry by a rescuer or attendant. Non-entry rescue.

33 Retrieval Line – An approved line or rope secured at one end of the worker by a full-body harness, and with its other end secured to either a lifting (or other retrieval) device, or to an anchor point located outside the entry portal.

34 Safety Line – A line secured at one end of the worker by a full-body harness with the other end secured to a “fall arrest” device. The main function is to prevent injury in the event of a fall.

35 Shall – Denotes a mandatory requirement.

36 Supervisor – An individual who has the job title as an EMWD Manager or Supervisor. Or, an individual who is assigned to work with the Attendant during a confined space entry and has the authority to authorize a confined space entry or terminate a confined space entry.

37 Threshold Limit Values (TLV) – TLVs are the worker exposure levels of chemical and physical agents to which it is believed an average worker may be exposed day after day for a working lifetime and result in no adverse effect. TLVs are set adopted by the American Conference of Governmental Industrial Hygienists (ACGIH). The TLVs are based on an 8-hour Time Weight Average (TWA) of 5-day 40-hour work week.

38 Toxic Atmosphere – An atmosphere containing a concentration of a substance above the published or otherwise known safe levels that is capable of causing harm to a worker.

39 Vertical Rescue – Methodology to move the entrant to safety while all or a portion of the entrant’s weight is supported by life-safety rope or wire. This methodology would include Diagonal Rescue where a portion of the entrant’s weight is supported by a surface within the space.

40 Warning Barriers – A physical system that prevents or provides adequate notice that entry into area is prohibited by non-authorized workers or members of the public. Acceptable barriers include cones, saw horses, delineators, temporary fencing, etc.
4 Program Requirements

4.1 Pre-Entry Evaluation To Determine Confined Space Status

The Entry Supervisor shall evaluate all structures and openings that meet confined space criteria, and identify and record the potential hazards associated with each one prior to all entry operations. This information will be made available to affected workers, their representatives and supervisors. Appendix B is the Confined Space Evaluation Form that may be used at the discretion of a particular department.

4.2 Hazard Identification and Basic Requirements

The District has established an entry permit program to ensure that entrants are protected from confined space hazards. Under the entry permit program, each department that issues entry permits shall:

4.2.1 Hazard Identification

Identify and evaluate each hazard of the permit space(s), including determination of severity.

4.2.2 Hazard Control

Implement the means, procedures and practices by which the confined spaces can be entered safely according to this procedure.

4.2.3 Worker Training

Ensure that workers attend required training prior to performing confined space entries.

4.2.4 Equipment

Provide, maintain, and ensure the proper use of the equipment necessary for safe entry, including testing, monitoring, communication, rescue, and personnel protective equipment.

4.2.5 Non-Entry Rescue

Ensure that the procedures and equipment necessary to perform non-entry rescues from confined spaces are implemented and provided.

4.2.6 Protection from External Hazards

Ensure that all pedestrians, vehicles or other barriers necessary to protect entrants from external hazards are provided.
4.3 Permit System

The District shall use a permit(s) in a standardized form through which the issuing department identifies all conditions that must be evaluated to ensure safe entry into any confined space. Departments who authorize entry into a permit space shall include the following information on the checklist portion of the permit:

4.3.1 Actual or potential hazards of the permit space;

4.3.2 Methods for isolation, lock-out/block-out, purging, blocking or blinding, inerting, ventilating, cooling, and flushing to remove or control hazards;

4.3.3 Maintenance of acceptable environmental conditions by the entry supervisor through verification, testing and monitoring equipment, and procedures;

4.3.4 Non-Entry Rescue equipment to be provided on-site which includes: communication procedures, equipment, and personal protective equipment such as harnesses, safety lines, and retrieval device.

4.3.5 The identity of permit space, location, purpose, date of entry, and duration.

4.3.6 A list of authorized entrants, eligible attendants, and individuals eligible to be in charge of entry along with an entry supervisor’s signature, verifying that all actions or conditions for safe entry have been met.

4.3.7 Upon completion of the entry covered by the permit, and after all entrants have exited, the permit space and all work has been performed, the permit shall be signed off as complete and further entry closed out.

4.3.8 All hot work in confined spaces will require a hot work permit before an entry permit is issued. The hot work permit is a part of the WELDING AND CUTTING SAFETY PROCEDURE.

4.4 Department Requirements

Each affected Department shall be required to become familiar with this procedure and ensure all aspects of the procedure are implemented and followed by their workers. The following items are found in the District’s procedure and shall be implemented by the individual departments to fit each specific application:

4.4.1 Evaluation of each facility within the department’s jurisdiction for the purpose of establishing its confined space designation prior to every entry.
4.4.2 Document each pre-entry evaluation. Documentation shall include a site description, location, configuration, initial gas detector readings, and initial classification (i.e., permit required or non-permit required confined space). Please see Appendix B for the Confined Space Evaluation Form;

4.4.3 Prepare and maintain an inventory of confined spaces using the format in Appendix F.

4.4.4 Determine site/type specific confined space entry and rescue procedures for each type of confined space without regard to confined space classification; and

4.4.5 Ensure that each worker required to work within the procedure is thoroughly trained as required.

4.5 Entering and Inspection of Confined Spaces

These precautions must be reviewed by workers working in confined spaces to ensure safe entry:

4.5.1 Always test atmosphere with gas detector prior to opening or removing access cover.

4.5.2 Use appropriate tools or hoist when removing access covers to confined spaces to avoid injury from lifting heavy covers in awkward postures.

4.5.3 Prevent injuries by following written procedures.

4.5.4 Ensure proper PPE is identified and available for personnel working in confined space.

4.5.5 Always clean sand and dirt from the edge of access cover rim so it does not accidentally fall and enter the eyes of entrants and allows for ease in replacing the cover after work is complete.

4.5.6 Before entering a confined space, always visually inspect the condition of the steps or rungs (if applicable).

4.5.7 Set up tripod/fall retrieval device.

4.5.8 Enter the confined space slowly and cautiously.

4.5.9 Test each step or rung with a gradual application of weight.

4.5.10 Do not carry tools or other objects when entering or exiting a confined space.

4.5.11 Always be careful not to look up.
4.5.12 Never drop tools or supplies into a confined space. Pass by hand if possible, or tie object to a hand line, or place in a bucket. Use half hitches to prevent objects from falling from bucket.

