CONFINED SPACE PROGRAM

CONTENTS

1.0 SCOPE

The following policy describes safe operating practices for entering, working, and exiting confined spaces. Confined spaces may include silos, vats, bins, sewers, pipelines, tanks, boiler compartments, HVAC ducts, vaults, and pits, which may lack oxygen (below 19.5%) or have dangerous air contamination and be of such configuration that it would be difficult to remove a suddenly disabled person and or enter and exit the space.

1.1 Contractors

Mariposa County is not responsible for the employees of contractors who may enter confined spaces. Contractors are responsible to ensure that they have their own confined space entry program and that it complies with all state and federal regulations. Contractors who do not have their own written policy and must enter a confined space shall be required to follow the County's policy at a minimum. All contractors that enter confined spaces shall submit copies of confined space entry permits to Public Works and the Risk Management/Human Resource Office as outlined in this policy.

1.2 Employees

Currently, Mariposa County does not allow its employees to enter permit-required confined spaces. Employees entering non-permit confined spaces shall follow this policy as applicable.

2.0 POLICY

All employees and contractors who enter confined spaces shall use the appropriate hazard abatement, personal protective equipment, and rescue equipment necessary to safely enter and exit from spaces considered confined in nature.

2.1 Purpose

The purpose of this policy is to ensure employees can safely enter and exit from spaces which have limited entry and contain hazards within them.

2.2 Definitions

For the purpose of this policy, individuals working in confined spaces refers to employees and contractors who, in the course of their work, are exposed to dangerous air contamination and/or oxygen deficiency in such spaces as silos, tanks, vats, vessels, boilers, compartments, HVAC ducts, sewers, pipelines, vaults, bins, tubes, and pits.

1. A confined space is defined by the concurrent existence of the following three conditions:

a. Is large enough and configured so that an employee can bodily enter and perform work
b. Ready access or egress for the removal of a suddenly disabled employee is difficult because of the location and/or size of the opening(s)
c. Is not designed for continuous occupancy

2. A permit-required confined space is defined by the existence of one or more than one of the following conditions:

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

2.3 Pre-entry Requirements

The following requirements must be completed before an authorized employee or contractor enters into the confined space:

1. Prior to working in a confined space, the job supervisor shall be contacted.

2. Lines which convey flammable, injurious, or incapacitating substances into the space shall be disconnected, blinded, or blocked off by other positive means to prevent the development of dangerous air contamination. NOTE: This does not require blocking of all laterals to sewers or storm drains.

3. The space shall be emptied, flushed, or otherwise purged of flammable, injurious, or incapacitating substances to the extent feasible.

4. There must be adequate atmospheric testing performed by a trained employee to identify and minimize any potential hazards.

5. To the fullest extent feasible, provide a safe entrance and exit. A written record of such testing results shall be made and kept at the work site for the duration of the work.

6. The air within the confined space shall be tested frequently to determine levels of contamination or oxygen deficiency.

7. If the results are at all abnormal, then the confined space must be purged with clean air for a minimum of ten minutes. Positive flow ventilation must be continued throughout the work procedure.

8. If tests show no danger is present, entry and work may proceed provided the air within the space is tested frequently.

The following requirements must be completed before entry into a permit-required confined space:

1. Notify the Risk Management and Public Works to obtain a permit to enter the space.

2. Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.

3. When the cover is removed, the opening shall be guarded by a rail or another barrier to prevent accidental falls and foreign objects from entering the space.

4. Before entrance, the internal atmosphere shall be tested with a calibrated direct-reading instrument for the following, in this order: oxygen content; flammable gases and vapors; and potential toxic air contaminants.

5. There may be no hazardous atmosphere within the space whenever there is an employee in the space.

2.4 Post-Test Requirements

If air testing indicates a hazard exists and supplemental purging or ventilation does not alleviate the hazard, the following additional conditions apply:

1. No ignition source shall be introduced.

2. If possible, use side openings rather than the top opening for entry. Side openings are those within 3.5 feet of the bottom.

3. Appropriate/approved respiratory protection shall be provided and used by all entry employees.

4. An appropriate/approved safety belt with an attached line shall be used by all entry employees. The free end of the line shall be secured outside the entry opening. The line shall be at least 1/2-inch diameter and 2,000 lbs. test. NOTE: Except where it can be shown that a safety belt and attached line would further endanger the life of the employee.

5. At least one employee shall stand by on the outside of the space keeping in constant visual and/or audio contact with the employee within the confined space and be ready to offer assistance in case of an emergency. Appropriate/approved respiratory equipment shall be available to the standby employee for immediate use.

6. At least one employee shall be within sight of the standby employee. Entry into the confined space by the standby employee for emergency rescue is permitted only after notification of an outside employee of the emergency condition and planned action.

7. Protective clothing or devices shall be provided and used as required.

8. At least one employee trained in First Aid and Cardiopulmonary Resuscitation (CPR) shall be immediately available whenever the respiratory protection equipment is required.

9. Only approved electrical equipment and lighting shall be used in flammable or explosive atmospheres. Air-powered equipment shall be used whenever possible.

