



COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

CONFINED SPACE  
MANUAL

Entire document may be accessed at <http://dpw.lacounty.gov/asd/contracts>

# FMD Confined Space Manual Update

## December 2008

### Confined Space Manual Revisions

PG. 25 Continuous storm drain inspections.  
(Size limitations)

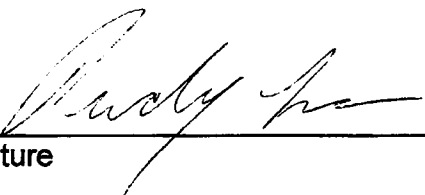
PG. 27 Storm drain maintenance.  
(Size limitations)

PG. 33 Storm drain rescue procedures.  
(Escape pack procedures)

PG. 59 Simulated rescue drills.  
(Notify DSC)

PG. 78 New permit for Big Dalton Dam arches.

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Rudy Lee  
Flood Maintenance Assistant Deputy Director

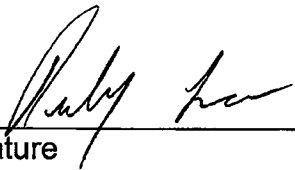
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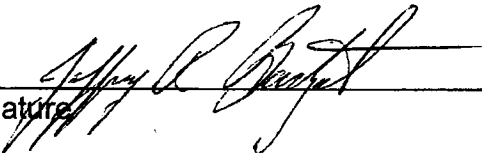
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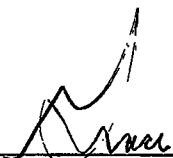
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Rudy Lee  
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Grace Rinck, CIH  
Aurora Industrial Hygiene



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## **INTRODUCTION**

The intent of this Manual is to comply with the philosophy of good safety practices and the explicit requirements of safety orders and to exceed the CAL/OSHA Safety Orders where added protection is warranted.

This confined space manual is meant to supplement and expand the Department's G114 Safety Directive on confined spaces. All employees working in/around confined spaces shall be familiar with directive G114. This manual provides instruction to all personnel working in Flood Maintenance Division facilities.

This manual covering work in confined spaces is intended to:

1. Minimize exposure to hazardous atmospheric conditions.
2. Maintain continuous communications with workers inside confined spaces.
3. Provide safe work procedures while working in confined spaces.
4. Provide safety and emergency equipment and training.
5. Describe employee duties and responsibilities for each confined space job category-entrant, attendant, and supervisor.

Updated and revised November 2008

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## **DEFINITIONS**

1. Attendant
  - A person who is assigned to monitor a confined space entry and provide for the safety of entrants.
2. California Occupational Safety and Health Association (Cal/OSHA)
  - A governing agency that writes and enforces health and safety regulations.
3. Confined Space
  - A Confined Space as defined by Cal/OSHA has all of the following characteristics:
    - Is large enough and so configured that an employee can bodily enter and perform assigned work
    - Has limited or restricted means for entry or exit
    - Is not designed for continuous occupancy
4. County-Wide Integrated Radio System (CWIRS)
  - Is the current radio system used in Public Works.
5. Cubic Feet Per Minute (CFM)
  - Is a measure used in industrial hygiene and ventilation engineering. It describes the rate of flow of a gas or air volume into or out of a space.
6. Divisional Safety Coordinator (DSC)
  - An individual selected by their division head to assist their division on safety related matters.
7. Emergency Medical Assistance
  - Emergency medical assistance refers to local emergency services (law enforcement, fire or medical) during an emergency.
8. Emergency Retrieval Equipment
  - The combination of a tripod or davit and a self retracting lifeline with rescue retrieval capabilities. This is also required to be used when entering and exiting

storm drains and on ladders greater than 20 feet in length as it acts as a fall arrest system.

9. Employee Health and Safety (EHS)

- A section of Public Works Human Resources Division that handles all aspects of safety.

10. Entrant

- A person who enters a confined space to perform an assigned task.

11. Entry Supervisor

- An individual who has been assigned the responsibility for directing all aspects of the confined space entry and terminate entry when required.

12. Evacuation

- An unaided emergency exit out of a confined space. This action may result from the entrant's own decision or by a command from outside the space.

13. Excavation

- A man-made cut, trench or depression in an earth surface, formed by earth removal.

14. Hazard

- A condition or changing set of circumstances that presents a potential for injury or illness. The potential or inherent characteristics of an activity, condition, or circumstance, which can produce adverse or harmful consequences.

15. Hazardous Atmosphere

- An atmosphere that may be, or is injurious to occupants by reason of oxygen deficiency or enrichment, flammability or explosiveness, or toxicity.

16. Hot Work Permit

- A permit used in conjunction with other entry permits to allow the use of welding and/or a cutting torch in a confined space. Any hot work in a confined space makes it a permit-required confined space.



17. Immediately Dangerous to Life or Health (IDLH)
  - IDLH means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.
18. Lower Explosive Limit (LEL)
  - The lower limit of flammability of a gas or vapor at ordinary ambient temperatures expressed by a percentage of the gas or vapor in air by volume.
19. Manual on Uniform Traffic Control Devices (MUTCD)
  - The Manual on Uniform Traffic Controls for Controls for Construction and Maintenance Work Zones (Manual) is published by the State of California, Department of Transportation (Caltrans), and is issued to provide the basic standards for uniform types of warning signs, lights, and devices to be placed upon any public highway or street.
20. National Institute for Occupational Safety and Health (NIOSH)
  - The National Institute for Occupational Safety and Health is a federal agency that conducts research on health and safety concerns, tests and certifies respirators, and trains occupational health and safety professionals.
21. Spotter
  - An individual who monitors the activities of a permit-required confined space, serves in the link of communication between the Entrant and Attendant, and is involved in a rescue. Serving as a spotter shall be his only assignment.
22. Trench
  - A narrow excavation in which usually the depth is greater than its width.
23. Permissible Exposure Limit (PEL)
  - An exposure limit published and enforced by Cal/OSHA as a legal standard.
24. Permit-required Confined Space
  - A space defined by Cal/OSHA that has one or more of the following characteristics:
    - Contains or has a potential to contain a hazardous atmosphere

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

25. Personal Protective Equipment (PPE)

- Devices worn by the worker for protection against hazards in the environment. Respirators, gloves, and hearing protectors are examples of PPE.

26. Work Area Traffic Control Handbook (WATCH Manual)

- The handbook is intended to serve as a standard for control of traffic in work areas in public streets by cities, counties and other agencies for employees who perform work activities in and in the vicinity of the Public Right-of-Way.

## **CONFINED SPACE**

Confined space operations subject to CAL/OSHA regulations can be categorized into "Non-permit" and "Permit-required" confined space activities.

"Non-permit" required confined space (defined in this manual as a Confined Space) - 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. The area can be entered without an attendant on hand to perform minor maintenance work provided the atmosphere has been tested prior to entry and the air testing results are recorded on a sign-in sheet.

Minor maintenance work includes routine inspection and maintenance tasks not expected to introduce airborne hazards.

Examples:

- Tightening a packing nut
- Working on electrical systems
- Test run engines
- Taking leakage measurements
- Making valve adjustments

Facilities that meet the "Confined Space" space criteria:

- Pump Plants/Pump Stations above the catwalks
- Pressure Reducing Vaults
- Injection Well Vaults
- San Gabriel Dam Tunnel at or above Catwalk Level
- San Gabriel Dam Silo
- Catch Basins
- Enclosed Sections of Open Channel

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## **CONFINED SPACE SIGN-IN SHEET**

A "Confined Space" sign-in sheet will authorize employee(s) to enter and perform routine maintenance as indicated on the "Confined Space" sign-in sheet.

Work performed in a "Confined Space" facility does not require an attendant when it is in compliance with a Confined Space sign-in-sheet.

When entering the facility the employee(s) must test for atmospheric conditions which consist of oxygen deficiency, flammable gas (LEL), hydrogen sulfide, and carbon monoxide. Test results shall be recorded on the "Confined Space" sign-in sheet. All work assignments shall require continuous air monitoring. If the supervisor or operations staff is aware of any additional atmospheric hazards that may be present then appropriate testing for this potential hazard should be conducted prior to entering the confined space.

Specific requirements for each Confined Space are listed in task specific sign-in sheets. Please read, understand, and follow them.

### **1. Pump Plants and Pressure Reducing Vaults**

- Pump plants (engine room), pressure reducing vaults and pump plants at road underpasses are classified as "Confined Space" facilities.
- Pump plants - In addition to work in the engine room, an employee(s) can proceed no lower than the catwalk level in the sump room when a stairway is available. Before descending into the sump area, the individual(s) must comply with the permit-required Confined Space Permit for this area.