4.5.13 Never clutter access area to prevent objects from falling, bouncing, being pushed, or dragged into opening.

4.6 Contractors Entry Into Confined Spaces

When contractor workers (not under the District’s direct supervision) enter PRCS, ensure the following:

4.6.1 Inform the contractor that the workplace contains confined spaces and that confined space entry must be in compliance with EMWD Confined Space Entry Procedure as well as that of the contractor.

4.6.2 Apprise the contractor of the characteristics of the confined space, including the known hazards, access/egress, and any experiences with the space;

4.6.3 Coordinate entry operations with the contractor, when both District personnel and contractor personnel will be working in or near a confined space (the contractor shall have procedures for coordinating such entry operations, to prevent endangerment of the workers of any other employer); and

4.6.4 Debrief the contractor at the conclusion of the entry operations regarding any hazards confronted or created in the confined space during entry operations.

4.7 Recordkeeping

4.7.1 A written record must be made of the results of each atmospheric test performed. Utilize the form in Appendix D.

4.7.2 If used, Confined Space Evaluation form (Appendix B) shall be kept at the site for the duration of the work, and made accessible to entrants, attendants, supervisors, other affected workers, and their representatives.

4.7.3 A copy of the Confined Space Entry Permit shall be posted or readily available at the job site during confined space operations.

4.7.4 The above documentation must be kept on file by respective departments for a minimum of three years.
4.8 Training

4.8.1 All workers involved in confined space operations (including entrants, attendants, and confined space entry supervisors) must receive training in the appropriate procedures and requirements described in this program. No person shall enter a confined space unless trained and qualified to do so.

4.8.2 Supervisors shall also be trained in the following:

- The possible toxic materials, lockout block out, flammable atmosphere conditions, oxygen deficiencies or enrichment, and other actual or potential hazards in confined spaces into which personnel must enter;
- Be knowledgeable of the type of operations workers will be performing in a confined space and of their impact on air quality, flammability, and/or availability of oxygen, and ensure that workers take appropriate precautions;
- Provide appropriate approved equipment; and
- Ensure necessary forms are available to record the confined space activities; review completed records; ensure the records are filed; and provide affected workers and/or their representatives access to review them and record testing results.

4.9 Joint Use Facilities

Prior to entry by District personnel into confined spaces, such as manholes which may be jointly owned or shared with another entity, the entry supervisor shall coordinate entry operations with other affected users or owners so that workers or operations of one employer do not endanger another employer’s personnel.

4.10 Entry Supervisor Review

NOTE: Entry Supervisors may contact Safety and Risk Management during the planning phase of such operations to provide guidance on safe entry conditions, hazard control, and personal protective equipment.

Before the start of work, the supervisor must:

4.10.1 Review the work assignment with workers, indicating any potential hazards involving the confined space(s);

4.10.2 Describe the scope of work, equipment and materials needed, and any operating instructions required to complete the job.
4.10.3 Identify any potential health risks and/or physical hazards or conditions, such as the history of spills, fall hazard, the use of solvents, welding operations or flooding within the work area, and methods to control those hazards;

4.10.4 Coordinate confined space entry activities with other employers, such as contractors or sub-contractors so that no workers of any employer will be endangered during confined space operations.

**NOTE:** Examples of methods to control hazards are lockout and blockout points, clearance points, fall protection or ventilation.

4.11 Attendant/Entrant Review

An attendant and entrant is responsible for:

4.11.1 Understanding the nature of all actual or potential hazards that may be encountered during entry into a confined space. If anything is not clearly understood, an attendant/entrant shall ask questions;

4.11.2 Inspecting the safety equipment for confined space entry to ensure that it is in operational condition;

4.11.3 Ensure that the atmospheric monitoring instruments (e.g., for oxygen, LEL, carbon monoxide, hydrogen sulfide) are maintained in an operational status. Instruments shall be tested and calibrated according to the manufacturer’s specifications or more frequently. A daily bump test shall be performed against all gases or vapors for which an instrument is configured

4.11.4 When the space is located such that work may encroach upon a public street or highway, establish a safe work area by erecting barricades, cones, warning signs and wearing appropriate reflective clothing;

4.11.5 The communication system between the Attendants and the facility, and between the Attendants and the authorized Entrants must be checked prior to entry;

4.11.6 Energy sources (except for those necessary to perform the work at hand) that could present a hazard to those in a confined space shall be locked out and blocked out in accordance with the EMWD Lockout/Blockout Procedure.

4.11.7 The space shall be isolated and ventilated to prevent dangerous gases or chemical substances from entering the confined space; and
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4.11.8 All non-permit required, and permit-required confined spaces shall be considered to have unacceptable atmospheres until proven safe by atmospheric testing. Ventilation must be maintained at all times.

4.12 Atmospheric Testing

4.12.1 Prior to any confined space entry, the atmosphere shall be tested with an appropriate, tested / calibrated direct reading instrument in accordance with the manufacturer’s requirements, see Appendix G.

Testing for atmospheric hazards shall be in the following order:

- Oxygen content;
- Flammable gases & vapors; and
- Potential toxic air contaminants.

4.12.2 Testing of Manholes and Other Spaces Prior to Opening

- Prior to fully opening a confined space, insert the probe into an available opening and draw a sample of the atmosphere into the meter, allowing sufficient time to obtain a representative sample.
- If the space opening has no hole, open the space only enough to insert a non-sparking item, such as a piece of wood or brass, then insert the probe.
- If atmospheric conditions are acceptable, then fully opening the confined space.

4.12.3 Test Atmosphere from Top to Bottom of Space:

- Testing of the confirmed or potential confined spaces shall be conducted throughout the entire portion of the space to be occupied. Some airborne contaminants may be heavier or lighter than air and can collect at the bottom or top of spaces. It is required that testing shall be done before ventilation and after the prescribed ventilation period. Testing shall continue for the duration of the entry.