2.5 Communication Requirements

When entry requires respiratory protection or loss of sight (or low visibility) contact between employees, an effective means of communication between standby and entry employees shall be provided and used. All affected employees shall be trained and proficient in the use of the communication system and the system shall be tested prior to each use.

2.6 Operating Procedures and Employee Training

Individuals working in confined spaces shall receive written and understandable operating and rescue procedures. Operating procedures shall conform to the applicable CAL/OSHA requirements (CCR Title 8 Sections 5156-5158, Confined Spaces) and shall include provisions for the surveillance of the surrounding area to avoid hazards such as drifting vapors from tanks, piping, and sewers.

2.7 Further Information

To obtain further information, contact the Public Works Office or Risk Management Office.

3.0 DEFINITIONS

3.1 Confined Space

A space defined by the concurrent existence of the following conditions:

1. Is large enough for work, but not designated for continuous occupancy
2. Existing ventilation is insufficient to remove dangerous air contamination and/or oxygen deficiency which may exist or develop
3. Ready access or egress for the removal of a suddenly disabled employee is difficult due to the location and/or size of the opening(s)
4. Confined spaces may include, but are not limited to, storage tanks, vessels, pits, degreasers, boilers, ducts, sewers, tunnels, vaults, and aircraft fuel cells.

3.2 Confined Space Attendant (CSA)

An individual assigned to monitor activities of personnel working in a confined space. The CSA monitors and provides external assistance to those inside the confined space. The CSA can terminate any confined space entry, summon rescue personnel in the event of an emergency, and assist the rescue team performing a non-entry rescue.

3.3 Confined Space Authorized Entrant (CSAE)

An individual who is authorized by the employer to enter a permit-required confined space.

3.4 Confined Space Supervisor (CSS)

An individual authorized by the employer to be responsible for determining if acceptable entry conditions are present at the permit space, for authorizing and canceling the entry permit, and overseeing the entry operations. CSS may also serve as a CSA or CSAE if so trained in these roles and responsibilities.

3.5 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.

3.6 Entry Permit

The written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the conditions of entry, the reason for entry, anticipated hazards, personnel involved, and the length of time for which the permit is valid.

3.7 Ceiling Level

Maximum airborne concentration of a toxic agent to which an employee may be exposed for a specified period of time.

3.8 Dangerous Air Contamination

1. 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.

2. 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.

3. 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.

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

3.9 Hazardous Atmosphere

An atmosphere that may expose employees to the risk of death, incapacitation, impairment of the ability to self-rescue (unaided escape from a permit space), injury, or acute illness from one or more of the following:

1. Flammable gas, vapor, or mist in excess of 10% of its Lower Flammable Limit (LFL)

2. Airborne combustible dust at a concentration that meets or exceeds its LFL. This may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less

3. Atmospheric oxygen concentration below 19.5% or above 23.5%

4. Any other condition that is immediately dangerous to life or health

3.10 Oxygen Deficiency

An atmosphere containing oxygen at a concentration of less than nineteen and one-half percent (19.5%) by volume.

3.11 Lower Explosive Limit

The minimum concentration of a gas or vapor which will ignite if sufficient ignition energy is present.

3.12 Minimum Explosive Concentration

The minimum concentration of particulate (dust) suspended in air which can sustain an explosion.

3.13 Permissible Exposure Level (PEL)

The maximum 8-hour time-weighted average of any airborne contaminant to which an employee can be exposed. PEL's are established by the Occupational Safety and Health Administration (OSHA).

3.14 Qualified Person

A person designated by the employer, in writing, as capable by education or specialized training to recognize and evaluate employee exposure to hazardous substances or other unsafe conditions in a confined space.

4.0 RESPONSIBILITIES

4.1 Supervisors

Supervisors are responsible for:

1. Ensuring that the Risk Management Office and Public Works Office is notified of all confined space operations in their area.
2. Ensuring only trained personnel participate in confined space operations.
3. Providing and maintaining the equipment required to work, ventilate, and if required, monitor confined spaces.

4. Ensuring that required safety procedures including inspections and testing of the confined space are conducted throughout the confined space operation by qualified personnel.
5. Ensuring that all employees in the area are aware of confined space operations, and measures are taken to prevent inadvertent or unplanned entries.
6. Ensuring that all employees are aware of emergency procedures.

4.2 Risk Management and Public Works Office

The Risk Management Office and Public Works Office is responsible for:

1. Providing overall administration of the confined space program.
2. Establishing and updating requirements for conducting confined space operations.
3. Maintenance and review of records of confined space entry operations.

4.3 Employees

All employees are responsible to conduct their work activities in accordance with established California Occupational Safety and Health Administration policies and Departmental policies and procedures.

4.4 Public Works

Public Works is responsible for:

1. Providing support in blanking off, locking out, and/or disconnecting potential contaminant lines in confined spaces where work is to be performed.
2. Coordinating with the Risk Management Office in approving lighting, equipment, and tools that may be used in confined spaces subject to dangerous air contamination by flammable and/or explosive substances.

5.0 GENERAL REQUIREMENTS

5.1 Notification of Entry

Management must notify the Risk Management Office and Public Works Office of the intended confined space entry 48 hours in advance. Upon review, if the space is designated a potential permit-required confined space; the operation must be monitored prior to any entry. Under no circumstances may any unauthorized (unpermitted) entry be attempted by any personnel.

