Written Confined Space Entry Program

Introduction

A. Statement of Need

There are two primary reasons why the (company name) will implement a Confined Space Entry Program. (company name) must comply with the Cal/OSHA Confined Spaces Standard found in GISO 5156 and Federal OSHA 29CFR1910.146 Additionally, this program will assist the (company name) in achieving the overall goal of a safer work place.

B. Anticipated Benefits

Several benefits are anticipated with the implementation of the Confined Space Entry Program.

1. Prevention of illnesses and injuries related to entry and/or work in permit-required confined spaces.
2. Overall improvement of the company's Safety Program.
3. Improvement of employer-employee relations by establishing regular lines of communication.
4. Avoidance of citations, violations, and related problems from the Federal and state regulations.

C. Program Administrator:

The Confined Space Entry Program Administrator is the company's Safety Organization.

D. Location and contact person for the written program:

A copy of this written confined space entry program is available, upon request, to employees, their designated representatives, directors or designees of the Federal Occupational Health and Safety Administration (OSHA). A copy of this written confined space entry program will be kept at:

(Company name)

E. Notice

Employees and contractors of (company name) shall not enter a confined space until the following requirements are met:

1. Hazards are identified and evaluated; and
2. Workers entering the space are trained on confined space hazards and entry procedures; and
3. Workers entering the space are identified and made aware of possible hazards that may be encountered on that particular job; and
4. Appropriate danger signs have been posted; and
5. Proper personal protective equipment has been selected and issued to affected employees.

If a confined space is not entered because one of the conditions mentioned above has not been met, the confined space will be restricted to employees and others by erecting barriers, installing locks, and/or posting warning signs until requirements have been met.

I. Purpose

The purpose of this program is to ensure the protection of all employees of the (company name) from the hazards associated with confined space entry. This document contains requirements for practices and procedures to protect employees from those hazards of entry into and work within permit required confined spaces.

It shall be the policy of the (company name) to reduce the need for confined space entry. It shall also be the policy of the (company name) to eliminate whenever possible, all confined space hazards in order to reclassify permit-required confined spaces to non-permit required confined spaces. When confined space entry is necessary, all provisions of this document are to be followed

II. Authority

The (company name's) Confined Space Entry Program is required by the Federal and state regulations.

III. Summary

(company name) has the responsibility to establish a written, comprehensive program which includes provisions for working in confined spaces. These provisions entail preventing unauthorized entries, identifying and evaluating hazards, establishing procedures for safe permit space entry, issuing and maintaining proper equipment, using outside attendants, establishing rescue and emergency procedures, identifying duties and job classifications of employees entering and/or working in confined spaces, establishing a system for issuing entry permits, developing post-entry procedures, and conducting post-illness/injury reviews.

The written plan will be reviewed every year in January for accuracy and completeness.

The written plan and its elements will be updated in the following situations:

1. When there is reason to believe that provisions of the program may not protect employees.
2. When new processes and/or technologies are introduced.
3. When job duties mentioned in the program are changed.
4. When locations mentioned in the program are changed.
5. When requirements for written confined space entry programs have changed in accordance with applilcalbe standarads, codes and regulations.
6. When any other elements are changed.

IV. Definition of a Confined Space

A confined space means a space that: **1)** is large enough and so configured that an employee can bodily enter and perform assigned work; **2)** has limited or restricted means for entry or exit; and **3)** is not designed for continuous human occupancy. Examples of confined spaces include but are not limited to storage tanks, process vessels, bins, silos, boilers, ventilation or exhaust ducts, sewers, pipe chassis, underground utility vaults, tunnels, and pipelines.

A permit-required confined space means a confined space that either **1)** contains or has the potential to contain a hazardous atmosphere, **2)** contains a material that has the potential for engulfing an entrant, **3)** has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or **4)** contains any other serious safety or health hazard.