4.13 Sampling

4.13.1 For testing, insert the probe into the top of the confirmed, potential, or non-permit confined space, and draw a sample of the atmosphere into the meter allowing sufficient time to allow the meter to register and analyze. This may vary depending upon the type of meter and length of sample tubing. Sample collection procedures shall follow the manufacturer’s recommended procedure that is summarized in Appendix G.
4.13.2 When monitoring for entries involving a descent into atmospheres which may be stratified, the atmospheric envelope should be tested a distance of approximately four (4) feet in the direction of travel and to each side.

4.13.3 If a sampling probe is used, the entrant’s rate of progress shall be slowed to accommodate the sampling speed and detector response time.

4.14 Acceptable Atmosphere

If testing indicates an acceptable atmosphere, continuous ventilation is required prior to and during any entry. Be sure to place the blower where fresh uncontaminated air is drawn into the structure. The ventilation shall remain in operation during the complete entry.

4.15 Unacceptable Atmosphere

If after any needed ventilation, testing continues to indicate atmospheric contaminants outside of acceptable entry levels, the space shall not be entered. Refer to Permit Required Confined Space Entry Procedure section for additional information.

4.16 Guarding The Opening

When covers are removed, a railing, temporary cover, or temporary barrier that will prevent an accidental fall through the opening and protect each worker working in the space from foreign objects entering the space shall guard the opening.

5 Entry Instructions

5.1 When operations are to be conducted which may impact air quality (such as welding, spray coating, abrasive blasting, or use of chemicals), additional precautions are to be taken. Consideration shall be given to safe entry conditions, hazard control and personal protective equipment during the planning phase of such operations.

5.2 Prior to any entry into a PRCS, the Entry Supervisor shall assure that all provisions of a Confined Space Permit (Appendix C) have been completed and the following specific provisions have been met:

5.2.1 Supervisor Review of Hazards

5.2.2 Equipment Inspection
5.2.3 Instrument Bump Test and Calibration

5.2.4 Work Area Preparation

5.2.5 Lockout and Isolation

5.2.6 Atmospheric Testing

5.2.7 Ventilation

5.2.8 Check “List of Requirements for Entry, Working In, and Exiting Confined Space” (Appendix A)

**NOTE:** The supervisor of the workers may be the Entry Supervisor, or the responsibility of the Entry Supervisor may be delegated.

5.2.9 Assemble and test the retrieval equipment before entry into a PRCS.

5.2.10 The Entry Supervisor is to check that the appropriate entries have been made on the Permit, that the Permit specified tests have been conducted, and that the specified procedures and equipment are in place before endorsing the Permit and allowing entry to begin.

5.2.11 When the Permit is signed, the authorized entrant(s) may enter the PRCS.

**NOTE:** Following the information specified in the Entry Permit, the Attendant continuously maintains an accurate count of authorized entrants in the confined space.

5.2.12 If the PRCS poses no actual or potential atmospheric hazards, and if all serious safety and health hazards within the space are eliminated without entry into the space, the Permit Required Confined Space (PRCS) may be re-classified as a Non-Permit Confined Space (NPCS) for as long as the hazards remain eliminated. Reclassification of a space requires use of the evaluation form in *Appendix B. Ventilation is still required.

**NOTE:** Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards. For example, carbon monoxide may still be generated in a space while being controlled by ventilation.

5.2.13 The Entry Supervisor shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification on the permit that contains the date, the location of the space, and the signature of the person making the determination. The permit will then remain posted for the duration of the entry.
5.2.14 If hazards arise within a PRCS that has been reclassified as an NPCS, each worker in the space shall exit the space. The Entry Supervisor shall then reclassify the entry as a PRCS and a new permit shall be initiated.

6 Duties and Responsibilities

6.1 Authorized Entrants

The authorized entrants are required to:

6.1.1 Understand the hazards that may be encountered during entry, including information on the mode, signs or symptoms, and consequences of exposure. Know methods of hazard mitigation.

6.1.2 Properly inspect and use equipment as required by the permit.

6.1.3 Follow responsibilities identified in entry instructions.

6.1.4 Maintain communications with the Attendant.

6.1.5 Alert the Attendant whenever:
   - The entrant recognizes any warning sign or symptom of exposure; or
   - A prohibited condition is detected.

6.1.6 Exit the permit space whenever:
   - An order to evacuate is given by the Attendant;
   - There is a warning sign or symptom of exposure;
   - A prohibited condition is detected; or
   - An alarm is activated.

6.2 Attendants

The Attendants are required to:

6.2.1 Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.

6.2.2 Be aware of possible behavioral effects of hazard exposure on authorized entrants.
6.2.3 Continuously maintain an accurate count of authorized entrants in the permit space and ensure that the permit accurately identifies who is in the permit space.

6.2.4 Remain immediately outside the permit space during entry operations until relieved by another attendant.

6.2.5 Communicate with authorized entrants as necessary to monitor entrant status and alert entrants of the need to evacuate the space.

6.2.6 Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order the authorized entrants to evacuate the permit space immediately under any of the following conditions:

- If the Attendant detects a prohibited condition;
- If the Attendant detects the behavioral effects of hazard exposure in an authorized entrant;
- If the Attendant detects a situation outside the space that could endanger the authorized entrants; or
- If the Attendant cannot effectively and safely perform all the duties required under the permit.

6.2.7 Summon rescue and other emergency services as soon as the Attendant determines that authorized entrants may need egress assistance from permit spaces.

- Perform non-entry rescues as determined during pre-job planning; and
- Perform no duties that might interfere with the Attendant’s primary duty to monitor and protect the authorized entrants.