Note: The monitoring of some routine confined space operation may be designated a responsibility of the using department. In these cases, upon initial notification, the Risk Management Office and Public Works Office will review the operation and establish specific written guidelines for monitoring and operating. If any aspect of the operation should change, the Risk Management Office and Public Works Office must be notified immediately and new guidelines will be established accordingly. Only persons trained and designated qualified by the Risk Management Office and Public Works Office may conduct this monitoring.

5.2 Employee Training

All employees involved in confined space operations must be properly trained on the hazards involved, their responsibilities/duties, completion of an entry permit and entry, as well as operating and emergency procedures. Only qualified personnel may conduct atmospheric monitoring. Only trained and medically qualified personnel may wear respiratory protection.

Only personnel trained and knowledgeable of the requirements of this Confined Space Entry Procedures will be authorized by Mariposa County to undertake the duties of a CSAE, CSA, CSS, or CSAC.

All confined space entry team members shall receive refresher training whenever there is a change in the confined space entry operations that present a hazard for which they have not been trained, the employee's duties and/or responsibilities have changed, or when evaluation of this policy identifies inadequacies in the employee's knowledge, or annually.

5.3 Medical Requirements

Any CSAE who will require respiratory protection to perform the entry must comply with all aspects of the site-specific Respiratory Protection Program.

At least two of the individuals involved in a permit-required confined space entry must have a valid First Aid & CPR certificate.

5.4 Entry Permits

Entry into a permit space shall be by permit only. This permit is an authorization for entry under defined conditions for a stated purpose and specific time. The qualified person will fill out the permit and assure all portions are completed before any entry into the confined space. Permits are valid for up to one shift only or for the designated time listed (up to 8 hours), whichever is less. Permits must be posted at the site during the operation and when finished, returned to the Risk Management Office and Public Works Office for completion and filing.

All completed and/or canceled permits will be kept on file in accordance with the County's IIPP and recordkeeping requirements.

5.5 Prevention of Hazardous Conditions

The confined space must be positively prevented from entry of any material or energy that may create a hazardous condition(s). Such lines may be isolated by blanking, double block and bleed, electrical lockout/tagout, and blocking or disconnecting mechanical linkages in such a manner as to prevent inadvertent reconnection.

5.6 Sources of Ignition

Work involving the use of flame, arc, spark, or other source of ignition is prohibited within a confined space (or any adjacent space) which contains, or is likely to develop, dangerous air contamination due to flammable and/or explosive substances unless:

1. An inert atmosphere, using gases such as nitrogen, is used to prevent the ignition and the oxygen concentration is maintained at less than 10% of the concentration which supports combustion.

2. Sufficiently frequent testing of the oxygen content is performed to ensure that the oxygen remains less than 10% of the concentration which supports combustion.

5.7 Ventilation

Adequate combustion air and exhaust gas venting must be provided whenever oxygen-consuming equipment (i.e. salamanders, plumber's torches, or other heating devices) are to be used.

1. Some confined spaces in Mariposa County are equipped with a ventilation system powered by electricity. The standard operating procedure is to turnPID the system on and let it run for 25 minutes prior to making entry into the space. This should ensure a safe breathing and working atmosphere.

2. The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space. The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards of the space.

6.0 PRE-ENTRY/OPERATING PROCEDURES

6.1 Air Monitoring

The air in the confined space must be monitored to determine whether dangerous air contamination - an atmosphere presenting a potential for death, disablement, injury, or acute illness - exists. This may result from one or more of the following causes:

1. Oxygen level less than 19.5% by volume (oxygen-deficient) or greater than 23.5% by volume (oxygen-enriched)

2. A flammable gas, vapor, or mist in excess of 10% of its lower explosive limit (lower flammable) limit.

3. Toxic, corrosive, or asphyxiant substance(s) above its permissible exposure or ceiling level.

4. An airborne combustible particulate in excess of 10% of its minimum explosive concentration.

5. Any condition or air contaminant defined as immediately dangerous to life or health.

6. If a ventilation system is available at the site, it will be turned on for at least 25 minutes prior to any entry or attempted entry.

7. The atmosphere inside the permit-required confined space shall be remotely tested by slowly lowering the air monitoring unit probe that has a combustible gas indicator, oxygen sensor and H^2S sensor into the confined space. This will allow testing of the air from top to bottom. The air monitoring instrument is to be lowered slowly to accommodate the sampling speed and detector response. The atmospheric envelope should be tested a distance of approximately 4 feet in the direction of travel and to each side. All data will be permanently recorded on the Entry Permit along with the tester's initials. The CSA shall obtain and record the gas readings indicated on the CSAE's gas meter at each time interval.

8. The CSAE shall carry the gas detector and a PID with him/her at all times while in the permit space. Therefore, each CSAE will carry a personal LEL/0^2 meter on their person at all times. In addition, PID will be carried by hand since there could be a number of chlorinated hydrocarbons in the atmosphere.

9. Direct reading instruments shall be used for oxygen (0^2) concentration, combustible gases (LEL), and any potential airborne toxic contaminants that may be monitored.