A. Responsibilities

The Safety Organization shall be responsible for the development, documentation, and administration of the (company name's) Confined Space Entry Program. In fulfilling these responsibilities, the Safety Organization shall carry out the following tasks:

1) Develop the Written Confined Space Entry Program and revise the program as necessary.
2) Maintain records of employee training.
3) Provide guidance for the proper selection and use of appropriate air monitoring equipment, respiratory protection, and personal protective equipment to meet the requirements of this program.
4) Periodically audit work operations and documentation using canceled permits to evaluate the overall effectiveness of the Confined Space Entry Program and ensure that employees participating in entry operations are protected from permit space hazards.
5) Assist each Manager/Supervisor in identifying confined spaces encountered by his/her employees.
6) Provide guidance for the proper selection and use of appropriate safety and rescue equipment to meet the requirements of the Confined Space Entry Program.

2. SUPERVISORS

Supervisors shall identify and report all job areas and locations that are or may be confined spaces. A list of confined spaces that are identified shall be submitted to the Safety Organization. In addition to this, designated supervisors shall carry out the following tasks:

1) Classify confined spaces as "permit required," "Alternate Procedure" or "non-permit required."
2) Identify personnel who will enter confined spaces.
3) Identify the personnel under their supervision required to wear respirators.
4) Advise personnel on routine measurement of respiratory hazards in confined spaces.
5) Provide detailed instruction and training on confined space hazards and entry procedures to those who may enter confined spaces.
6) Provide instruction to personnel on the proper use of equipment required for confined space entry.
7) Maintain equipment that is used to enter confined spaces.
8) Conduct work site inspections to review unit compliance with confined space entry procedures.
9) Maintain records of equipment maintenance and employee training.
10) Inform employees who may enter the permit confined space by posting danger signs or by training.
11) Issuance and cancellation of entry permits.
12) Establishment of a lockout program for their department.
13) Identify and evaluate the hazards of permit spaces before employees enter them.
14) Conduct a pre-entry briefing to inform entrants of possible hazards that may be encountered.
15) Identify the people who will enter the confined spaces.
16) Take the necessary measures to prevent entrance into prohibited permit spaces.

3. EMPLOYEES WHO MAY ENTER CONFINED SPACES

Employees who may enter confined spaces shall comply with the confined space entry procedures contained herein and with those procedures stipulated by their supervisor. To comply, employees shall carry out the following tasks:

1) Store, clean, maintain and guard against damage, equipment used for confined space entry.
2) Report any deficiencies or malfunction of equipment to a supervisor.
3) Understand emergency procedures in case of an accident in a confined space.
4) Under no circumstance enter a confined space that is suspect of having a non-respirable atmosphere, even to rescue a fellow employee.

B. Permit-Required Confined Space Program

Departments will identify and classify every confined space as either a Permit-Required Confined Space or, when the confined space does not present a real potential hazard, a Non-Permit Confined Space. When Permit-Required Confined Spaces are identified, department heads and supervisors will also be responsible for the following:

a. Preventing Unauthorized Entry
b. Identifying Permit Space Hazards
c. Developing Safe Entry Practices
d. Maintaining and Using Equipment Properly

e. Testing for Acceptable Entry Conditions
f. Providing Permit Space Attendants
g. Providing Emergency Retrieval Systems

1. PROGRAM ELEMENTS FOR PERMIT-REQUIRED CONFINED SPACES

1) **Preventing Unauthorized Entry**

In order to prevent unauthorized entry into permit-required confined spaces, Departments must utilize at least two of the following mechanisms:

- Providing information to visitors
- Posting warning signs
- Erecting barriers
- Installing locks or covers at entry points

Each Department will document the implementation of these mechanisms and ensure that they remain in place.

2) **Identifying Permit Space Hazards**

Each Department will identify and evaluate the hazards of permit spaces before employees enter them. The following hazards shall be identified prior to entry into a confined space:

- Atmospheric hazards
- Asphyxiating atmospheres
- Flammable atmospheres
- Toxic atmospheres
- Burn hazards
- Heat stress hazards
- Mechanical hazards
- Engulfment hazards
- Physical hazards (falls, debris, slipping hazards)
- Electrocution
- Danger of unexpected movement of machinery
- Noise hazards

3) **Developing Safe Entry Practices**

Departments will implement procedures and practices necessary for safe permit space entry operations. Theses include, but are not limited to:

- Acceptable entry conditions
- Isolating the permit space
- Purging, inerting, flushing or ventilating the permit space as necessary to eliminate or control atmospheric hazards.
- Pre-entry Briefing. The lead worker will conduct a meeting of all employees who will enter the confined space. Employees will be informed of the hazards and safety conditions of the particular job

4) **Controlling Hazards**

Hazards shall be controlled by the following mechanisms:

- Lockout of energy sources
- Cleaning and purging(See Appendix c, Ventilation of Confined Spaces)

- Personal protective equipment (see the City of Spokane's Written Respiratory Protection Program)

5) **Entering Confined Spaces along Roadways**

The following precautions shall be followed when entering a confined space located along a roadway, parking lot, or any areas where traffic flow may cause a potential hazard:

- Approach the area cautiously and activate flashers upon approach to the confined area to be entered.
- Park any vehicles in such a way that traffic will flow in the most unobstructed manner, and where possible, the vehicle should provide protection for the entry crew.
- Park the vehicle in such a manner that exhaust fumes are not drawn down into the manhole. If this is not possible, extend the exhaust stack above the vehicle.
- Before uncovering a manhole, place traffic safety cones around the manhole and vehicle, visible to traffic in all directions. Place cones to protect the crew and to channel traffic flow. The cones should be placed at sufficient distances and intervals to adequately warn oncoming traffic.
- In areas of high traffic volume or other sites warranting additional highly visible safety equipment, use illuminating traffic arrows, barricades, and "Men Working" signs.
- When placement of the vehicle creates a situation of having only one open lane of traffic in a congested area, use a flag person to direct traffic flow. When a flag person is necessary, an additional crew member is required to attend the employee in the manhole. Wear traffic safety vests or equivalent at all times when working on the street or easement surface in the field.
- In the case of opening or obstructions in the street or sidewalk being worked on or left unattended, effectively display danger signals such as warning signs, cones, and flags. Under these same conditions at night, prominently display warning lights. Enclose excavations and openings with suitable barricades.

2. EQUIPMENT USE AND MAINTENANCE

Equipment, including testing, ventilating, lighting, monitoring, communication and personal protective equipment, necessary for the safe entry into a Permit Space shall be provided, maintained and properly used by each Department. See Appendix d, Basic Confined Space Entry and Rescue Equipment.

3. TESTING FOR ACCEPTABLE ENTRY CONDITIONS

Permit space evaluation will include all testing conducted before an entry as well as all testing and monitoring activities to ensure that acceptable entry conditions are maintained throughout the entry. Atmospheric testing should be conducted in accordance with Appendix b of this program.

4. PROVIDING PERMIT SPACE ATTENDANTS

Each Department will provide at least one attendant outside a permit space to be entered for the duration of the entry operations. See Appendix e, "Duties of the Attendant" for specific responsibilities.

5. TRAINING AND DUTIES OF ENTRY PERSONNEL

There are three specific members of a confined space entry team:

1) Authorized Entrants
2) Attendants
3) Entry Supervisor or "Lead Worker"

The department shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned.

Training shall be provided to each affected employee:

- Before the employee is first assigned duties.
- Before there is a change in assigned duties.

- Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained.
- Whenever the department has reason to believe either that there are deviations from the permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.

The training shall establish employee proficiency in the duties outlined in Appendix e and shall establish new or revised procedures, as necessary, for compliance with applilcable standards, codes and regulations.

The department shall certify that the training required by the previously mentioned paragraphs has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.

Only trained attendants, authorized entrants, and personnel authorizing or in charge of entry shall work in and around a Permit Space.

6. RESCUE AND EMERGENCY SERVICES – "911" IS NOT A PRIMARY EMERGENCY SERVICE FOR CONFINED SPACE RESCUE

Where ever possible, the use of non-entry rescue systems or methods shall be used. Where non-entry rescue is not possible, departments will coordinate rescue and emergency services. These service prividers will be made aware of the hazards they may confront when called on to perform rescues. They shall be responsible to equip, train, and conduct it appropriately. Designated departments will provide the service providers with access to all permit spaces from which rescue may be necessary so that they can develop appropriate rescue plans and practice rescue operations.