6.3 Entry Supervisors

The Entry Supervisors are required to:

6.3.1 Understand the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure to hazardous conditions, materials or atmospheres;

6.3.2 Determine when to terminate the entry and cancel the permit;

6.3.3 Determine, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry
operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained;

6.3.4 Verify, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

6.3.5 Verify for high hazard confined space entries that rescue services—other than self-rescue or non-entry rescue—are available and that the means for summoning them are operable; and

6.3.6 Remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations.

6.4 Rescue Duties

Departments are responsible to ensure that these procedures are followed when workers are working in a confined space:

6.4.1 Recognition of actual or potential emergencies;

6.4.2 Notification of EMS and/or Central Control/IOC of rescues;

6.4.3 Request for additional workers if needed. NOTE: Workers may come from any department;

6.4.4 Proper use of safety equipment;

6.4.5 Required First Aid/CPR training; and

6.4.6 Non-Entry Rescue Methods.

6.4.7 High hazard permit required confined space entries may require the use of a standby rescue team at the site. Contact Safety, Risk and Emergency Management for all high hazard entries.

7 Ventilation Requirements

Ventilation is one of the most important rules of safety concerning confined space entry. Though ventilation can provide good quality make up air, it cannot reduce other hazards
that are associated with permit space(s). The ventilation requirements that must be met prior to entry are as follows:

7.1 Pre-Entry Requirements

7.1.1 Various sizes of permit spaces are located through the District. When initial air sampling determines a hazardous atmosphere is present, forced air ventilation shall be performed until the hazard within the space has been eliminated. A continuous supply of fresh air shall be provided while entrant(s) is/are in the confined space. The confined space must have ten (10) complete air changes before sampling the air inside the confined space again.

To determine how long it will take to achieve ten (10) complete air changes in the confined space, the following information must be known:

- The cubic feet of space inside the confined space; and
- The cubic feet per minute (CFM) the ventilator is rated for.

**NOTE:** Multiple bends in the ventilation hose will reduce the actual CFM capacity of the ventilating blower (each 90° bend reduces the rated CFM capacity of a ventilation blower by up to 50%).

To determine the cubic feet of space inside the confined space for square or rectangular spaces:

Multiply the Length x Width x Height. EXAMPLE: A confined space is 20’ x 15’ x 30’.

20’ x 15’ x 30’ = 9,000 cubic feet

The rating of the ventilator shows the cubic feet of air the blower will discharge. For this example, let’s assume the ventilator has a rating of 1,500 CFM.

To find out how long it will take to make one complete air change inside the confined space, divide 9,000 cubic feet by 1,500 CFM. The answer is 6. Therefore, it will take 6 minutes to make one complete air change inside the confined space.

Ten (10) air changes are required. Multiply 6 minutes by 10, the required number of air changes in the confined space:

10 x 6 = 60. It will take 60 minutes to achieve 10 complete air changes.
Confined Space Entry Procedure

If the confined space is round, multiply \( \pi \) (3.14) times the radius squared, times the length of the cylinder (pipe, tunnel, etc.) = cubic feet of space. \( \pi r^2 h = \text{volume} \)

EXAMPLE: \( \pi \) (3.14) \times \text{radius}^2 \times \text{length of cylinder or height of tank} \ (\text{pipe, tunnel, etc.}) = \text{cubic feet of space. Assume a pipe has a 3'} \text{ diameter and is 30'} \text{ long. One-half of the 3'} \text{ diameter is 1.5 feet (the radius). } 1.5^2 \times (1.5 \times 1.5) = 2.25 \text{ square feet.} \)

To simplify: \( 3.14 \times 2.25 = 7.07 \text{ square feet.} \) (The actual number is 7.0686, but we rounded up.)

\( 7.07 \text{ square feet} \times 30' \) (the length of the cylinder) = 212 cubic feet.

To find out how long it will take to make one complete air change inside the confined space, divide 212 cubic feet by 1,500 cfm. The answer is, 0.14 minutes for one complete air change.

Ten (10) complete air changes are required. Therefore, 10 \times 0.14 minutes per air change = 1.4 minutes.

Round up and let the ventilator push fresh air into the confined space for 2 minutes before testing the atmosphere inside the confined space again.

To achieve a greater efficiency of air exchanges, when it is possible, move the end of the hose around by using a rope. Pull the end to the hose up into the upper corners of the confined space. Also move the end of the hose around near the bottom of the confined space to move the gases or air around so it will be diluted or exhausted out of the confined space.

After 10 complete (or near complete) air changes have been made, lower the hose on the air monitor into the confined space and sample the air at different levels. The end of the air monitor hose shall be lowered 2 to 4 feet each time to sample the air at different levels inside the confined space.

A continuous supply of fresh air shall be provided while entrant(s) is/are in the confined space.

7.2 Work in Progress

7.2.1 A continuous supply of fresh air shall be provided while entrant(s) is/are in the confined space.

7.2.2 Entrant must exit confined space if blower stops.
7.2.3 All blowers shall be at a minimum of 1,500 cfm.

7.2.4 Five (5) air exchanges per hour for a permit space are suggested.

7.3 Recordkeeping

The Entry Supervisor shall document the time that the blower was started and when the blower was shut-off on the permit.

8 Safety Equipment

No worker shall perform or order to be performed, any work in a permit space unless all the necessary safety equipment is available and all proper safety procedures are followed. Requirements for safety equipment and use are as follows:

8.1 Fall / Retrieval Device and Approved Support Device

A fall/retrieval device and tripod or other adequate anchorage shall be required for all top-opening entries into a permit space.

8.1.1 Tripod

- The tripod shall be capable of set-up on surfaces that are not level.
- The tripod shall be capable of locking in place with safety chains attached to base of legs.
- Non-slip feet on legs of tripod.
- It is recommended that tripods are adjustable up to 9 feet tall.

8.1.2 Other anchorage points used shall be capable of supporting a 5000 pound static load and the means of attachment shall be rated for fall protection and retrieval hoist loads.

8.1.3 Fall/Retrieval Device

- Fall/retrieval device may have a “fall-arrest” capability.
- Additional block to tackle hoist may be added for retrieval purposes.
- Self-Retracting Lifelines (SRL) shall be the required fall protection device used in conjunction with permit required confined space entry. Certain spaces may require the use of a winch type retrieval device as a primary means of extraction with an SRL as a secondary means of retrieval.
8.2 **Personal Protective Equipment**

8.2.1 A hard hat shall be worn at all times in a confined space.

8.2.2 To provide as much body protection as possible, coverall or uniforms shall be worn when working in a confined space.