10. All air monitoring equipment shall be maintained, calibrated, and operated in accordance with the manufacturer's specifications.

11. If any equipment malfunctions or appears to malfunction, the entry shall be terminated until the situation can be corrected.

12. All air monitoring equipment shall be "zeroed" and/or "calibrated" to verify sensor operation prior to use in pre-entry atmosphere testing. This testing shall be done in a fresh air environment. Refer to the air monitoring equipment operations manuals for guidance.

As a minimum, monitoring must include items in specific order. Monitoring for any toxic substances that might be reasonably expected to exist or develop must also be performed. All testing must be performed by a qualified person using approved equipment. All equipment must be used and calibrated according to the manufacturer's instructions and all results recorded on the Confined Space Entry Permit.

6.2 Posting/Guarding Procedures

1. A "Danger - Permit-Required Confined Space, Do Not Enter" or using other similar language would satisfy the requirement for a sign.

2. The Entry Permit shall be posted at the designated entrance to the permit-required confined space or by any other equally acceptable means so that entrants can confirm that pre-entry preparations have been completed. The Entry Permit should be encased in a protective cover if weather or room conditions will render the permit unreadable (wet, dusty, etc.).

3. Entrances to permit-required confined spaces must not be opened and left unguarded in public areas, even if barricaded. If control of bystanders is difficult, a worker other than the CSA should be designated to handle crowd control.

4. Entrances to permit-required confined spaces must be guarded against workers accidentally falling into them. Do not leave lids, covers, etc. open if a worker or other bystander could fall in.

6.3 Entry

If results of the monitoring show dangerous air contamination and oxygen deficiency does not exist, then entry may be allowed under the following provisions:

1. The confined space must be cleaned/purged and continuous positive ventilation must be utilized during the operation. Care must be taken to direct ventilation exhaust air downwind of exterior personnel and away from intake(s) or point(s) of entry.

2. Atmospheric testing will be conducted with sufficient frequency to ensure that the development of any dangerous air contamination and oxygen deficiency does not occur during the performance of any operation.

3. Any change in the operation, such as the introduction of a different chemical or change in the quantity used, voids the permit. A new permit may be issued upon reevaluation of the new operation by the Office of Environmental Health and Safety.

4. A standby employee, properly trained in confined space operations, must be located outside of the confined space site at all times. They must keep visual contact and summon emergency assistance if necessary.

5. The confined area must be properly guarded against inadvertent entry of substances or other physical hazards (i.e. vehicles, pedestrians, cars, etc.).

6. All necessary personal protective equipment needed to protect the employees(s) in the confined space must be utilized.

7. Only approved explosion-proof lighting, equipment and tools may be used when the environment may exceed 10% of the lower explosive level.

6.4 Removal of Hazardous Condition

If the results show dangerous air contamination or oxygen deficiency does exist, then the confined space will be ventilated and purged/cleaned/flushed to remove the hazard to the greatest extent feasible. This ventilation must be approved and may need to be statically bonded and explosion-proof. When additional atmospheric monitoring has demonstrated no dangerous air contamination and no oxygen deficiency exists or may develop, then entry may be allowed under the provisions of 6.4.

1. All confined space hazards shall be isolated prior to entry. These include, but are not limited to, blanking or blinding, double block and bleeding of all process piping into the space, and lockout/tagout of all electrical and mechanical sources of energy. Refer to the Mariposa County Lockout/Tagout Policy in the Safety and Loss Prevention Procedure Manual.

2. If the permit space is determined to contain a hazardous atmosphere, as defined by exceeding the "action levels" above and on the Entry Permit, then additional forced air ventilation must be used to control the hazard to below the action levels.

3. If forced air ventilation cannot be used or is not effective, then the County Risk Manager must be consulted to determine the appropriate level of personal protective equipment required to perform the task, and/or whether the entry is to be attempted.

4. The use of Self-Contained Breathing Apparatus (SCBA) when forced air ventilation cannot obtain safe atmospheric levels is not permitted without prior review and approval of the County Risk Manager.

5. Only NIOSH-approved SCBA's or airline respirators equipped with a 5-minute emergency air supply (egress bottle) shall be used in confined spaces containing hazardous atmospheres or with conditions determined to be immediately dangerous to health and life (IDLH).

6.5 Entry Under Hazardous Conditions

However, if the additional monitoring demonstrates that an atmosphere free of dangerous air contamination or oxygen deficiency cannot be ensured or in emergency situations when the appropriate provisions cannot be implemented, entry may be allowed only under the following provisions (in addition to the applicable provisions of 6.3 and 6.2):

1. An approved safety belt (at least 1/2-inch diameter and 2000 pounds approved) with an attached line shall be used, with the free end of the line secured outside the entry point. Confined spaces with top and side openings should be entered from the side when possible. When entry must be made through a top opening, the safety belt shall be of a full-body harness type and a hoisting device shall be utilized to lift employees out of the space. The only exception to any safety belt and attached line is when it can be shown its use would further endanger the safety of an employee.

2. An approved air line respirator or self-contained breathing apparatus (SCBA) shall be worn by all person(s) entering the confined space. Air shall meet the requirements of the Compressed Gas Association of Group D breathing air.