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.

Non-Entry Rescue Retrieval Systems shall meet the following requirements:

1) Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head. Wristlets may be used in lieu of the chest or full body harness if the employer can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

2) The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

3) If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

7. WRITTEN PERMIT SYSTEM

A permit system shall be utilized for entry into Permit Spaces

Each canceled entry permit shall be retained for at least 1 year to facilitate the review of the permit-required confined space program. Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

8. COORDINATING ENTRY OPERATIONS

All outside contractors performing work in confined space entry permit areas shall be informed of any fire, explosion, health or other safety hazards of that confined space. This information shall be based on current or past history of the confined space and the nature of the contractor's work procedure in making such disclosure.

Each Department shall inform contractors of the (company name's) safety rules and emergency plans which may be applicable to the contractor's employees. Contractors and their employees must not be allowed to enter a confined space until the provisions of this program have been satisfied. When both company and contractor personnel are working in or near permit spaces, their entry operations must be coordinated to avoid endangering any personnel.

At the conclusion of the entry operations, the contractor must be debriefed regarding the permit space program that was followed and concerning any hazards confronted or created in permit spaces during entry operations.

It is the responsibility of each contractor who is retained to perform permit space entry operations to obtain any available information regarding permit space hazards and entry operations. They must also coordinate entry operations with the (company name) when both will be working in or near permit spaces. The company must be informed of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either through a debriefing or during the entry operations.

9. CONCLUDING ENTRY

The lead worker will determine when the entry operations have been completed. The permit space will be closed and the permit canceled. The lead worker will write "Permit Canceled" with the date, time, and signature at the bottom of the Confined Space Permit. Entry into the permit space will only be allowed after following all aspects of this program.

10. PROGRAM REVIEW AND REVISION

Each Department will review entry operations and revise the procedures to correct any deficiencies before subsequent entries are authorized. Any revisions will be reported to the Safety Organization in order to revise the written program.

11. ANNUAL COMPLIANCE REVIEW

The Safety Organization will review the program annually in light of actual entry, work, and exit experience to determine how the program can be improved.

C. ALTERNATIVE ENTRY

Employees who enter a confined space need not comply with the procedures set forth in the program provided that:

- **a.** It can be demonstrated that the only hazard posed by the permit space is an actual or potential hazardous atmosphere.
- **b.** It can be demonstrated that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry.
- **c.** Monitoring and inspection data are developed that support the previous conclusions.
- **d.** If an initial entry of the permit space is necessary to obtain the data required, the entry is performed according to the procedures set forth in this document concerning the entry of a permit required confined space.
- **e.** The determinations and supporting data required are documented and made available to each employee who enters the space.

D. Reclassification to a Non-Permit Confined Space

If a permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.

Note: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards.

The department shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space.

If hazards arise within a permit space that has been declassified to a non-permit confined space under this section, each employee in the space shall exit the space. The Department shall then reevaluate the space and determine whether it must be reclassified as a permit space, in accordance with other applicable provisions.

Appendix a.- Definitions

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

Alternate Entry Procedures: means procedures that may be used when the only hazard of a confined space, based upon monitoring and inspection data, is an actual or potential hazardous atmosphere in which continuous forced air ventilation alone is all that is needed to maintain the permit required confined space for safe entry.

Attendant: means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

Authorized Entrant: means an employee who is authorized by the employer to enter a permit required confined space.

Blanking or Blinding: means the absolute closure of a pipe, line or duct, by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined Space: means a space that the space:

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

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

Emergency: means any occurrence (including any failure of hazard control or monitoring equipment) or event(s) internal or external to the confined space that could endanger entrants.

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

Entry: means the action by which a person passes through an opening into a permit required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.
Entry permit: means the written or printed document that is provided by the employer to allow and control entry into a permit space and contains the information specified in paragraph (f) of this section.

Entry permit system: means the employer's written procedures for preparing and issuing permits for entry and returning the permit space to service following termination of entry and designates by name or title the individuals who may authorize entry.