8.2.3 Special safety equipment such as boots, waders, dry suit, gloves, safety goggles/glasses and ear protection shall be worn as needed.

8.2.4 A fall/retrieval device or other approved devices shall be provided for lifting worker(s) out of top opening confined spaces.

8.2.5 Rescue lifelines or wristlets may be utilized in certain permit required confined spaces where the use of a fall retrieval device is not possible.

8.2.6 A full body harness will be required with this program. This harness must meet ANSI Standard A10.14 and EMWD Fall Protection Procedure guidelines.

8.2.7 Intrinsically safe electrical equipment is required for confined spaces.

8.2.8 Respiratory protection equipment will be required as necessary based on an evaluation of potential contaminants in the space.

8.3 **Equipment Inspection**

8.3.1 All equipment needed for working in a permit space shall be periodically inspected and repaired or replaced if necessary. It must also be inspected prior to each entry into a confined space by both the Entry Supervisor and the Entrant(s).

8.3.2 If a necessary piece of equipment is in questionable condition, work shall halt until the equipment is repaired or replaced.

8.3.3 Manufacturer recommendations shall be followed for all equipment.

9 **Permit Classification System**

The “permit classification system” is based on existing or potential hazards relative to the confined space. The classification is based upon the characteristics and configuration of the space, oxygen level, flammability, and toxicity. The classification shall be determined
by the most hazardous condition of entering, working in, and exiting a confined space. Refer to checklist of requirements for entry.

9.1 Permit Required Confined Space

Permit Required Confined Space (PRCS) is one that presents a situation that may be immediately dangerous to life or health (IDLH) or may cause serious injury or illness to an entrant.

9.1.1 These include, but are not limited to, oxygen deficiency, explosive or flammable atmospheres, physical hazards, and/or concentrations of toxic substances.

9.1.2 Special requirements for PRCS are as follows:

- Two (2) Attendants required outside PRCS at all times. The Entry Supervisor may act as the second attendant.
- One (1) Attendant must maintain communication with entrant at all times (i.e., at manhole, hatch, opening, etc.);
- Second Attendant must remain onsite in the area of the permit required confined space entry; and
- Entrant shall utilize approved safety harness and lifeline/retrieval device.

Common types of PRCS are sewer manholes, sewer lines, Lift Station wells, junction structures, valve vaults, meter vaults, pumping plant wet wells, vats, pits, large pipe and ducts, and various types of storage tanks. Situations may arise that make Non-Permit Confined Space (NPCS) a PRCS.

9.2 Non-Permit Required Confined Space

A Non-Permit Required Confined Space (low hazard) is one in which the potential hazard would not require any special modification of the work procedure except for the following:

9.2.1 If no Attendant is used, Central Control will be notified of location, entry time, estimated working time, and interval for safety checks. They will also be notified when work is completed.

9.2.2 Entrant will have constant and reliable communications with Central Control (via handheld radio).

9.2.3 Entrant will have safe, a stable means of entry and exit (ladder, etc.).
9.2.4 Atmospheric testing, monitoring and ventilation are required.

9.3 Special Consideration Spaces

9.3.1 Any below grade facility or area with restricted access (i.e., ladder access, entry configuration hazard) that is ventilated full time, has the potential to become a confined space and shall be entered after a worksite hazard analysis has been conducted. These sites shall be treated as confined spaces until the hazard has been removed or mitigated via a JSA conducted by a qualified person.

9.3.2 Trenches and other earthworks are normally not considered confined spaces. Situations can arise, however, which would make these structures confined spaces. A broken gas main, force main or sewer main may need to be classified as a confined space if a determination has been made that atmospheric hazards are present.

9.3.3 Any confined space that cannot be entered according to the strict provisions and requirements of this procedure can only be entered once a site-specific written procedure has been developed. This procedure shall include the development of a JSA and must identify all hazards and the alternative measures of personal protection that will be utilized to protect the entrants in the confined space. The written procedure must be reviewed and approved by the Safety, Risk and Emergency Management Department prior to entry operations.

9.3.4 All sewer manholes within the District’s boundaries shall be considered permit required confined spaces and entered based off an evaluation of all hazards present.

Facilities with an engineered means of ingress/egress (stairwell into lower levels, entry points that would allow self-rescue) which may be ventilated full time are to be considered workplaces with the potential for a hazardous atmosphere. Examples of these sites would be sewer lift station drywells and wet wells with engineered stairwells and influent pump station/head works buildings with multiple entry/exit points. These facilities shall not be considered confined spaces, but shall be evaluated for worker exposures through a worksite hazard analysis (JSA, SOP) conducted by the department seeking access.
### APPENDIX A

**CHECKLIST OF REQUIREMENTS FOR ENTRY, WORKING IN AND EXITING CONFINED SPACES**

<table>
<thead>
<tr>
<th>CHECK</th>
<th>PRCS</th>
<th>NPCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-ENTRY EVALUATION</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PERMIT</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>ATMOSPHERIC MONITORING</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>MONITORING</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>TRAINING OF PERSONNEL</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>LABELING AND POSTING</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>ISOLATE / LOCK-OUT/BLOCK-OUT</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>PURGE / VENTILATE</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>CLEANING PROCESSES</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>SPECIAL EQUIPMENT / TOOLS</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>SITE SAFETY BRIEFING</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>ATTENDANT</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>COMMUNICATIONS / OBSERVATION</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>NON-ENTRY RESCUE PLAN</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>HEAD PROTECTION</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>HEARING PROTECTION</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>HAND PROTECTION</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>FOOT PROTECTION</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>BODY PROTECTION</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>RESPIRATORY PROTECTION</td>
<td>O</td>
<td>N/A</td>
</tr>
<tr>
<td>TRIPOD</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>HARNESS</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>LIFELINE</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>RESCUE EQUIPMENT</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>RECORDKEEPING</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

X = REQUIRED  
O = OPTIONAL – Determination to be made based on entry requirements.
APPENDIX B

CONFINED SPACE ENTRY PERMIT DECISION DIAGRAM

If the space being evaluated is determined to be a PERMIT-REQUIRED Confined Space, there are 3 options to consider:

1) Deny entry to all employees;
2) Evaluate the space and develop a procedure for safe entry.
3) Reclassify the space to non-permit required confined space by removing the hazard as follows:
   1. If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space.
   2. If testing and inspection during entry demonstrate that the hazards within the permit space have been eliminated.
   3. If hazards arise within a de-classified space, all employees within that space shall exit immediately and the space shall be re-evaluated.
   4. The entry supervisor shall document the basis for determining that all hazards in a permit-required space have been eliminated, through a certification that contains the date, location, and signature of the person making the determination. A copy of this certification shall be made available to each employee entering as de-classified space.
## APPENDIX C
### CONFINED SPACE EVALUATION FORM

<table>
<thead>
<tr>
<th>Survey Date:</th>
<th>Evaluator (Name):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Location:</td>
<td></td>
</tr>
<tr>
<td>Site Description:</td>
<td></td>
</tr>
</tbody>
</table>

### Method of Entry (circle which apply): Steps Ladder Top-Opening Doorway Stairway Side Opening

<table>
<thead>
<tr>
<th>Number of entry / exit points:</th>
<th>Frequency of entry:</th>
</tr>
</thead>
</table>

### Existing ventilation? Yes ☐ No ☐ | Potential Atmospheric Hazards? Yes ☐ No ☐ |
### Potential for engulfment? Yes ☐ No ☐ | Other IDLH Hazards? Yes ☐ No ☐ |

#### Possible Atmospheric Hazards:
- □ Oxygen deficiency
- □ Enrichment
- □ Flammable
- □ Toxic
- □ Specific hazard for flammable and/or toxic

#### Comments:

#### Possible Content Hazards:
- □ Flammable
- □ Corrosive
- □ Toxic
- □ Irritant
- □ Oxidizer
- □ Dust
- □ Chemical
- □ N/A

#### Physical state:
- □ Solid
- □ Liquid
- □ Gas
- □ N/A

#### Comments:

#### Potential Energy:
- □ Electrical
- □ Hydraulic
- □ Pneumatic
- □ Mechanical
- □ Fire control system
- □ Physical (Heat/Cold)
- □ Chemical
- □ N/A

#### Comments:

#### Environment in the Space:
- □ Slippery surfaces
- □ Ambient temperature high or low
- □ Surface temperature high or low
- □ Noise
- □ N/A

#### Comments:

#### Configuration of Space:
- □ Interior shape & slope
- □ Low overhead clearance
- □ Drop offs
- □ Complex layout
- □ Stability
- □ Inward converging walls
- □ Tank
- □ Vessel
- □ N/A
- □ Tank/Vessel: Pressure released
- □ Drained
- □ Cleaned

#### Comments:

#### External Hazards:
- □ Traffic
- □ Machinery
- □ Equipment
- □ Processes
- □ Terrain
- □ Material
- □ N/A

#### Comments:

#### Other Hazards:
- □ Animals
- □ Insects
- □ Biological organisms
- □ Non-ionizing radiation
- □ Ionizing radiation
- □ Other
- □ N/A

#### Comments:

#### Is the only hazard atmospheric? Yes ☐ No ☐

#### Will removing check valves, piping, pumps, blind flanges or meters create the potential for atmospheric or engulfment hazards? Yes ☐ No ☐

#### Atmospheric test results

<table>
<thead>
<tr>
<th>Without Ventilation</th>
<th>With Ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>O2</td>
</tr>
<tr>
<td>CO</td>
<td>CO</td>
</tr>
<tr>
<td>H2S</td>
<td>H2S</td>
</tr>
<tr>
<td>LEL</td>
<td>LEL</td>
</tr>
</tbody>
</table>

#### CONFINED SPACE

<table>
<thead>
<tr>
<th>Can be toxic entered</th>
<th>Yes ☐ No ☐</th>
<th>Hazardous Atmosphere?</th>
<th>Yes ☐ No ☐</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited or restricted entry?</td>
<td>Yes ☐ No ☐</td>
<td>Potential for engulfment?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>Designed for continuous human occupancy?</td>
<td>Yes ☐ No ☐</td>
<td>Internal configuration hazard?</td>
<td>Yes ☐ No ☐</td>
</tr>
<tr>
<td>Other serious safety hazard?</td>
<td>Yes ☐ No ☐</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Reasons for entering space & typical activities:

### Who usually enters space?
- □ Maintenance
- □ Production
- □ Contractors
- □ Other

### Eligible for Alternate Procedure?
- □ Yes ☐ No ☐ | Eligible for Reclassification? | Yes ☐ No ☐ |

### External connections to space:

#### Comments:

### Evaluation Results:
- □ Not a Confined Space
- □ Permit Required Confined Space
- □ Non-Permit Required Confined Space
- □ Eligible for Reclassification

---

Rev. 1/6/2014 9:09 AM
APPENDIX D
CONFINED SPACE PERMIT

LOCATION: ___________________________ DATE ISSUED: ___________________________
DESCRIPTION OF CONFINED SPACE: ___________________________ TIME: ___________________________
PURPOSE OF ENTRY: ___________________________ COMPLETION DATE: ___________________________
DEPARTMENT: ___________________________ TIME: ___________________________

IDENTIFY CONFINED SPACE PERSONNEL BELOW

<table>
<thead>
<tr>
<th>CREW MEMBERS</th>
<th>AUTHORIZED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTRANT</td>
<td>YES</td>
</tr>
<tr>
<td>ATTENDANT</td>
<td>YES</td>
</tr>
</tbody>
</table>

SPECIAL REQUIREMENTS

<table>
<thead>
<tr>
<th>LOCK-OUT / LOCKOUT</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINES BROKEN-CAPPED OR BLANDED</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>LINES / SYSTEM PURGED AND VENTED</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>DOUBLE BLOCK AND BLEED</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>AREA SECURE</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>VENTILATION – FULL TIME</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>MONITORING AND TESTING</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>HOT WORK PERMIT / PRE-JOB</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