3. At least one standby employee in a constant, effective means of communication with the entrant shall be outside the confined space at all times, ready to give assistance. At least one additional stand-by employee, who may have other duties, must be within sight or call of the

primary stand-by employee. This secondary standby must also be trained in confined space operations.

4. The primary standby employee shall have a SCBA or approved air line respirator (independent source of breathing air) with an escape bottle. This standby may enter the confined space only in an emergency and only after:

    a. Attempting to pull the person out with the safety line.

    b. Alerting the secondary stand-by of the intended entry, the existence of an emergency, and issuing instructions to call 911.

    c. Wearing appropriate respiratory protection and using necessary safety lines.

5. At least one person trained in CPR/Basic First Aid shall be on hand at the site.

7.0 COMMUNICATIONS PROCEDURES

1. Communications between the Confined Space Attendant (CSA) and the Confined Space Authorized Entrant (CSAE) shall be continuously maintained by voice and/or hand signals and/or explosion-proof two-way radio.
2. The CSA must have immediate availability of a telephone and/or two-way radio to contact rescue services when necessary. The communications link must be verified prior to beginning entry operations.

8.0 CONFINED SPACE PERSONNEL DUTIES

Each worker must be authorized by the County Risk Manager to assist in any Confined Space Entry activities. Each worker involved in the Confined Space Entry Procedure has clearly defined duties. The authorized workers must be able to identify and demonstrate they're given duties as follows:

8.1 Confined Space Supervisor (CSS) Duties

1. Ensure that the Confined Space Authorized Entrant (CSAE) and the Confined Space Attendant (CSA) perform their confined space duties correctly.

2. Recognize all actual and potential hazards faced by the CSA and the CSAE during performance of Confined Space Entry Procedures. Understand how to control or eliminate the recognized hazards, and have the authority to do so.

3. Know how to test and check out all applicable safety equipment (gas detectors, rescue winches, harnesses, etc.).

4. Verify that all required air monitoring is performed correctly, and that all necessary safety equipment is checked out before entry begins.

5. Verify that Confined Space Rescue Services (CSRS) are available, and that a permit (if applicable) is properly filled out.

6. Authorize the start of the confined space entry work after verification that the entry permit (if applicable) is properly filled out.

7. Terminate the confined space entry when abnormal conditions are identified, or the job is completed normally.

8. Ensure that the CSA and CSAE return all safety equipment to the designated storage locations and store it properly.

9. Generate preventative and/or corrective work orders for any equipment used during the entry, if necessary. At a minimum, communicate the need to the Facilities Maintenance Manager.

8.2 Confined Space Attendant (CSA) Duties

1. Recognize the actual and potential hazards faced during entry.

2. Know how to test and check out all applicable safety equipment (gas detectors, rescue winches, harnesses, etc.).

3. Maintain contact with all CSAE's and keep an accurate count of all entrants in the confined space.

4. Remain outside of the confined space at all times during the entry operations, until relieved by another CSA.

5. Monitor activities inside and outside of the permit space. Order the evacuation of entrants (CSAE) when any sort of prohibited or abnormal condition is detected, or a situation occurs outside of the space that could affect the safety of the CSAE or the CSA.

6. Prevent entry into the confined space by any unauthorized persons.

7. Perform non-entry rescue procedures using available equipment. The CSA can not enter the space unless he/she is permitted to become a CSAE and is relieved by another CSA.

8. Summons CSRS when emergency assistance is needed for removal of the CSAE(s) from the space.

9. Perform no other duties (flagging, equipment operator, "gofer", etc.) that will interfere with any CSA duties.

8.3 Confined Space Authorized Entrant (CSAE) Duties

1. Recognize the actual and potential hazards faced during entry.

2. Know how to test and check out all applicable safety equipment (gas detectors, rescue winches, harnesses, etc.).

3. Remain in contact with the CSA at all times while in the space.

4. Alert the CSA when a warning sign or symptom of abnormal health effects, dangerous situations, or prohibited conditions are found.

5. Exit Confined Space when CSA or CSS orders evacuation, gas detector alarms or fails, or any conditions in Duty #4 above occur.

6. Know how to safely perform the assigned work tasks (welding, cleaning, repair, etc.) in the confined space.

9.0 EMERGENCY RESCUE PROCEDURES

It is absolutely essential that well planned procedures and the use of proper protective equipment be followed before any attempt at the rescue of a disabled employee in a confined space is attempted. The past history of rescue attempts has shown a very poor record in following successful rescue procedures. Spontaneous reaction, instead of well planned and executed rescue procedures, has led to numerous unnecessary deaths in confined spaces. The literature and data received have shown that in 19 out of 25 reported cases in which rescue was attempted, the rescuers were injured or killed.

9.1 Conditions

Before any rescue attempts are made, the following conditions must be met:

1. A properly equipped standby employee (see B below) and an additionally trained employee (see C below) must be present before any rescue of the disabled employee is attempted.

2. The standby employee must be equipped with:
    a. Properly approved respiratory equipment.
    b. A chest or full-body harness with a lifeline attached.
    c. All necessary personal protective equipment.