Entry supervisor: See "Lead Worker". The term "Lead Worker" is utilized by The City of Spokane wherever 29 CFR 1910.146 refers to the "entry supervisor".

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

1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

2) Airborne combustible dust at a concentration that meets or exceeds its LFL;

   Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.

3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

4) Atmospheric concentration of any substance which may exceed a permissible exposure limit.

   Note: An airborne concentration of a substance that isn't capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to it health effects isn't covered by this definition.

5) Any other atmospheric condition that is immediately dangerous to life or health.

   Note: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, 1910.1200 , published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

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

Immediately dangerous to life or health (IDLH): means any condition which poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.
Note: Some materials - hydrogen fluoride gas and cadmium vapor, for example - may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12 - 72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

Inerting: means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.
Note: This procedure produces an IDLH oxygen-deficient atmosphere.

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

Lead Worker (Entry Supervisor): means the person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section. The term "Lead Worker" is utilized by the City of Spokane wherever 29 CFR 1910.146 refers to the "entry supervisor."

Note: A lead worker also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of lead worker may be passed from one individual to another during the course of an entry operation.

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

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

Oxygen deficient atmosphere: means an atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere: means an atmosphere containing more that 23.5 percent oxygen by volume.

Permit required confined space: (permit space) means a confined space that has one or more of the following characteristics:

1) Contains or has a potential to contain a hazardous atmosphere;
2) Contains a material that has the potential for engulfment of an entrant;
3) 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; or,
4) Contains any other recognized serious safety or health hazard.

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

Permit system: means the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

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

Rescue service: means the personnel designated to rescue employees from permit spaces.

Retrieval system: means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Testing: means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space. Testing enable employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

Appendix b.- Atmospheric Testing and Monitoring

1. PROCEDURES FOR ATMOSPHERIC TESTING AND MONITORING

Atmospheric testing is necessary for two purposes: evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.

1) **Evaluation Testing**

The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate entry procedures can be developed and acceptable entry conditions stipulated for that space. A minimum of three tests should be performed to identify atmospheric hazards in confined spaces. These tests must be performed in the following sequence:

- Oxygen Content
- Flammability
- Toxicity

2) **Verification Testing**

The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions.

3) **Duration of Testing**

Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.

4) **Testing Stratified Atmospheres**

When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

5) **Equipment Calibration**

To ensure that the atmospheric testing equipment is functioning properly, any direct reading test device should not be used without performing the following three operations:

- Inspection
- Calibration

Function TestAll three operations should be performed according to specific manufacturer’s instructions.

2. AIR MONITORING GUIDE

1) **Calibrate Instrument**

2) **Inspect Instrument**

Check physical condition of instrument (case, meter, attachments, hoses for cracks)

- Review instructions to insure you know how to use the device and interpret results.

3) **Perform Function Test**

- Oxygen sensor: breathe into sampling device to reduce the oxygen level below 19.5%. The oxygen alarm should sound.
- Combustible gas sensor: remove cap of solvent magic marker or open a cigarette lighter without a flame near the sampling device until it reaches a 10% reading. The gas sensor should sound.
- Always perform a function test in the field before use.

- Never perform a function test in the suspected atmosphere.

4) **Pre-Test Space**

- Zero instrument in known fresh air.
- Test entire space, top to bottom, every four feet and in the direction of travel.
- Order of tests:
  - ◊ Oxygen
  - ◊ Flammability
  - ◊ Toxicity

5) **Monitor the Space**

- If continuous monitoring is required, position the instrument near the workers breathing zone.

Appendix c.- Ventilation of Confined Spaces

Ventilation is one of the most effective means of controlling hazardous atmospheres in confined spaces. In this procedure, clean air replaces contaminated air by natural or forced (mechanical) ventilation.

1. FACTORS IN VENTILATING CONFINED SPACES

When ventilating a confined space, the following factors must by taken into consideration:

1) **Volume of air:**

This determines the capacity of the blower or ejector.

2) **Type of atmosphere:**

This will determine the type of blower or ejector used and the length of time needed to ventilate until it is safe for people to enter the space.