### **2. San Gabriel Dam Tunnel – at or above catwalk level**

- The tunnel is classified as a "Confined Space" facility when the ventilation fans are operating. Refer to the sign-in sheet for the tunnel in Appendix II if fans are not operating.
- In addition to performing maintenance tasks along the catwalk and upper landing (donut area), an employee can not proceed down into the bay areas (between concrete penstock columns) for inspections without complying with the permit-required Confined Space Permit for this area.

### **3. San Gabriel Dam Silo**

- The silo is classified as a "Confined Space" facility when the ventilation fans are operating.

#### 4. Catch Basin

- A catch basin is classified as a "Confined Space" facility when work does not introduce a hazardous atmosphere.
- When the vertical height is 20 feet or greater, a harness, and emergency retrieval equipment must be used as fall protection during entry and exit from the catch basin.

#### 5. Enclosed sections of an open channel that meet one or more of the following criteria are classified as a confined space:

- Have enclosed sections greater than 300' in length.
- Have inadequate ventilation (air flow that can be felt at a minimum).
- Have restricted means of egress (blockage in or so narrow a channel that it would impede the egress of the space).
- When work is done in a section that could introduce airborne hazards. (The use of internal combustion engine i.e.; water pump, compressor, Vactor Truck, etc.)

**Exception:** When traveling through an enclosed section of a channel in an enclosed cab of a motorized vehicle and the channel is wide enough to turn around in that motorized vehicle, NO air monitoring equipment or escape breathing apparatus are required. If an employee exits the vehicle while in an enclosed section, all requirements of a confined space apply.

#### 6. Excavations/Trenches

- Excavations, in particular trenches, have the possibility of having a hazardous atmosphere. Where an excavation or trench is in landfill areas or areas where hazardous substances are stored nearby, the atmosphere in the excavation shall be tested before employees enter excavations greater than four feet in depth. A sign-in sheet is provided to record gas monitor readings.
- Excavations and trenches over four feet in depth require a means of egress every 25 feet of travel. Trenches greater than five feet in depth require a means to protect the employees in the trench (shoring or sloping). Additionally, all excavations shall be inspected daily by a properly trained competent person.

See Appendix II, Permits Section for copies of the prepared sign-in sheets.

## **PERMIT-REQUIRED CONFINED SPACE**

A Permit-Required Confined Space as defined by Cal/OSHA has one or more of the following characteristics:

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

Examples:

- Pump plants - sump area
- Storm drains
- Outlet tunnels or Penstocks
- Channel subdrains
- CDS/Low Flow Diversion Vaults

These areas, which can expose an employee(s) to a risk of death, incapacitation or injury, must be entered with the aid of a crew trained to work in confined spaces as required in the individual permit.

Major maintenance work that would be expected to produce an atmospheric hazard in a confined space facility mandates a "Permit-Required" entry permit. Tasks would include painting, hotwork (welding), using an internal combustion engine, cleaning a pump plant sump, etc.

### **Atmospheric Hazards possible in a Confined Space:**

An atmosphere, which exposes employees to a risk of death, incapacitation, injury or illness from one or more of the following:

1. Atmospheric Oxygen concentration below 19.5 percent or above 23.5 percent.

2. Atmospheric concentration of a substance in excess of its OSHA Permissible Exposure Limit (PEL):

Examples:

- Carbon monoxide
- Hydrogen sulfide
- Welding fumes
- Paint vapors

3. Flammable gas, vapor or mist in excess of ten percent (10%) of its Lower Explosive Limit (LEL):

Examples:

- Methane (natural gas)
- Propane
- Fuel/solvent vapors

Airborne combustible dust of a concentration that meets or exceeds its PEL (obscures vision at a distance of approximately five feet or less).

4. Any atmospheric condition recognized as immediately dangerous to life or health (IDLH).



## **ENTRY PERMITS**

A "Permit-Required" entry permit will authorize personnel to enter a confined space to perform a task, provided all the provisions of the entry permit are followed.

When entering the space, the trained employees must test for atmospheric conditions. Test results shall be recorded on the "Permit-Required" entry permit. All work assignments require continuous air monitoring.

An attendant must be on duty outside the permit space.

See Appendix II for copies of the prepared permits.

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## **PERSONNEL ASSIGNMENT**

### **I. Flood Control Construction Supervisor**

A Flood Control Construction Supervisor (FCCS) will be assigned the responsibility of supervising a crew participating in confined space entries.

A FCCS shall make sure that employees under their supervision who enter or work in confined spaces know and understand confined space entry, operational, and rescue procedures. They are also responsible for making sure that their employees comply with the requirements of this manual, Safety Directive G114, and Cal/OSHA.

A FCCS shall report areas of concern regarding confined space operations to the DSC who may contact EHS. DSC/EHS shall recommend ways and means and/or safety equipment necessary to correct safety deficiencies discovered during the operation.

1. FCCS shall be trained and knowledgeable with the following:

General hazards associated with confined spaces.

- Specific hazards associated with the facility, location or operation.
- Proper use and limitations of personal protective equipment, and other safety equipment.
- Permit system and other procedural requirements.
  - Duties and responsibilities of the confined space entry team.
- Recognition of overexposure symptoms.
  - Proper use of atmospheric monitoring instruments. This shall include zeroing, daily bump checks, and calibration of the instrument.
  - Use, maintenance, and limitations of respirators.
- Proper response to emergencies.

Foremen supervising crews working in permit-required confined spaces shall be trained in Fall Protection Competent Person. This qualifies them to conduct the bi-annual inspection of fall arrest equipment.

For permit-confined spaces, only physically fit employees who have been properly trained and do not exceed full body harness and tripod-weight limitations (310 lbs.) with equipment on shall be allowed to inspect and work in a confined space.

- Employees should be screened for:
  - Claustrophobia - fear of working in small/dark areas
  - Fear of insects, snakes and rats
  - Fear of wearing masks or hoods

2. The FCCS will have the responsibility to ensure that:

- Crews are properly trained.
- Daily visual inspection of all safety equipment is performed.
- Monthly inspection reports on safety equipment are completed.
- Daily Functional (Bump) Test shall be performed prior to each day's use. Refer to manufacturer guide for bump test instructions. A functional test is defined as a brief exposure of the monitor to a known concentration of gases for the purpose of verifying sensor and alarm operation and is not intended to be a measure of the accuracy of the instrument.
- If an instrument fails to operate properly during any functional "Bump" test, a full instrument calibration shall be performed prior to use.
- Calibrations of air monitoring equipment per manufacturer's recommendations are completed.

## **II. Employee**

- Shall attend training before working in confined spaces. Refer to the Training Matrix for details in the Training Requirements section.
- Inspect safety equipment before every use.
- Ensure all equipment is on the vehicle before leaving the yard.
- Know how to use all equipment including gas monitor, fall protection equipment, respirators, and emergency retrieval equipment.
- Immediately report equipment problems to their supervisor.
- Report incidents of exposure, an accident, or an injury in a confined space to their supervisor immediately.
- Employees who enter and work in confined spaces shall know and understand confined space entry , operational, and rescue procedures and shall follow these procedures when entering a confined space.

- Employees who discover unidentified hazards in confined spaces shall report them to their supervisor immediately.
- Employees shall wear required PPE.
- Employees who fail to follow confined space procedures or comply with instructions from their supervisors regarding confined space procedures are subject to disciplinary action.

### **III. Entry Team**

#### **1. Entry Supervisor**

- **Personnel Requirements:** One entry supervisor per job is responsible for authorizing an entry into a permit required confined space and terminates the entry when required.
- **Duties:** The Entry Supervisor shall have the following duties:
  - Attend confined space training.
  - Know the requirements of the confined space entry program, including proper duties of entrants, attendants, and rescue personnel.
  - Be knowledgeable about the gas monitor.
  - Verify that all required actions have been taken prior to signing the permit and allowing entry to begin, and ensure that acceptable conditions are maintained for the duration of the entry.
  - Verify that rescue services are available prior to and throughout the entry, and that the means for summoning them are operable.
  - Communicate the status and requirements of the entry to other Entry Supervisor(s) whenever the Entry Supervisor is changed.
  - Terminate entry, assure removal of personnel and equipment, and cancel or complete the entry permit when required.

#### **2. Attendant**

- **Location:** The attendant shall be stationed immediately outside the point of entry/exit of the confined space to observe the permit required confined space (PRCS) and be able to communicate with the occupants throughout the entry.