3. The additional employee is required to:
    a. Maintain communication with the standby employee either visually, by voice, or with the use of an alarm-activated explosion-proof communication system if the rescue of a disabled employee within a confined space is necessary.

4. An employee trained in First Aid and CPR shall be immediately available at the confined space.

9.2 Procedures

If an unknown or suspected disabling environment exists, the Hazardous Confined Space Requirements shall be implemented prior to entry of any additional personnel.

1. Send for emergency assistance (911).
2. For employees wearing a safety line/harness.
    a. Set up hoisting apparatus if top entry was used.
    b. Evacuate victim without entry of additional personnel.
    c. Administer First Aid or CPR as necessary.
    d. Stay with the victim until medical personnel arrive.
3. For employees NOT wearing a safety line/harness:
    a. Send for an additional employee who has approved respiratory equipment and a safety line/harness.
    b. At least one employee shall remain outside at all times to give assistance.
    c. Set up hoisting apparatus if top entry was used.
    d. Purge the confined space with a mechanical blower for several minutes.
    e. Test for combustibles, O^2 deficiency, and toxic materials prior to entry.
4. When no hazard is present as determined by testing, continue the rescue procedure.
5. If a hazardous environment exists, the rescuer shall wear approved respiratory equipment, safety line and harness in addition to necessary personal protective equipment.
    a. Put safety line/harness on the victim.
    b. Evacuate the victim.
    c. Administer First Aid or CPR if necessary.
    d. Stay with the victim until medical personnel arrive.

At NO time should rescue operations be conducted without appropriate approved respiratory and protective equipment and unless the atmosphere of the Confined Space is KNOWN to be harmless.

REFERENCES

Agency	***Section***	***Link***
Cal-OSHA	Title 8	https://www.dir.ca.gov/samples/search/query.htm
Cal-OSHA	5156	https://www.dir.ca.gov/title8/5156.html
Cal-OSHA	5157	https://www.dir.ca.gov/title8/5157.html

Table 1

Hazardous Atmosphere Categories

Hazardous atmospheres can be divided into four (4) categories:

A. Flammable; B. Toxic; C. Irritant/Corrosive; D. Asphyxiating

A. Flammable Atmospheres

1. Enriched oxygen atmosphere above 25% oxygen.
2. Combustible gases such as acetylene, butane, propane, hydrogen, methane and natural or manufactured gases.
3. By-products of work such as spray paint vapors or cleaning solvents.
4. Chemical reactions that create flammable gases such as hydrogen for dilute sulfuric acid and iron acetylene for calcium carbide and water or percussion induced combustion of acetylene - metal compounds, peroxides and nitrates.
5. Combustible dust concentrations found in handling grain products, nitrated fertilizers and finely ground chemical products.
6. Desorption of chemicals from the inner surfaces of confined spaces as propane or natural gas.

B. Toxic Atmospheres

1. Hydrogen chloride and vinyl chloride monomer from PVC production.
2. Hydrogen sulfide from stored decomposed material.
3. Oxides of heavy metals from welding fumes.
4. Cadmium poisoning from torch cutting cadmium plated objects.
5. Hydrogen sulfide from using hydrochloric acid to clean iron sulfide off of heat exchanger walls.
6. Hydrogen sulfide from accidental combination of sodium sulfate and acid dichromate in the tanning process.
7. Toxic solvents such as trichloroethylene, methyl chloroform and dichloromethane.
8. Acrylonitrile which is sometimes used as part of a protective coating for tank interiors.
9. Trichloroethane and dichloroethane which are widely used cleaning solvents.
10. Arsine gas from the combination of aluminum, sodium hydroxide and sodium arsenite.
11. Carbon monoxide from incomplete combustion of wood, coal, gas, oil and gasoline, from microbial decomposition of organic matter in sewers, silos and fermentation tanks.

C. Corrosive Atmospheres

1. Primary irritants such as chlorine, ozone, hydrochloric acid, sulfuric acid, nitrogen dioxide, ammonia and sulfur dioxide.
2. Secondary irritants such as benzene, carbon tetrachloride, ethyl chloride, trichloroethylene and chloropropene. These irritants produce systemic toxic effects as well as surface irritation.

D. Asphyxiating Atmospheres

1. Consumption of oxygen due to welding, heating, cutting and brazing.
2. Consumption of oxygen due to bacterial action such as fermentation or during chemical reactions such as the formation of rust.
3. Consumption of oxygen by the number of people operating in a confined space.
4. Displacement of oxygen by inert gases such as helium, argon or nitrogen.
5. Displacement of oxygen by carbon dioxide as in sewers, storage bins, wells, tunnels, wine vats and grain elevators.
6. Absorption of oxygen by the vessel walls or substances contained like activated carbon.

E. Other Hazards

1. Electrical equipment which would cause injury.
2. Mechanical equipment which would cause injury.
3. Static charge due to mechanical cleaning such as abrasive blasting.
4. Communication problems between the worker inside and the standby person outside due to visual interference, failure of electronic equipment or lack of proper illumination.
5. Entry and exit problems due to space configuration, size and number of openings, barriers within, and the time requirements for exiting and rescue.
6. Physical problems such as heat, cold, humidity, air velocity, noise vibration, scaffolds, surface residues and structural hazards.