3) **Access to space:**

This determines how to get the ventilating air into and out of the space.

4) **Power requirements and availability:**

This will influence the power source and fan motor size. A portable generator may be required as a source of power.

5) **Cost, efficiency, and maintenance:**

This may have an effect on the type of device that is selected and what is necessary to keep it working properly.

6) **Shape of space:**

This will affect the type of directional device needed and the amount of air pressure required to provide sufficient ventilation.

7) **Source of clean air:**

This is necessary to ensure adequate ventilation.

8) **Length of time ventilation is needed:**

This is determined by the type of contaminant and the work that is to be done in the space.

9) **Type of work to be done:**

This determines whether local exhaust ventilation or general ventilation is required.

2. VENTILATION GUIDE

1) Select fan with a capacity to quickly replace the air in the space. Limitations are pasted on the fan housing.
2) Use reliable, grounded electrical power.
3) Eliminate any hazardous atmosphere. Exhaust toxic and flammable air; supply fresh air when oxygen-deficient.
4) Provide constant circulation of fresh air while space is occupied.

    - Natural ventilation is allowable only on "non-permit" entry.
    - Direct high-velocity supply ventilation to mix the air throughout the space.
    - Capture contaminants during hot work or cleaning with solvents by using additional local (or point) exhaust.

    Pure oxygen is not "fresh air". Never use bottled oxygen for ventilation.
5) Arrange ductwork to ensure safety:

    - Locate supply fan intake away from flammable or toxic air.
    - Position exhaust fan outlet to avoid recirculation of bad air or endangering others outside the space.
    - Position exhaust duct inlet next to the source of contaminants.
    - Keep ducts short and straight.
    - Make sure air circulates through entire space and does not short-circuit.

6) Monitor the air to ensure ventilation is keeping the air safe to breathe.

Appendix d.- Basic Confined Space Entry and Rescue Equipment

Equipment shall include, but not be limited to:

Safety Cones

Safety Vest

Barricades (as required)

Men Working Signs (as required)

Safety Flags

Manhole Hook (or pick)

Combustible Gas/Oxygen/CO2/Toxic Gas Detector

Utility Ropes

Full Body Harness

Retrieval Line

Mechanical Retrieval Device

Tri-pod or Other Anchoring Point

Forced Air Ventilation Blower & Hose

Fire Extinguisher

First Aid Kit

Safety Ladder

Manhole Access Bracket

Self Contained Air Units

Hard Hats

Safety Glasses

Safety Shoes

Rescue Telephone Number

Appendix e.- Employee Duties

1. DUTIES OF AUTHORIZED ENTRANTS:

1) Know the hazards that may be faced during entry.
2) Recognize the signs and symptoms of hazard exposure.
3) Understand the consequences of hazardous exposure.
4) Use equipment properly.
5) Communicate with the attendant.
6) Alert the attendant of hazards.
7) Exit the permit space quickly when required.

2. DUTIES OF THE ATTENDANT:

1) Know entry hazards.
2) Know behavioral effects of exposure.
3) Maintain accurate entrant identification.
4) Remain outside the permit space.
5) Communicate with entrants.
6) Monitor entry activities.
7) Summon rescue and emergency services.
8) Prevent unauthorized entry.
9) Perform non-entry rescue.
10) Perform no conflicting duties.

3. DUTIES OF THE "LEAD WORKER" (ENTRY SUPERVISOR):

1) Know the potential hazards during entry and work.
2) Determine if acceptable entry conditions are present at a permit space where entry is planned.
3) Terminate entry as required by the standard.
4) Verify that rescue services are readily available and the means for summoning them are operable.
5) Remove unauthorized individuals who enter or try to enter the permit space during entry and work.
6) Determine that entry and work operations remain consistent with entry permit terms and that acceptable entry conditions are maintained.

Note: The person authorizing the entry may also serve as the entrant or attendant for the entry

Appendix f.- Confined Space Entry Procedures

1. Determine if entry into confined space is necessary to perform work.

2. The following minimum required equipment should be on hand:

1) Ventilation,
2) Barrier and warning signs,
3) Gas monitor capable of measuring concentrations of oxygen, flammable gases, hydrogen sulfide and carbon monoxide.