- Personnel Requirements: There shall be one attendant per point of entry/exit.
- Duties: Attendants shall have the following duties:
  - Provide standby assistance to entrants entering the confined space.
  - Direct entrants to exit the confined space when any irregularities are observed.
  - Initiate an evacuation of the space and emergency procedures.
  - Monitor for any conditions or changes that could adversely affect the entry.
  - Remain at the entry point unless relieved by another attendant or until the entry is cancelled or completed.
  - Always maintain two-way communication at all entrances and have a secondary method to communicate with entrants if primary means fail.

### 3. Entrant

- Duties: Entrant shall have the following duties:
  - Recognize potential hazards that may be encountered during entry and the proper use and limitations of equipment for control of these hazards.
  - Inspect for hazards not identified by atmospheric monitoring during entry activities.
  - Recognize symptoms and warning signs of exposure to potential hazards or prohibited conditions.
  - Notify the attendant of any emergency or unacceptable condition in the confined space.
  - Exit the confined space immediately if symptoms, warning signs, or unacceptable conditions occur or if directed by the Attendant or Entry Supervisor.
  - Respond to emergencies, which includes method(s) for self-rescue.

## **NON-FLOOD MAINTENANCE DIVISION PERSONNEL**

- This section does not apply to Flood Maintenance field personnel, as FMD employees are expected to work in confined spaces and receive confined space training. This section may apply to the engineering sections in Flood Maintenance if they have not had an opportunity to attend confined space training and a project requires them to review a confined space area as identified in the previous sections of this manual.
- There are times that Public Works employees who work for Division's other than Flood Maintenance, may have a need to enter areas classified as confined spaces or Permit required confined spaces. Examples of this may be engineers from Design Division who are looking at design/repair issues.
- There may also be times that persons not employed by the Department may need to access these facilities as well. In the past, examples have been the media, state inspectors, contractors on a pre-bid inspection and also law enforcement.
- In either case, appropriate training is provided to the personnel prior to them entering the confined space and it is solely directed towards the particular space and the applicable hazards. This training is intended to introduce the hazards of a Flood Maintenance Division confined space to someone who has not received FMD In-house Confined Space training on Flood Maintenance Division spaces. A Public Works Crew Leader or above will conduct the tailgate. The training shall cover the items listed on the Permit Required Confined Space Tailgate for Non-FMD Personnel. Everyone receiving the training shall sign the tailgate sign-in sheet.
- To help ensure the safety of the space, prior to allowing entry, a FMD crew shall proceed through the space checking the atmosphere and the conditions to be sure that it is safe to allow people into the confined space. Only the number of personnel that can be safely rescued are allowed to enter the confined space at one time. This determination is based upon the site supervisor's determination of equipment availability and analysis of space to be entered.

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## **CONTRACTOR**

When a contract has been awarded for work in a confined space and contractor employees will work in the space, either Construction Division or Flood Maintenance Division shall:

- Inform the contractor that the workplace contains or is a confined space and that confined space entry is allowed only through compliance with a confined space program meeting the requirements of Cal/OSHA, Title 8, Section 5157.
- Apprise the contractor of the elements, including the hazards identified and Flood Maintenance's experience with the confined space.
- Provide applicable portions of the confined space manual and procedures to all contractors entering a Flood Maintenance confined space.
- Coordinate entry operations with the contractor, when Flood Maintenance personnel and contractor personnel will be working in or near the confined space.
- Debrief the contractor following an incident during their confined space operation.
- Once the contract is awarded, the contractor shall provide their own equipment and PPE for confined space entry.

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## **PROCEDURES**

### **STORM DRAIN INSPECTIONS AND MAINTENANCE**

The entry supervisor must know the hazards of the confined space, verify that all tests are conducted and all procedures and equipment are in place, and verify that rescue services are available.

#### **1. Vehicles**

Traffic control devices (arrow boards, high rise flag stands, and cones) shall be positioned as needed to direct traffic around the work area in accordance with the Manual on Uniform Traffic Control Devices and/or the Watch Manual.

#### **2. Personal Protective Equipment Requirements**

Each crew member entering a manhole shall be equipped with:

- Hard hat
- Full body harness
- Approved flashlight
- Gloves
- Rubber boots (if needed) with anti-slip devices when necessary
- An escape breathing apparatus
- A gas monitor for every inspection team

#### **3. Monitoring for Hazardous Atmosphere**

Before the manhole lid is removed, a test shall be performed to determine if there is a hazardous atmosphere present. Once it is determined safe, the manhole lid is removed. The manhole shaft shall be tested for an atmospheric condition and the test results recorded on the permit. Air tends to stratify in a confined space; be sure to measure at various levels (heights), not to exceed four feet apart.

Test shall be taken for the following:

- Oxygen content
- Flammable gas (LEL)

- Hydrogen sulfide
- Carbon monoxide

Note: If any one of the four elements test positive, or a hazardous material spill is suspected in the drain, entry is NOT permitted until such time the area becomes safe (see forced ventilation).

#### 4. Safety Equipment

Emergency retrieval equipment shall be positioned above the manhole opening, used as fall protection during entry into and exiting the storm drain, and including rescues. If emergency retrieval equipment is not used, a barrier shall be used to protect the manhole.

#### 5. Smoking

Smoking within 20 feet of the entrance to the manhole is prohibited.

## **INSPECTIONS**

**CONTINUOUS INSPECTIONS ARE ONLY ALLOWED IN STORM DRAINS 42 INCHES AND ABOVE. SPOT INSPECTIONS AND MAINTENANCE MAY BE CONDUCTED IN LINES OF ANY SIZE.**

Continuous storm drain inspections shall require a minimum of six crew members qualified to work in a confined space. The crew size is based on the criteria that each truck is equipped with a hand held CWIRS radio and/or cell phones which will be used by the attendant at each manhole shaft. It is the responsibility of the attendant to summons emergency medical assistance.

### **1. Two Hole Open Continuous Inspection**

Continuous inspection crew size consists of the following: One attendant and spotter located at each of the open manholes and a two-person inspection crew inspecting the drain.

A continuous inspection as shown in Figure 1, involves entering one manhole (No. 1) and exiting through another manhole when the inspection is completed (No. 2). Employees (A) & (F) - are attendants outside the manhole, ready to give assistance.

Each manhole shaft shall have a SCBA available.

Manholes (Nos. 1 and 2) are protected by traffic control devices.

Test (Nos. 1 and 2) for an atmospheric condition before removing manhole lid.

Employees (B), (C) & (D) with appropriate safety equipment descend to invert of manhole (No.1). Employee (B) serve as a spotter.

Employee (E) with appropriate safety equipment descends to invert of manhole (No. 2). Employee (E) serves as spotter.

After employees have entered, employees must disconnect the self-retracting lifeline and attach it to either the drop step or send it back up to the attendant. An emergency retrieval equipment shall be used when entering and exiting the manhole shaft.

After employees (B) & (E) have made contact and the storm drain is declared safe, employees (C) & (D) proceed toward manhole (No. 2). The leading employee will carry the gas monitor and will perform continuous monitoring of atmospheric conditions as he proceeds through the storm drain. The second employee will inspect and record storm drain deficiencies, keeping a reasonable distance behind the lead employee.

When employees (C) & (D) approach manhole (No. 2), employees (A) & (B) are notified.

They close manhole (No. 1) and proceed to manhole (No. 3) and the procedure is repeated to the completion of the job.

## **2. Three-Hole Open Continuous Inspection**

Continuous inspection crew size consists of the following personnel: One attendant and spotter located at each of the open manholes and a two-person inspection crew inspecting the storm drain.

A continuous inspection as shown in Figure 2, involves entering one manhole (No. 1) and exiting through another manhole when the inspection is completed (No. 3). Employees (A), (F) & (G) - are attendants outside the manhole.

Each manhole shaft shall have a SCBA available.

Manholes (No. 1, 2, and 3) are protected by traffic control devices.

Test manholes (No. 1, 2, and 3) for an atmospheric hazard before removing manhole lid.

Employees (B), (C) & (D) with appropriate safety equipment descend to invert of manhole (No.1). Employee (B) serve as a spotter.

Employees (E) & (H) with appropriate safety equipment descend to invert of manholes (No. 2) & (No. 3) Employees (E) & (H) serve as spotters.

Emergency retrieval equipment shall be used when entering and exiting the manhole shaft. After employees have entered, employees must disconnect the self- retracting life-line and attach it to either the drop step or send it back up to the attendant.