References

Agency	***Section***	***Link***
Cal-OSHA	Title 8	https://www.dir.ca.gov/samples/search/query.htm
Cal-OSHA	5157	https://www.dir.ca.gov/title8/5157.html
Cal-OSHA	5158	https://www.dir.ca.gov/title8/5158.html

Table 2

Check List

Check list of consideration for entry, working in and exiting from confined spaces, and permit required confined spaces.

Items:

___ 1. Permit (for permit spaces only)
___ 2. Atmosphere Testing
___ 3. Monitoring
___ 4. Medical Surveillance
___ 5. Training of Personnel
___ 6. Labeling and Posting
___ 7. Preparation:
- ___ Isolate/lockout/tagout
- ___ Purge and ventilate
- ___ Cleaning Processes
- ___ Requirements for special equipment and tools

___ 8. Procedures:
- ___ Initial plan
- ___ Standby
- ___ Communications/observation
- ___ Rescue
- ___ Work

___ 9. Rescue Equipment
___ 10. Safety Equipment and Clothing:
- ___ Head protection†
- ___ Hearing protection†
- ___ Hand protection†
- ___ Foot protection†
- ___ Body protection†
- ___ Safety belts*
- ___ Life lines and harnesses*
- ___ Record keeping/exposure*
- ___ Respiratory protection**

†Depends on job and area
*Required
**Decision Rests with qualified person

Table 3

Confined Space Entry Permit

Date:_____

Time:_____

Expires Date/Time:_____

Confined Space Location:_____

Purpose of Entry:_____

POTENTIAL HAZARDS EXPECTED

_____ OXYGEN DEFICIENCY

_____ FLAMMABLE GASES/VAPORS

_____ TOXIC GASES/VAPORS

_____ MECHANICAL HAZARDS

_____ ELECTRICAL SHOCK

_____ MATERIALS HARMFUL TO SKIN

_____ ENGULFMENT

_____ HEAT STRESS

_____ OTHER:_____

EQUIPMENT REQUIRED FOR ENTRY

_____ Respirator

Type:_____

_____ Supplied Air Breathing Apparatus

_____ Protective Clothing

Type:_____

_____ Hearing Protection

_____ Eye Protection

_____ Personal Atmosphere Monitor

_____ Communication Equipment

Type:_____

_____ Other:_____

ELECTRIC EQUIPMENT/TOOLS

_____ Low Voltage Tools/Lights

_____ Ground-fault Interrupters

_____ Approved for Hazardous Environments

RESCUE EQUIPMENT REQUIRED

_____ Fire Extinguisher

_____ Harness/Lifeline

_____ Tripod/Retrieval Equipment

_____ Other:_____

PREPARATION REQUIRED

_____ Notify affected departments of service interruption

_____ Isolate supply/return; blanked-double valve; lock & tag

_____ Zero Energy State (Lockout/tag all energy sources)

_____ Cleaned, drained, washed and purged

_____ Ventilation to provide fresh air

_____ Emergency Response Team Available

_____ Employees informed of specific confined space hazards

_____ Procedures reviewed with each employee

_____ Atmospheric Tests in compliance

_____ Attach Hot Work Permit

_____ Notified EH&S Department

_____ Other:_____

AUTHORIZED ENTRANTS:

_____

_____

_____

_____

AUTHORIZED ATTENDANT(S):

_____

_____

_____

RESCUE SERVICES

Contact by telephone: 9-1-1

PERSONAL/AREA CONTINUOUS ATMOSPHERIC MONITORING EQUIPMENT

Monitoring Equipment Type:_____

Monitoring Equipment Serial Number:_____

Calibrated By:_____

Date Calibrated:_____

PRE-OPENING ATMOSPHERIC TEST EQUIPMENT

Test Equipment Type:_____

Test Equipment Serial Number:_____

Date Calibrated:_____

Calibrated By:_____

Person Conducting Pre-Opening Testing:_____

ATMOSPHERE TEST RESULTS

TIME	DISTANCE FROM ENTRANCE	RESULTS O2	C.G.	H2S	CO	OTHER: _____

TEMPERATURE IN CONFINED SPACE:_____

ACCEPTABLE ATMOSPHERIC CONDITIONS ARE:

OXYGEN BETWEEN 19.5% AND 23.5%

COMBUSTIBLE GAS LESS THAN 10% OF LOWER EXPLOSIVE LIMIT (LEL)

NO DETECTABLE AMOUNTS OF ANY OTHER ATMOSPHERIC CONTAMINANT

IF THESE CONDITIONS ARE NOT MET THE SPACE MAY NOT BE ENTERED AT THIS TIME. CONTACT EH&S DEPARTMENT BEFORE PROCEEDING.

A confined space entrant may not enter the confined space unless he has reviewed the permit. By signing below the entrant confirms that he has read, reviewed, and understood the work authorized by this permit and the information contained herein. Entrant also confirms that safety instructions and procedures have been received and are understood.