3. Eliminate any unsafe conditions before the access door or cover is opened.

4. Immediately guard the entry by some barrier and signs to prevent people or objects from accidentally entering the confined space.

5. Conduct hazard assessment

1) *Test the real or potential atmospheric hazards*

- Oxygen content less than 19.5% or greater than 23.5%
- Flammable gases and vapors greater than 10% of the LEL (Lower Explosive Limit)
- Hydrogen Sulfide concentrations greater than 10 ppm (Parts per million)
- Carbon Monoxide concentrations greater than 35 ppm
- Other toxic gases or vapors greater than PEL (Permissible Exposure Limit)

Note: For more information, see Air Monitoring Guide (Appendix B).

2) Review the space for other observable serious safety and health hazards:

- mechanical,
- electrical,
- burn,
- heat stress,
- engulfment, or
- entrapment hazards, etc.

6. If any hazardous atmosphere exists, do the following:

1) If possible, determine and eliminate the source of the atmospheric hazards (for example: carbon monoxide from nearby truck or gas-powered generator).

2) When the atmosphere contains toxins or flammables, ventilate the space by drawing air out until the air has been changed over several times.

3) When oxygen deficient, ventilate by pushing air into the space until the air has been changed over several times.

4) Verify the hazardous atmosphere has been eliminated by testing the air.

Note: For more information, see Ventilation Guide (Appendix C).

7. Determine from information gathered above which of the following entry procedures is appropriate:

1) **Non-Permit Space**
If there are neither real nor potential atmospheric hazards and no observable serious safety and health hazards, this should be certified in writing.

2) **Alternative Entry Procedures**
If no observable serious safety and health hazards exist and atmospheric hazards are controlled with continuous ventilation, this should be certified in writing.

3) **Permit-Required Space**
If there are any observable serious safety/health hazards in addition to potential or real atmospheric hazards, all procedure here must be followed. Authorize permit with signature.

4) **Non-Respirable Atmospheres**
If hazardous atmosphere cannot be eliminated by continuous ventilation, contact EHS before continuing.

8. Follow pre-entry precautions:

1) Notify affected departments of service interruption.

2) Lock-out/tag-out all sources of energy (e.g. steam, electric, mechanical) posing a risk to workers.

3) Install blank in affected pipes where valves are not secure or seated.

4) Clean and/or purge any chemical storage vessel.

5) Wear appropriate personal protective and respiratory protection.

6) Have lights and or ladder available.

7) If coordination is needed with contractors, see Contractor Checklist.

8) Have appropriate MSDS's (Material Safety Data Sheet).

9) Determine how often air monitoring will be conducted.

9. Additional precautions necessary for Permit-Required Spaces:

1) Determine start and end times for authorized entry.

2) Assign roles and responsibilities as entrant(s), attendant(s), leadworker(s).

3) Set up non-entry rescue equipment (tri-pod, harness).

4) Identify rescue service.

5) Determine communication method between entrant/attendant.

6) Conduct pre-entry briefing: review hazards, procedures, and precautions.

10. Sign and post the Permit/Certification at the site.

11. Continually ventilate the space by pushing air so that a positive pressure changes the air over several times every hour. Direct the clean air toward the worker.

12. Test the air periodically while personnel are in the confined space to ensure the ventilation is preventing any accumulation of a hazardous atmosphere.

13. Under the following conditions, personnel must exit the confined space, re-evaluate hazards, and modify entry procedures.

1) If any hazardous atmosphere is detected after entry.

Note: If a hazardous atmosphere has been detected after entry, EHS staff should be notified before re-entry.

2) If any health or safety hazard develops which was not anticipated.

3) If Attendant (on Permit-Required Confined Space Entry) cannot effectively perform duties.

4) If personnel in confined space are experiencing symptoms from heat stress or over-exposure to atmospheric hazards.

14. When work is completed, return the space to original condition. Close out the permit/certification and submit the completed paperwork to your supervisor.