After employees (B), (E) & (H) have made contact, employees (C) & (D) proceed towards manhole (No. 2). The leading employee will carry the gas monitor and will perform continuous monitoring of atmospheric conditions as he proceeds through the storm drain. The second employee will inspect and record storm drain deficiencies, keeping a reasonable distance behind the lead employee.

When employees (C) & (D) approach manhole (No. 2), employees (A) & (B) are notified that employees (C) & (D) have reached manhole (No. 2). Employees (A) & (B) will close manhole (No. 1) and proceed to manhole (No. 4). During the time that employees (A) & (B) are moving to manhole (No. 4) employees (C) & (D) proceed toward manhole (No. 3). This procedure is repeated to the completion of the job.

At no time during continuous inspection shall the two person inspection crew proceed past the last monitored manhole shaft.

### **3. Spot inspections**

**Spot inspections may be conducted in any size storm drain.**

A spot inspection crew will consist of two employees provided that the entrant/inspector does not disconnect from the retractable lifeline and stays within the area of the manhole shaft to maintain communication. A non-entry rescue would be performed using the emergency retrieval equipment.

If the entrant/inspector needs to conduct a spot inspection and must travel away from the manhole shaft or disconnect from the emergency retrieval equipment, a three-man crew is required. The third employee serves as the spotter or rescuer.

The requirements of this section also pertain to the Underground Camera Crew. As long as the entrant does not disconnect from the retractable lifeline, only two employees are required. If the emergency retrieval equipment is not set up over the manhole, a temporary barrier shall be placed to prevent falling into the open manhole.

### **4. Maintenance**

Maintenance may be conducted in any size storm drain, lateral, or connector pipe provided an effective rescue plan has been established. The Storm Drain Confined Space Entry Permit for General Maintenance Activities shall be completed prior to work being performed.

Supervisors will ensure all safety equipment and procedures are in place due to the various scenarios crews may encounter conducting maintenance. Additional safety equipment used should be listed on the permit under the Precautions Completed section.

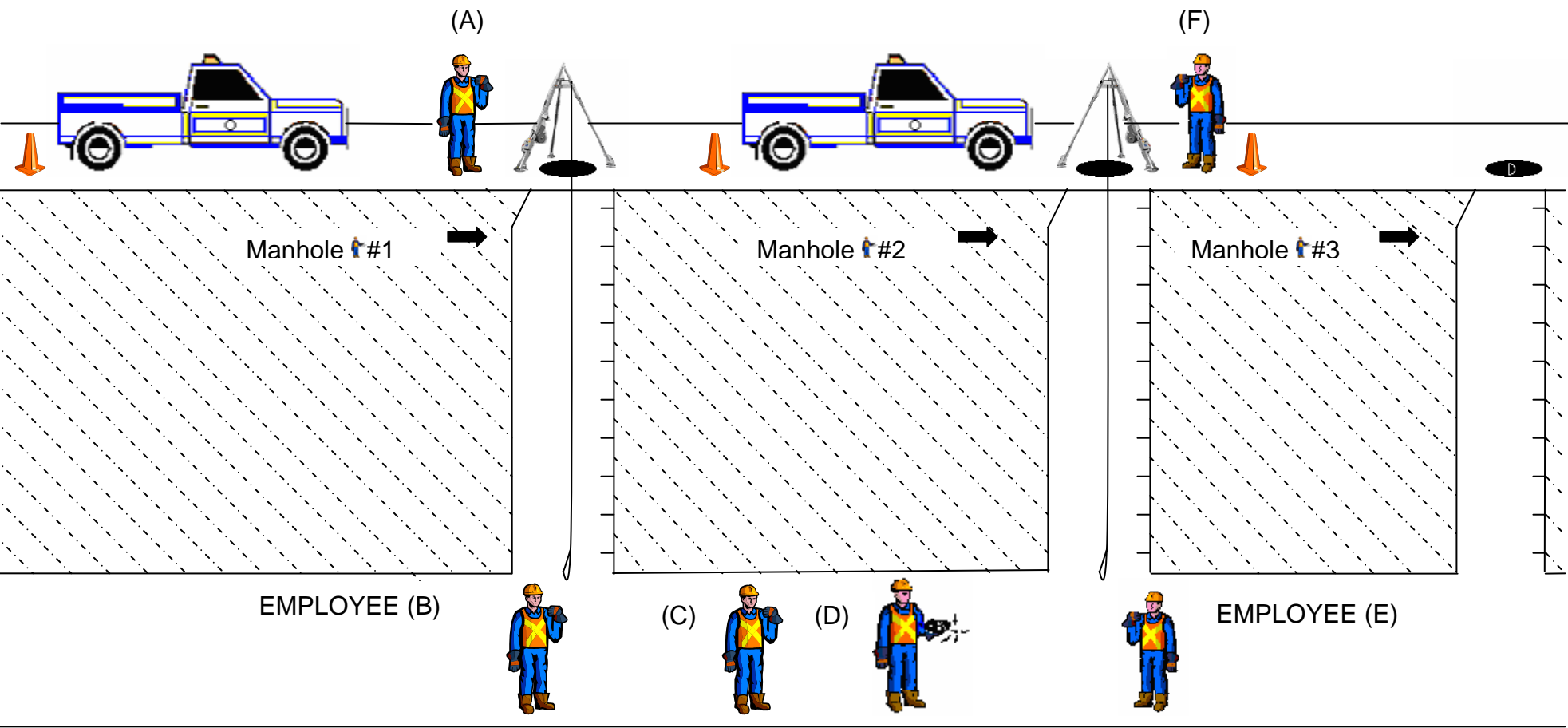
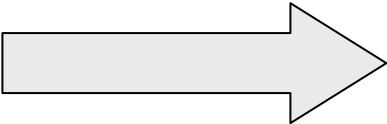
Contact the Flood Maintenance Divisional Safety Coordinator if additional assistance is needed.

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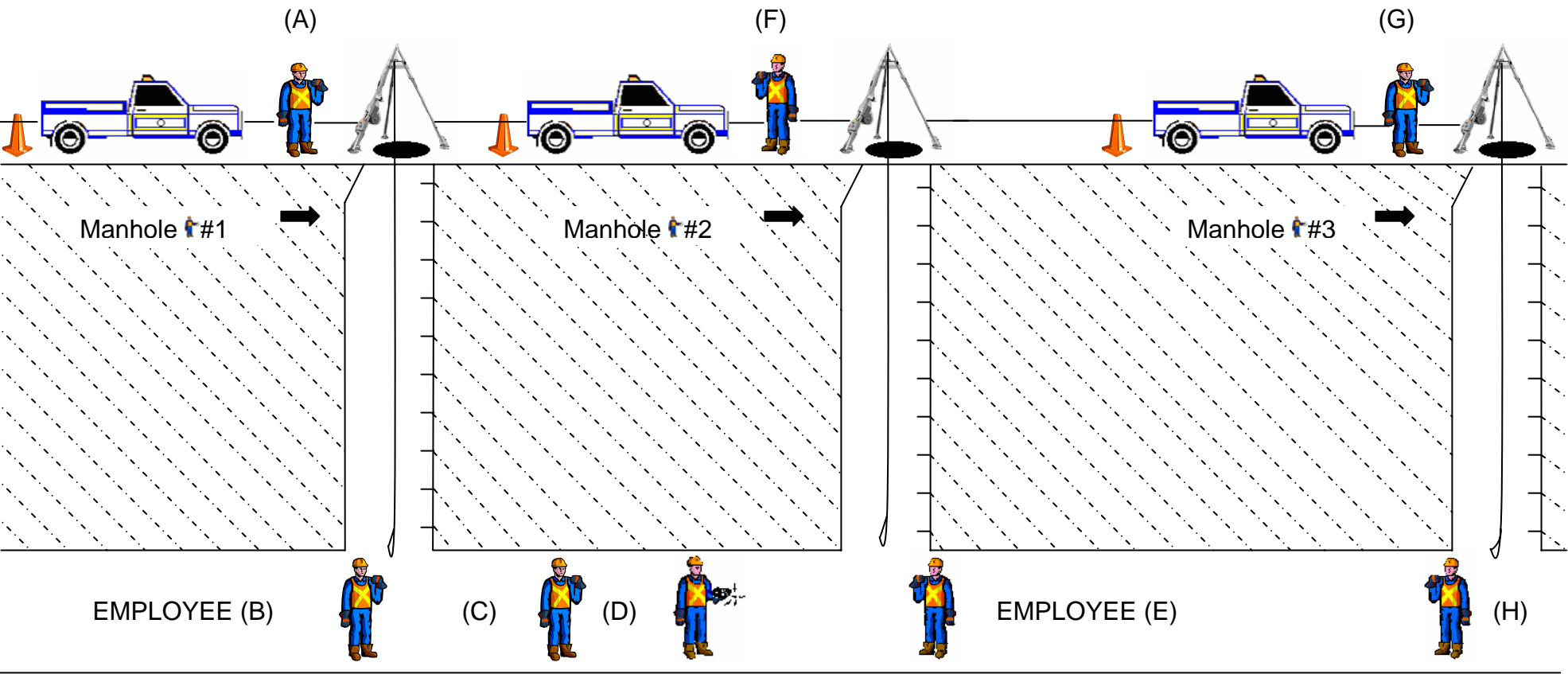
**FIGURE 1**  
**CONTINUOUS INSPECTION (2 HOLES – 6 PERSON)**