CONFINED SPACE SIGN IN LOG

(Times must be posted for each Entry and Exit)

ENTRANT	SIGNATURE	ENTRY	EXIT	ENTRY	EXIT	ENTRY	EXIT

CONFINED SPACE ENTRY SUPERVISOR CERTIFICATION

AUTHORIZATION: I certify that all required precautions have been taken and necessary equipment is provided for safe entry and work in this confined space.

Name:_____ Date:_____

Signature:_____ Time:_____

TABLE 4

Recommended Respiratory Selection Guide

Hazard	Concentration* Less Than or Equal To	Respirator**
Particulate	5 x PEL	Single use respirator***
Particulate	10 x PEL	Any dust respirator***
Particulate	50 x PEL	Full facepiece respirator with high efficiency filter(s) or self-contained breathing apparatus with full facepiece operated in the demand mode.
Particulate	2000 x PEL	Supplied-air respirator with full facepiece operated in any positive pressure mode.
Particulate	Greater than 2000 x PEL	Self-contained breathing apparatus with full facepiece operated in the pressure demand mode or a supplied-air respirator with full facepiece operated in any positive pressure mode with an auxiliary self-contained breathing apparatus.
Known gas or vapor contaminant****	50 x PEL	Chemical cartridge respirator with full facepiece and cartridges approved for the specific contaminant(s) or a full facepiece self-contained breathing apparatus operated in the demand mode.

* If the concentration forms a flammable atmosphere only the self-contained breathing apparatus with full facepiece operated in the pressure demand mode may be used.

** Any respirator recommended for a higher concentration may be used at a lower concentration.

*** These respirators may not be used if the toxic material is carcinogenic.

**** If the concentration forms an atmosphere which is immediately dangerous to life, then only the self-contained breathing apparatus operated in the pressure demand mode or the combination supplied air respirator with full facepiece operated in any positive pressure mode with an auxiliary self-contained breathing apparatus may be used.

Hazard	Concentration*	Respirator**
	Less Than or Equal To	
Known gas or vapor positive pressure mode.	2000 x PEL	Supplied-air respirator with full facepiece operated in any contaminant***
Known gas or vapor	Greater than 2000 x PEL	Self-contained breathing apparatus with full facepiece operated contaminant*** in the pressure demand mode or a combination supplied-air respirator with full facepiece operated in any positive pressure mode with an auxiliary self-contained breathing apparatus.
Combination of particulates and gases or vapors****	50 x PEL	A full facepiece combination respirator approved for dusts and mists and the specific contaminant(s) (gases or vapors).
	1000 x PEL	Powered air-purifying full facepiece combination respirator with high efficiency filter(s) and chemical cartridge approved for the specific gas or vapor.
	2000 x PEL	Supplied-air respirator with full facepiece operated in any positive pressure mode.
	Greater than 2000 x PEL	Self-contained breathing apparatus with a full facepiece operated in the pressure demand mode or a combination supplied-air respirator with full facepiece operated in any positive pressure mode with an auxiliary self-contained breathing apparatus.

* If the concentration forms a flammable atmosphere only the self-contained breathing apparatus with full facepiece operated in the pressure demand mode may be used.

** Any respirator recommended for a higher concentration may be used at a lower concentration.

*** These respirators may not be used if the toxic material is carcinogenic.

**** If the concentration forms an atmosphere which is immediately dangerous to life, then only the self-contained breathing apparatus operated in the pressure demand mode or the combination supplied air respirator with full facepiece operated in any positive pressure mode with an auxiliary self-contained breathing apparatus may be used.

RECOMMENDED RESPIRATORY SELECTION GUIDE

Hazard	Concentration* Less Than or Equal To	Respirator**
Unknown contaminant	Undetermined	Self-contained breathing apparatus with full facepiece operated in the positive pressure mode or a supplied-air respirator with full facepiece operated in any positive pressure mode with an auxiliary self-contained breathing apparatus.
Inert and other with anlevel is below 17%	in the pressure demand mode or a combination supplied-air respirator where the oxygen	Self-contained breathing apparatus with full facepiece operated atmospheres with full facepiece operated in any positive pressure mode auxiliary self-contained breathing apparatus.
Emergency	Unknown	Self-contained breathing apparatus with full facepiece operated in the pressure demand mode or a combination supplied-air respirator with full facepiece operated in any positive pressure mode with an auxiliary self-contained breathing apparatus.

* If the concentration forms a flammable atmosphere only the self-contained breathing apparatus with full facepiece operated in the pressure demand mode may be used.

** Any respirator recommended for a higher concentration may be used at a lower concentration.

*** These respirators may not be used if the toxic material is carcinogenic.

**** If the concentration forms an atmosphere which is immediately dangerous to life, then only the self-contained breathing apparatus operated in the pressure demand mode or the combination supplied air respirator with full facepiece operated in any positive pressure mode with an auxiliary self-contained breathing apparatus may be used.

TABLE 5

Confined Spaces Located at Mariposa County

SPACE	LOCATION	POTENTIAL HAZARDOUS MATERIALS/CONDITIONS

This list is intended as a guideline. It is not a complete list of confined spaces in the County. If you have a question regarding confined spaces, please call the County Risk Manager.

APPENDIX TITLE 8 5156-5158