CHECKLIST OF REQUIREMENTS REVIEWED

ATMOSPHERIC MONITORING INSTRUMENT

<table>
<thead>
<tr>
<th>INSTRUMENT MANUFACTURER</th>
<th>TYPE OR MODEL – INCLUDE SERIAL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAILY CALIBRATION/BUMP TEST/OPERATIONAL CHECK</td>
<td>YES</td>
</tr>
</tbody>
</table>

VENTILATION BLOWER MANUFACTURER

| VENTILATION BLOWER CAPACITY | CFM |
| VENTILATION BLOWER OPERATION TIME | START : STOP |

COMMUNICATION PROCEDURES:

RESCUE PROCEDURES: Non-entry rescue □ Confined space rescue team □ Self rescue □

CHECK ALL THAT APPLY

MANAGEMENT EMPLOYEE

AUTHORIZING ENTRY:

Authorized: ___________________________ ENTRY SUPERVISOR: ___________________________
DATE: ___________________________ DATE: ___________________________
TIME: ___________________________ TIME: ___________________________

NOTE: Signature by Entry Supervisor verifies that actions and conditions for safe confined space entry have been met.
## APPENDIX E
### RECORD OF GAS ANALYSIS

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Gas Read Time (15 Min. Increments)</th>
<th>Worker Taking Read</th>
<th>O2</th>
<th>Lel</th>
<th>H2S</th>
<th>Co</th>
<th>Entrant(S) Name And Employee Number</th>
<th>Time In</th>
<th>Time Out</th>
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</tbody>
</table>
APPENDIX F
RIVERSIDE COUNTY FIRE DEPARTMENT FACILITIES WITH CONFINED SPACE RESCUE EQUIPMENT AND TRAINING

Station #2 – Moreno Valley
24935 Hemlock
Moreno Valley CA, 92557
(951) 242-3101

Hazardous Materials Station
Station #34 – Winchester
32655 Haddock Street Winchester, CA 92596
(951) 926-6430

Station #73 – Rancho California
27415 Enterprise Circle West
Temecula, CA 92590
(951) 699-0351

Station #76 – Menifee Lakes
29950 Menifee Road
Menifee, CA 92584
(951) 679-2241

Station #97 – Rosetta Canyon
41725 Rosetta Canyon Drive
Lake Elsinore, CA 92530
(951) 245-0420
APPENDIX G
CONFINED SPACE INVENTORY AND LABELING

Inventory

Each department having responsibilities over a District facility shall develop and maintain a confined space inventory that includes at least the information shown in the table below. Area refers to the general unit or section of a plant or facility. Location is the specific place where the confined spaces entry point is located. It may be designated on a map, using Maximo asset numbers, P&ID reference numbers, name of equipment, or any other specific method. Description is the type of opening such as manway, manhole, duct, ladder, hatchway, tank top, etc.

The hazards of each space shall be described by as many of the Hazard Code designations as exist and/or for which there is a potential to exist in the confined space. The confined space evaluation form (Appendix B) shall be used as reference and/or this inventory used to aid in filling the evaluation form in Appendix B. Hazard code 4 has several categories which shall be used as 4a, 4b, 4c, etc.

The Special Considerations column may be used as needed for notes or to describe issues related to the space, its entry or hazards.

To be included in the inventory:

Tanks, sewers, basins, pits, electrical vaults, piping/valve vaults, large diameter pipe or duct, vats, vessels, silos, storage bins, hoppers, and ladder entry into pumping plants or subgrade facilities or other spaces that may have limited means of entry,

<table>
<thead>
<tr>
<th>#</th>
<th>AREA</th>
<th>LOCATION</th>
<th>DESCRIPTION</th>
<th>HAZARD CODE</th>
<th>SPECIAL CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>East of Chlorine Contact</td>
<td>West of Fence Line</td>
<td>Manhole - Drain</td>
<td>1, 2, &amp; 4c,b</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Contact Basin</td>
<td>Contact Basin</td>
<td>Contact Basin #3</td>
<td>1, 2, &amp; 4c,b</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Contact Basin</td>
<td>Contact Basin</td>
<td>Contact Basin #2</td>
<td>1, 2, &amp; 4c,b</td>
<td></td>
</tr>
</tbody>
</table>

Hazard Codes

1 Contains or has the potential to contain a hazardous atmosphere—toxic or oxygen <19.5% or > 23.5%.
2 Contains a material that has the potential for engulfing an entrant including cave-in of excavations.

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.

4 Contains any other recognized serious safety or health hazard.
   a Electrical
   b Moving parts
   c Surface chemical
   d Hot temperature or hot surface
   e Biological hazard (including microbiological, insect, or animal)

Labeling and Signage

Confined spaces shall be labeled to provide a reasonable warning for workers to keep out unless they have a permit. A sign reading “DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER” and using an additional sign with similar language when appropriate would satisfy the requirement for a sign. In areas such as aeration basins where confined spaces exist in subwalking surface in a large area, perimeter signs may be used as well as designated access point such as hatchways or ladder swing gates. Perimeter sign wording shall be considered for each area and shall describe the access point of confined space entry. Example: “All basins below pedestrian grating are considered confined spaces—DO NOT ENTER.”

Signs shall be legible and maintained to address weathering or work environments that cause deterioration.

Signs shall be placed so they remain visible while confined space operations are under way. Sign placement on the entry doors, covers or hatchways shall be avoided since they would no longer be visible when the doors, covers or hatchways are removed during confined space operations.
APPENDIX H
GAS DETECTOR (MONITOR) MANUFACTURER’S REQUIREMENTS

Industrial Scientific
Ventis MX4

Zero, Calibration, and, Bump testing
Gas detection instruments are potentially life-saving devices. When completed regularly, the procedures defined below help to maintain proper instrument functionality and enhance operator safety.

Procedures

Configuration – The configuration process allows qualified personnel to review and adjust a unit’s settings.

Bump Test – (or “functional test”). Bump testing checks for sensor and alarm functionality. The installed sensors are briefly exposed to expected concentrations of calibration gases that are greater than the sensors’ low alarm set points. When one or more sensors “pass” the test, they are “functional” and the unit will alarm. Each sensor’s “pass” or “fail” result is indicated on the unit’s display.

Note: a bump test does not measure for sensor accuracy (see “Calibration”).