**FLOW OF VEHICLE TRAFFIC**



**FIGURE 2**  
**CONTINUOUS INSPECTION (3 HOLES – 8 PERSON)**

**FLOW OF VEHICLE TRAFFIC** 



## **MINIMUM EQUIPMENT FOR CONTINUOUS STORM DRAIN INSPECTION**

Each truck will be equipped with a warning light, traffic directional board, mobile radio, and the following additional equipment:

### 1. Respirators

- One, escape breathing apparatus for each person entering a permit required confined space.
- One, self-contained breathing apparatus (SCBA).

### 2. Monitoring Instruments

- Gas monitors appropriate for the work assignment shall be provided for continuous storm drain inspection.

### 3. Traffic Cones

- Ten, 28-inch reflector traffic cones

### 4. Storm Drain Carts

- One, storm drain cart.  
A cart for the purpose of transporting an employee through an area too small for the employee to stand.

### 5. Ladder - 20 ft. Extension (Optional)

- One, fiberglass extension ladder per inspection crew.

### 6. Tools

1 each	digging bar, 5 foot
1 each	hammer, striking 4 pounds
1 each	lifter, catch basin grate
1 each	lifter, catch basin lid
1 each	lifter, manhole lid, manual
1 each	lifter, manhole lid, easy lift
1 each	pick, railroad
1 each	shovel, round point
1 each	socket set with deep sockets of various sizes

### 7. Harness

- Full body harness with shoulder and rear dorsal D-ring attachments for all personnel entering a confined space.

#### 8. Emergency Retrieval System

- One, emergency retrieval system equipped with a self-retracting lifeline (SRL) with emergency retrieval capabilities and auxiliary personnel/equipment hoist.

#### 9. First Aid Supply and Biohazard Kit

- One, First Aid Kit.  
A monthly inspection shall be taken to determine what items need to be replenished.
- One, Biohazard Kit
- Two, bottles of 32 oz. eye rinse solution

#### 10. Flashlights

All personnel entering a permit-required confined space will be provided with an approved flashlight.

#### 11. Anti-Slip Shoe Devices

- Two, pairs of anti-slip shoe devices.

#### 12. Hearing Protection

- Twelve, pairs of ear plugs.

## **STORM DRAIN RESCUE PROCEDURE**

Before starting any new assignment, the supervisor shall inform the crew about the emergency rescue procedures for that particular job. Each member of the crew shall be assigned a specific task to perform during an emergency. Those employees not involved in the actual rescue shall assist as needed in other areas such as in guiding traffic and looking out for EMA.

It is considered an atmospheric hazard if the gas monitor alarm is sounding. Employees within the vicinity shall put on their escape pack and exit the area.

### **A. Emergency Rescue Procedure**

When at any time there is any questionable action or non-movement by the employee inside, a verbal check will be made. If there is no response, the employee will be removed. Exception: If the employee is disabled due to falling or impact, he/she shall not be removed from the confined space unless there is immediate danger to his/her life. Emergency medical assistance shall be notified immediately, and shall remove the injured employee.

### **Emergency Rescue Procedures for a Hazardous Atmosphere Rescue**

#### **1. Employee(s) assignment within the confined space:**

- Put on escape breathing apparatus, and if possible, that of the fallen co-worker, alert the attendant, and evacuate the space.
- Rescue employee(s), don a SCBA, enter the space, move injured employee to the nearest exit.
- Attach retrieval line to injured person when making a rescue through a top opening.
- Communications shall be maintained between the rescuer within the confined space and attendant.

#### **2. Attendant(s) outside the confined space shall:**

- Ensure that emergency retrieval equipment is positioned above the manhole opening.
- Provide carts, respirator(s), stretcher, etc., as needed to assist in the rescue operations.
- Operate the emergency retrieval equipment to remove the injured person from the confined space, and proceed with first aid, cardiopulmonary resuscitation, or rescue breathing, as needed.

If the attendant is not the entrant supervisor, he or she must notify entrant supervisor.

NOTE: The attendant shall not leave the area, nor enter the confined space area unless relieved by another attendant.

3. Entrant Supervisor:

- Notify Public Works dispatch of the injury and location of the emergency and request emergency medical assistance (the name of the injured should not be given in radio communication).

**Rescue Procedures for a Non-Hazardous Atmosphere Rescue**

1. Employee(s) assignment within the confined space:

- Evaluate the downed employee and alert the attendant.
- Perform first aid or CPR as required.
- Assist Emergency Medical Service personnel when they arrive and continue to monitor the work environment.

2. Attendant(s) outside the confined space shall:

- Ensure that emergency retrieval equipment is positioned above the manhole opening.
- Provide carts, respirator(s), stretcher, etc., as needed to assist in the rescue operations.
- Operate the emergency retrieval equipment to remove the injured person from the confined area, and proceed with first aid, cardiopulmonary resuscitation, or rescue breathing, as needed.

If the attendant is not the entrant supervisor, he or she must notify entrant supervisor.

NOTE: The attendant shall not leave the area, nor enter the confined space area unless relieved by another attendant.

3. Entrant Supervisor:

- Notify Public Works dispatch of the injury and location of the emergency and request emergency medical assistance. (the name of the injured should not be given in radio communication).

## **SUBDRAIN INSPECTION AND MAINTENANCE**

### **Cleanout Only**

This section applies to the many different types of sub-drain systems that Flood Maintenance is responsible for maintaining.

A Confined Space entry permit for sub-drain vault clean out activities is not required when employees are cleaning a sub-drain with a vactor truck and not entering the sub-drain vault. No employee may break the plane of the sub-drain vault without completing a Confined Space Permit for sub-drain vault general maintenance activities. The following procedural guideline shall be followed:

- Remove bolts and lids.
- Sample the air if the vault is not full of water. This ensures there is not a high concentration of hydrogen-sulfide.
- Use the vactor truck to remove sediment from the vault.
- Replace the lids and bolts.

### **Cleanout and Maintenance**

Entry into a sub-drain vault must be done for inspection and maintenance of the flap gates on a routine basis. Entry into a sub-drain vault is a "Permit-Required" confined space. Completion of the Confined Space Permit for sub-drain vault general maintenance activities is required prior to entry.

A minimum of two employees will be required for sub-drain entry provided that the entrant does not disconnect from the retractable lifeline and stays within the area of the opening. Two employees are needed for sub-drain entries, one entrant and one attendant. If the entrant disconnects from the retractable lifeline, a three-man crew will be required. The third employee serves as a spotter. There may also be the need for an employee to operate the vactor truck or a pump to remove the water.

There are different types, styles, and configurations of sub-drains. The guidelines are as follows:

- Water must be diverted from the sub-drain lid, an alignment scratch mark can be placed on the lid and ring to help align bolt holes when reinstalling the lid. The bolts and lids are removed.
- The vault is cleaned with a vactor truck or it can be pumped out into a water tank or both. A barrier around the manhole is placed to prevent water from entering the vault. When the vault is empty, the atmosphere shall be tested prior to the initial entry and tested continuously while occupied.

- Due to the noise produced by the pumps and the vector truck, hearing protection is required.
- Before the employee enters the sub-drain vault, emergency retrieval equipment must be set over the manhole. The entrant shall be required to use a full body harness, a SCBA, and/or a supplied air line with an egress bottle. The Entrant hooks to the emergency retrieval equipment and enters the sub-drain vault and is handed the tools needed.
- To perform longer maintenance, the subdrain vault can be isolated from possible airborne contamination by installing inflatable plugs in the drains. When the atmosphere is verified to be safe, the entrant may remove the SCBA/supplied air, while performing the work. Prior to removing the plugs from the system, the entrant will don the SCBA/supplied air until exited from the vault.
- When the work is completed, the entrant exits the sub-drain, unhooks the emergency retrieval equipment and removes the SCBA/supplied air.
- All water removed from the vault may be decanted back into the vault.
- The lid(s) and bolts are replaced.



## **SUBDRAIN RESCUE PROCEDURES**

In the event that a rescue is needed, all equipment shall be shut down unless it is being used to prevent water from filling the sub drain vault. Depending upon the injury, the entry supervisor shall contact dispatch to request emergency medical assistance. In all cases requiring a rescue, supervision shall be contacted.

If the employee is still connected to the emergency retrieval equipment and the employee is unable to exit the vault under his own power, the attendant shall operate the emergency retrieval equipment to raise the employee out of the vault. Trained crew members shall attend to his first aid needs.

### **Atmospheric Hazard Related Rescue**

If an employee collapses for an unknown reason and/or the gas monitor alarm is sounding, it is considered an atmospheric hazard. If the employee requiring rescuing has disconnected from the emergency retrieval equipment, another employee shall enter the sub drain vault on supplied air, connect the injured employee to the emergency retrieval equipment and the attendant shall crank the employee out of the vault. The other employee shall exit the vault after the injured employee has been removed. If the second employee is in the vault at the time of injury, he shall don his escape breathing apparatus, attach the retrieval line to the injured employee and exit after the injured employee has cleared the hole.

### **Non-Atmospheric Hazard Related Rescue**

A non-atmospheric hazard related rescue is when an employee is injured and there is no suspected airborne contamination and it is substantiated by the gas monitor. If the injured employee has disconnected from the emergency retrieval equipment, the rescuing employee will enter the vault, attach the emergency retrieval equipment to the injured employee and the attendant shall crank the employee out of the vault. The rescuer then exits the vault and the crew members perform first aid on the injured employee.

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## **PUMP PLANTS**

Each pump plant is unique in its characteristic. Entry into the office area is a confined space. Test for atmosphere before entering. All areas below the catwalks are permit-required confined spaces. See applicable permits for details. Consult with your supervisor for specific characteristics and procedures of individual pump plants.

### **Access**

When access to the sump is by a ladder more than 20 feet in length, emergency retrieval equipment shall be used as fall protection. If the ladder is more than 5 feet in length, emergency retrieval equipment must be nearby for rescue purposes although it may not be needed for entry. Any access to the sump requires all entrants to wear a full body harness.

### **Sump Cleanout**

Sump cleaning requires a minimum of one attendant and one standby employee when either utilizing a vactor truck or removing debris by manual labor. There is a potential exposure to hydrogen sulfide (H<sub>2</sub>S) and other hazardous waste; therefore, the sump area has been classified a "Permit-required" confined space.

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## **PUMP PLANT - SUMP RESCUE PROCEDURE**

1. One employee will serve as the attendant at the top of the stairs or the ladder. The attendant may also be stationed at the floor opening that the vactor truck is using as access to the sump. In the event of an emergency the attendant reacts as follows:

### **Access by Ladder**

If the entry to the sump is by ladder, the attendant calls for the vactor truck operator and informs him of the emergency. The vactor truck operator will then shut down the vactor and call for emergency medical assistance by phone or radio. The attendant shall set-up the emergency retrieval equipment for the rescue of the injured employee. The attendant shall not leave the area unless the potential hazard could expose them to a potential injury or harm.

### **Access by Stairs**

If the entry to the sump is by stairs, the attendant calls for the vactor truck operator and informs him of the emergency. The vactor truck operator will shut down the vactor and call emergency medical assistance by phone or radio. The operator then must return and assist the attendant.

2. A second (standby) employee will be stationed at the bottom of the stairs, below the opening in the floor or at the base of the ladder. He monitors the gas meter and has a SCBA with him. The function of the standby is to monitor the entrance and maintain communication between the entrants and the attendant. In case of emergency, the standby employee, dons the SCBA and serves as a rescuer.
3. At least one of the entrants in the sump area shall be carrying a gas meter in the area that the work is being done. This would be at the end of the vactor hose or where the sump is being disturbed. All entrants shall be equipped with an escape breathing apparatus.

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## **PUMP PLANT PAINTING**

This section applies to all Pump Plant painting projects, and precautions that need to be taken before the job begins. Other divisions shall notify Flood Maintenance to arrange for entry into all FMD pump plants.

Exposures to high vapor concentrations can produce undesirable symptoms when painting. A Material Safety Data Sheet (MSDS) shall be reviewed before the job is to begin. A MSDS shall be on-site during painting operations.

Painters shall ensure that adequate ventilation is sufficient in the space during work operations. Not all pump plants have large bay doors to ventilate air inside a pump plant. Refer to the Airflow Requirements section for additional ventilation requirements for conducting paint operations.

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## **RADIO EMERGENCY ASSISTANCE GUIDELINES**

The following guidelines are to be used when calling Public Works dispatch for emergency assistance.

If the radio call is after normal working hours, the Flood dispatcher may have to be used to reach an operator.

- When calling Public Works dispatch, use the phrase "CODE 3" which stands for "Emergency, act immediately." This alerts the radio operators to give the call top priority.
- Provide the operators the radio number of the vehicle calling.
- Provide the area or city that the call is coming from.
- Provide the location, street address, and cross streets where help is needed.
- Provide the type of emergency and what types of services are needed. This may be the police, paramedics, fire department, or swift water rescue.
- Inform the operator if any Public Works vehicles or employees are involved. (The name of the injured employee should not be given in radio communication).
- Be prepared to give necessary details about the incident.
- Stay near the radio if possible to supply the operators with further information.
- Contact the supervisor or the area yard.
- Supervisor shall contact EHS and/or DSC.

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## **AIRFLOW REQUIREMENTS**

- Forced air mechanical ventilation can be used to control atmospheric hazards within a confined space.
- Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards.
- Based on requirements within this manual, an employee may not enter the confined space until the forced air ventilation has eliminated any hazardous atmosphere.
- The forced air ventilation shall be directed 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 in the space.
- Locate the blower at least 5 feet from the opening to prevent re-entry.
- Select the blower based on the volume of the space, number of elbows in the flex hose, and the length of hose and not just on the cubic feet per minute (CFM) on the fan.
- Place the supply air hose near the area of work and never lower than 25 percent of the total height of the space.
- Purge the space for at least ten minutes prior to entry. Longer purge times may be necessary for smaller blowers.
- NIOSH studies recommend 20 air changes per hour for a ventilation rate.
- Supply and local exhaust ventilation may be necessary when welding in a confined space.
- Locate the blower away from generator exhaust, car exhaust, or contaminant sources.

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## **RESPIRATORS**

- I. Respirators shall be inspected and sanitized after each use and inspected monthly. A record of the most recent certification shall be maintained with the respirator. It shall include the inspector's identification, the date, and a respirator identification number.

1. Self Contained Breathing Apparatus

- A Self Contained Breathing Apparatus (SCBA) is a self-contained respirator intended to supply fresh breathing air on demand. A single tank of compressed air, carried on the back, provides the air, and a regulator controls the flow of air to the face mask. Exhaled air is released to the atmosphere.
- A SCBA is designed to protect the wearer with respiratory protection while working in hazardous atmospheres, such as oxygen deficiency and/or inhalation of toxic contaminants.
- When engaged in rescue where protection against a hazardous atmosphere is needed, the employee(s) shall use a SCBA.

2. Supplied Air Respirator

- A supplied air respirator (SAR) or airline respirator provides breathing air through an airline from a source outside the work area. Hazardous atmospheres can be encountered during emergency situations, chemical spills, high concentrations of air contaminants, or the use of materials that have poor warning properties.

3. An Escape Breathing Apparatus

- An Emergency Escape Breathing Apparatus is a small lightweight refillable escape unit to be used in confined spaces, when a gas monitor indicates a hazard, and it may take some time to get to a safe area.
- An Escape Breathing Apparatus is intended for use only during an emergency exit. It cannot be used to enter an area that has a hazardous atmosphere.

4. Air Purifying Respirator

- An air-purifying respirator (APR) means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.
- Air purifying respirators are not designed for use in conditions that are immediately dangerous to life or health and must not be used when entering an area that is oxygen deficient.

## II. Inspection and Maintenance of a SCBA

### 1. Exhalation Valve

- This valve may be tested by visual inspection and by donning the face mask, covering inhalation tube, and inhaling. If the mask is tight on the face and leakage is noted, the valve should be removed for closer inspection.
- Inhalation Tube: Inspect for cracks, punctures, or other openings. This test may be made at the time the exhalation valve is tested.
- Face Piece: Inspect entire mask for general condition, face shield, and all clamps for tightness.
- Air Tank: Inspect tank fittings for leaks.