Zero – Zeroing sets each installed sensor to recognize the ambient air as clean air. If the ambient air is not truly clean air, any gasses that are present and relevant to the installed sensor types will be measured and displayed as zero. Readings will be inaccurate until the unit is correctly zeroed in truly fresh air or with a zero-air cylinder.

Calibration – All sensors gradually degrade over time. This diminishes a sensor’s ability to measure gas concentrations accurately; however, regular calibrations adjust the instrument to compensate for this decline in sensitivity. During calibration, the installed sensors are exposed to expected concentrations of calibration gases and, when needed, the instrument will self-adjust to ensure the accurate measurement and display of gas concentration values.

Note: When a sensor has degraded beyond an acceptable level, no further adjustment is possible and the sensor will no longer pass calibration.

Peak Readings – The instrument stores the highest detected gas readings, the “peak readings” or “peaks”. Bump testing and calibration will often register new peak readings. Therefore, the clearing of the peak readings should follow each calibration. The instrument operator may also
wish to clear the peak readings after a bump test, before a change in location, or after an alarm is addressed and cleared.

**Note:** The peak readings and the data log readings are stored independently of one another; therefore, clearing the peak reading does not affect the data log. Powering the instrument off or changing its battery does not affect the peak reading. These checks and balances help promote operator safety, and serve to contain the peak readings in a “black-box” manner. In the event of a gas-related incident, this black-box record can be useful to the safety team or a prospective investigator.

**Recommendations**

Industrial Scientific Corporation (ISC) minimum frequency recommendations for each procedure are summarized in the table below. These recommendations are based on field data, safe work procedures, industry best practices, and regulatory standards to help ensure worker safety. Industrial Scientific is not responsible for setting safety practices and policies. These policies may be affected by the directives and recommendations of regulatory groups, environmental conditions, operating conditions, instrument use patterns and exposure to gas, and other factors.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>ISC Recommended minimum frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Before first use and as needed thereafter.</td>
</tr>
<tr>
<td>Calibration</td>
<td>Before first use and monthly thereafter.</td>
</tr>
<tr>
<td>Bump test</td>
<td>Prior to each day’s use.</td>
</tr>
</tbody>
</table>

Between regular calibrations, ISC also recommends a calibration be performed immediately following each of these incidences: the unit falls, is dropped, or experiences another significant impact; is exposed to water; fails a bump test; or has been repeatedly

**Remote Sampling**

*Aspirated monitor*

In confined space, an air sample should be taken in four-foot (1.22 m) intervals.

Guidelines for using a motorized pump and sampling line

When sampling with a motorized pump and sampling line, Industrial Scientific recommends the following:

- Choose the tubing type based on the target gases. If the target gases are known, use Teflon-lined tubing when sampling for these gases: chlorine (Cl2), chlorine dioxide (ClO2), hydrogen chloride (HCl), and volatile organic compounds (VOCs). For other known target gases, urethane tubing or Teflon-lined tubing may be used.
When the target gases are unknown, use Teflon-lined tubing.

- Know the length of the sample line as it is a factor in determining sampling time. A sample line may consist of tubing, a probe, or a probe and tubing. It should also have a dust filter–water stop installed at the line’s end that will extend into the sample area. Sample-line length is defined as the distance from the dust filter–water stop will extend into the sample area. Sample-line length is defined as the distance from the dust filter–water stop opening to the point where the line connects to the pump’s inlet. Ensure sample-line length does not exceed the pump’s maximum draw.

- Before and after each air sample, perform a test of the full sampling line.

- Use a thumb to block the end of the sampling line at the water-stop opening. This should cause a pump-fault alarm.

- Remove the thumb from the water-stop opening. After the alarm cycle completes, the pump should resume normal operation.

Note: If a pump fault does not occur, check and correct for cracks or other damage, debris, and proper installation in these areas: all sampling line connections, the pump’s inlet cap and inlet barrel, and the dust filter- water stop items at the end of the sampling line and inside the pump inlet barrel.

- Based on sample-line length, calculate the minimum time recommended for the air sample to reach the instrument’s sensors. As shown below, use a base time of 2 minutes, and add 2 seconds for each 30 cm (1’) of line length. Watch the display screen for gas readings and, if present, allow them to stabilize to determine the reading.

<table>
<thead>
<tr>
<th>Sample-line length (m)</th>
<th>Base time (minutes)</th>
<th>+ Sample-line-length factor (seconds)</th>
<th>Minimum sample time (mm:ss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.05 m (10’)</td>
<td>2 min</td>
<td>+ (10 x 2 s)</td>
<td>= 02:20</td>
</tr>
<tr>
<td>6.10 m (20’)</td>
<td>2 min</td>
<td>+ (20 x 2 s)</td>
<td>= 02:40</td>
</tr>
<tr>
<td>9.14 m (30’)</td>
<td>2 min</td>
<td>+ (30 x 2 s)</td>
<td>= 03:00</td>
</tr>
<tr>
<td>12.10 m (40’)</td>
<td>2 min</td>
<td>+ (40 x 2 s)</td>
<td>= 03:20</td>
</tr>
<tr>
<td>15.24 m (50’)</td>
<td>2 min</td>
<td>+ (50 x 2 s)</td>
<td>= 03:40</td>
</tr>
<tr>
<td>18.29 m (60’)</td>
<td>2 min</td>
<td>+ (60 x 2 s)</td>
<td>= 04:00</td>
</tr>
<tr>
<td>21.34 m (70’)</td>
<td>2 min</td>
<td>+ (70 x 2 s)</td>
<td>= 04:20</td>
</tr>
<tr>
<td>24.38 m (80’)</td>
<td>2 min</td>
<td>+ (80 x 2 s)</td>
<td>= 04:40</td>
</tr>
<tr>
<td>27.43 m (90’)</td>
<td>2 min</td>
<td>+ (90 x 2 s)</td>
<td>= 05:00</td>
</tr>
<tr>
<td>30.48 m (100’)</td>
<td>2 min</td>
<td>+ (100 x 2 s)</td>
<td>= 05:20</td>
</tr>
</tbody>
</table>