### 2. Testing for Leaks

- To test the complete assembly, open the cylinder control valve and the main line control valve on the regulator. Note: the reading on both pressure gauges. Close the cylinder control valve and observe the regulator pressure gauges for a 3-minute period. If the pressure drops more than 100 psi in this period, inspect all fittings and hoses for leaks. Soapy water will aid in detecting leaks. Notify your immediate supervisor if a leak in the system or defective parts are found.

### 3. Cleaning

- Respirators shall be cleaned and sanitized at least monthly, but weekly for routinely used respirators.
- Soap and water are the only materials needed to clean respirators.
- Respirator equipment shall not be passed from one person to another until it has been cleaned and sanitized.

### 4. Storage

- When not in use, respirators shall be stored to protect against dust, sunlight, extreme temperatures, excessive moisture, or damaging chemicals.

### 5. Fit-Testing

- Employees required to use respiratory protection shall not be permitted to have any facial hair that interferes with the sealing surface of the respirator and the face. Refer to Facial Hair Guidelines, Figure 3.

## 6. Recertification

- SCBA and supplied-air respirator equipment shall be certified per manufacturer recommendation.

## 7. Training

- Training requirements for use of respirators can be found in the training section of this manual.

**FIGURE 3 – Facial Hair Guidelines**



The Shade Portions are your respirator seal areas. Facial Hair is not permitted on these portions of the face.

---

**Unacceptable**



Full Beard



Goatee & Narrow Mustache



Goatee & Wide Mustache



Extended Side Burns



Full Manchu Mustache



Wide Mustache

---

**Acceptable**





## MINIMUM TRAINING REQUIREMENT

### FLOOD MAINTENANCE DIVISION CONFINED SPACE TRAINING MATRIX

	Confined Space Training- 8 hour & Refreshers 4 hour	Confined Space Training- In-house	Non-FMD Permit Required Confined Space Tailgate	HAZWOPER- First Responder and Refreshers	Medical Exam No. 2- Confined Space	Medical Exam No. 5- Respirator	SCBA/SA Training and Fit Testing	Respirator Training and Fit Testing	CPR & First Aid Training	In-house Rescue training	Escape Breathing Apparatus Evacuation Training	Gas Meter Training	Traffic Control and Flagging Training
<b>Continuous Inspection Team</b>	R	R		R	R	R	R	O	R	R	R	R	R
<b>Pump Plant Sump Cleanout Crew</b>	R	R			R	R	R		R	R	R	R	O
<b>Sub-drain Maintenance Crew</b>	R	R			R	R	R		R	R	R	R	
<b>Catch Basin Maintenance</b>	R											R	R
<b>All Confined Spaces</b>	R											R	O
<b>San Gabriel Dam Tunnel &amp; Silo</b>	R										R	R	
<b>All Dam Tunnels {PRCS areas}</b>	R	R			R	R	R		R	R	R	R	
<b>Non FMD personnel not regularly assigned to work in confined spaces</b>			R								R		

R = required

O = optional

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## **TRAINING REQUIREMENTS**

### 1. Confined Space Training

- Initial - 8 hours
  - All employees working in Confined Spaces are required to attend an 8-hour training course.
- Refresher - 4 hours
  - A refresher course is required every 5 years, when recommended by the EHS office, when regulations change or when a supervisor deems it is necessary.

### 2. Confined Space Training In-house

- This training is to supplement the training provided by EHS and their vendor. It covers the actual procedures for Flood Maintenance Division's confined spaces, work, and safety procedures.
- The In-House Confined Space Training form shall be completed as the training is conducted and retained to verify the employee received the training.

### 3. Non-FMD Permit-Required Confined Space Tailgate

- This training is intended to introduce the hazards of a Flood Maintenance Division confined space to an employee not assigned to FMD.
- The training shall be done by a Public Works Crew Leader or above and shall cover the items addressed on the Permit Required Confined Space Tailgate for Non-FMD Personnel.
- Everyone entering the confined space shall sign that they have received this tailgate training on the specifics of the individual confined space. They shall also be listed on the entry permit as entrants.

### 4. HAZWOPER-First Responder Operational Level and Refresher

- Due to the nature of the Flood Control channel and storm drain system, crews are often called to assist agencies in Hazardous Material spills. Sometimes FMD crews are first on site to these spills. Subsequently, the division requires HAZWOPER First Responder Operational Level training for employees responding to spills and to allow them to work in a defensive manner to control the spread of hazardous materials. This training establishes the procedures and limitations FMD employees can do to protect themselves, the public, and the environment. These procedures are outlined in the Flood Maintenance Division Hazardous Materials Emergency Response Procedures.

- The initial training is 8-hour. Annual refresher training is 4-hour.

#### 5. Medical Exam No. 2 - Confined Space

- All employees who work in a confined space are required to have this exam.
- The examination is required initially and every 2 years thereafter.

#### 6. Medical Exam No. 5 – Respirators

- All employees who are required to wear a respirator; such as a SCBA or APR, as part of their job duties are required to have this exam.
- Employees shall receive the exam before the initial fit-testing and whenever the following trigger events occur:
  - An employee reports medical signs or symptoms related to respirator use.
  - A supervisor observes the employee to have medically-related problems when using the respirator.
  - There is a change in an employee's workplace conditions (e.g., physical work effort, protective clothing, or temperature) that results in a substantial increase in the physiological burden placed on the employee.
  - There is a change in an employee's job duties to such an extent that an employee who was previously using an air-purifying respirator must now use a self-contained breathing apparatus.

#### 7. SCBA/SA Training and Fit-Testing

- All employees who use SCBA/SA system are required to attend initial/annual SCBA/SA training and fit testing.

#### 8. Respiratory Training and Fit-Testing

- All employees are required to attend initial/annual Respiratory training and fit-testing.

#### 9. CPR and First Aid Training

- Each member of the team should be trained in basic first-aid and in cardiopulmonary resuscitation (CPR). At least one member of the rescue team shall have a current certification in first aid and CPR.

#### 10. In-House Rescue Training

- Each member of the team shall practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed. Continuous storm drain inspection crews conduct rescue drills every six months.

#### 11. Escape Breathing Apparatus Training

- Any employee who may have to use the Escape Breathing Apparatus shall be given a tailgate level training on the particular unit. This training will follow the manufacturers requirements in the owners/operators manual and shall include at a minimum, inspections, how to properly use the apparatus and its limitations.
- Employees are not required to receive respirator training or fit testing and are not required to be clean shave to wear these escape breathing apparatus.

#### 12. Gas Monitor Training

- All employees using gas monitors shall be trained in how to properly use the meter.
- Initial gas meter training should be provided by a manufacturers trained representative and be model specific.
- Subsequent gas meter training for employees can be conducted by a FMD employee who is knowledgeable in the daily operation of the gas meter and was originally trained by the manufacturer's representative.

#### 13. Traffic Control and Flagging Training

- All employees who work in or around traffic are required to attend Traffic Control and Flagger training initially.
- The initial 8-hour training is required one-time. A refresher course is required when recommended by the EHS office, when regulations change or when a supervisor deems it necessary.

#### 14. Fall Protection Training

- Supervisors shall be trained as a Fall Protection Competent Person. The initial 32-hour training is required one-time and a 16-hour refresher is required every two years.
- Employees should be trained in Worker at Heights or trained in fall protection equipment as part of the confined space training.

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## **SIMULATED RESCUE DRILLS**

- Every member of the crew including alternates who work on a continuous storm drain inspection crew shall participate in making simulated rescue drills every six months.
- Other regular routine operations shall conduct rescue drills annually (i.e.; Pump Plant Sump cleanout).
- Non-routine work in a permit-required confined space shall have rescue drills prior to starting work. (i.e.; General maintenance or sub-drain vault.)

Simulated rescue drills shall include removing mannequins or actual persons from a representative permit-required space.

The FMD DSC shall be notified of scheduled dates and times for the simulated rescue drills.

Documentation of simulated rescue drills using the supplied form shall be recorded and kept on file with the training records.

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## **RECORD KEEPING**

The following documents shall be maintained at the yards for a period of three years:

1. Sign-in sheets for both "Confined Space" and "Permit Required" areas.
2. Confined Spaces Tailgates.
3. Maintenance records on safety equipment and gas monitoring instruments.
4. Monthly equipment inspection sheet.
5. Records shall be kept at FMD yards for employees who work in confined spaces and had training in:
  - a. CPR and First Aid
  - b. Gas Monitor Operation
  - c. In-house Confined Space training
6. Simulated Rescue Drills.
7. Records shall be kept at EHS for employees who had training in:
  - a. Confined Space
  - b. HAZWOPER training
  - c. Traffic Control training
  - d. Respiratory Protection training
  - e. Fall Protection training (Competent Person and Worker at Heights)
  - f. Medical Exam Records

### **Incident Records**

In the event of an employee exposure to levels above the permissible exposure limits (PEL), and after all employees have been evacuated, a print out from the meter's days events shall be printed and attached to the permit for documentation of the incident. The supervisor or entrant supervisor then must write on the entry permit (comment section) the time, location, the names of exposed employees, and the description of the incident.

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## **APPENDIX I – FORMS**

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION  
**GAS MONITOR TRAINING**

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Division: Flood Maintenance Yard: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

Supervisor conducting training: \_\_\_\_\_ Title: \_\_\_\_\_

Type of gas monitor: \_\_\_\_\_

Make: \_\_\_\_\_

Model: \_\_\_\_\_

Topics covered:

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**ATTENDANCE:**

	Print Name	Signature	Job Title
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION  
**SIMULATED RESCUE DRILL**

---

Division: Flood Maintenance Yard: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

Supervisor conducting drill: \_\_\_\_\_ Title: \_\_\_\_\_

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Brief summary of rescue drill: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Equipment used: \_\_\_\_\_

\_\_\_\_\_

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**ATTENDANCE:**

	Print Name	Signature	Job Title
1.			
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12.			

Employee Safety

Recommendations: \_\_\_\_\_

\_\_\_\_\_

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION  
**ESCAPE BREATHING APPARATUS TRAINING**

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Division: Flood Maintenance Yard: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

Supervisor conducting training: \_\_\_\_\_ Title: \_\_\_\_\_

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Brief summary of the training: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Equipment used: \_\_\_\_\_

\_\_\_\_\_

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**ATTENDANCE:**

	Print Name	Signature	Job Title
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Employee Safety

Recommendations: \_\_\_\_\_

\_\_\_\_\_

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

**SCBA INSPECTION CHECKLIST**

Serial No.: \_\_\_\_\_

Location: \_\_\_\_\_

PW No.: \_\_\_\_\_

DATE INSPECTED	CYLINDER PRESSURE	CALIBRATION DATE	REGULATOR SERIAL NO.	FACEPIECE & BREATHING TUBE CONDITION	OVER-ALL CONDITION	CONNECTIONS SECURE	CLEAN AND SANITIZED	REMARKS	INSPECTED BY (first initial and last name)

Comments: \_\_\_\_\_

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

**ESCAPE BREATHING APPARATUS INSPECTION LOG**

MO/YR	CYLINDER SERIAL NO.	REGULATOR SERIAL NO.	HYDRO DATE	CYLINDER PRESSURE	CYLINDER SIZE	CONDITION/COMMENTS	INSPECTED BY



COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

**SUPPLIED AIR RESPIRATOR INSPECTION LOG**

Serial No.: \_\_\_\_\_ Location: \_\_\_\_\_ PW No.: \_\_\_\_\_

DATE INSPECTED	CYLINDER PRESSURE	CALIBRATION DATE	REGULATOR SERIAL NO.	FACEPIECE & BREATHING TUBE CONDITION	OVER-ALL CONDITION	CONNECTIONS SECURE	CLEAN AND SANITIZED	REMARKS	INSPECTED BY (first initial and last name)

Comments: \_\_\_\_\_

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

**GRADE "D" BREATHING AIR CYLINDERS INSPECTION LOG**

MO/YR	CYLINDER SERIAL NO.	CYLINDER NO.	HYRDRO DATE	CYLINDER PRESSURE	CYLINDER SIZE	CONDITION/ COMMENTS	INSPECTED BY

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

**SUPPLIED AIR SYSTEM REGULATOR INSPECTION LOG**

MO/YR	REGULATOR SERIAL NO.	REGULATOR NO.	CERTIFICATION DATE	CHECK GAUGES	CONDITION/COMMENTS	INSPECTED BY

Comments:

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**COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION**

**INDUSTRIAL SCIENTIFIC CORPORATION  
ATMOSPHERIC METERS**

**MODEL TMX 412**

**BUMP TESTING**

Gas detection instruments are potential life-saving devices. Recognizing this fact, Industrial Scientific Corporation recommends that a functional (“bump”) test be performed on every instrument prior to each days use. A functional test is defined as a brief exposure to the monitor to a concentration of gases in excess of the lowest alarm set-point for each sensor for the purpose of verifying sensor and alarm operation and is not intended to be a measure of the accuracy of the instrument.

Industrial Scientific recommends that a full instrument calibration be performed using a certified concentration of gases monthly to ensure maximum accuracy. If an instrument fails to operate properly following any functional “bump” test, a full instrument calibration should be performed prior to use.

When you bump test or field calibrate the meter, you must record it on a bump test record sheet. This information has to be kept on file for a period of three years.

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

**BUMP TEST RECORD SHEET**

BUMP TESTING IS MANDATORY PRIOR TO EACH DAYS USE.  
THIS BUMP TEST RECORD SHEET MUST BE KEPT ON FILE FOR A PERIOD OF  
THREE YEARS.

**BUMP TESTING WILL NOT CALIBRATE YOUR METER.**

BUMP TESTING IS FOR THE PURPOSE OF VERIFYING SENSOR AND ALARM  
OPERATION AND IS NOT INTENDED TO BE A MEASURE OF THE ACCURACY  
OF THE INSTRUMENT.

**Check CO, H2S, O2, and LEL BOXES, IF INDIVIDUAL SENSORS ARE  
VISUALLY ALARMING.** IF ONE OR MORE SENSORS ARE NOT FLASHING IN  
ALARM MODE THEN THE METER MUST BE CALIBRATED. ONLY WRITE YES IN  
THE CAL BOX IF THE METER IS FIELD CALIBRATED.

SERIAL NO.	DATE	TIME	LOCATION	CO ALARM	H2S ALARM	O2 ALARM	LEL ALARM	CAL YES/NO	USER INITIAL

## **PERMIT REQUIRED CONFINED SPACE TAILGATE FOR NON-FMD PERSONNEL**

An expanded tailgate meeting shall be held prior to entry into a permit required confined space in which non-FMD personnel will be entering the confined space.

This tailgate meeting will cover the following topics:

1. The hazards associated with confined spaces:
  - Atmosphere
  - Engulfment
  - Insects, vermin, snakes
  - Limited ingress and egress
  - Slip hazard
  - Claustrophobia
2. The proper use of fall protection/rescue equipment:
  - Full body harness
  - Emergency retrieval equipment
  - Dorsal D-ring
3. The use of gas monitors:
  - Purpose
  - Sample procedure
  - Alarm procedure
4. The use of escape breathing apparatus:
  - Unpack unit
  - Turn on air
  - Don the hood

5. Emergency procedures:

- **FOLLOW FMD PERSONNEL DIRECTIONS**
- Provide site specific instructions
- Evacuate confined space in an orderly manner

6. Complete sign-in sheet

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

**PERMIT REQUIRED CONFINED SPACE TAILGATE FOR NON-FMD PERSONNEL**

Division:     **Flood Maintenance**     Yard/Area/District: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

Supervisor Conducting  
Tailgate: \_\_\_\_\_ Title: \_\_\_\_\_

An expanded tailgate meeting was held and the personnel listed below have received instructions in the following topics:

1. Confined space hazards
2. The proper use of emergency retrieval equipment
3. The use of a gas monitor
4. The use of an escape breathing apparatus
5. Emergency procedures

ATTENDANCE:

	Print Name	Signature	Job Title	Division/Company
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COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
FLOOD MAINTENANCE DIVISION

**IN-HOUSE CONFINED SPACE TRAINING**

Date: \_\_\_\_\_

Location: \_\_\_\_\_

Employee Name: \_\_\_\_\_  
(print)

Employee No: \_\_\_\_\_

The above employee has received in-house confined space training in the following areas.

	Trainee Initial
1. Confined Space Manual	
2. General Hazards Associated with Confined Space Entry	
3. Operating Procedures	
4. Permit System	
5. Rescue Procedures	
6. Personal Protective Equipment	
7. Gas Monitoring Equipment	
8. Fall Protection Equipment	
9. Escape Breathing Apparatus	
10. Traffic Control, if applicable	

Training conducted by: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(print)

Trainee Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## **APPENDIX II - PERMITS**

The following types of permits are valid for use during the 2007 calendar year. Individual copies are included.

### A. "Confined Spaces"

1. Catch Basins
2. Cogswell Dam Water Filtration System Chambers
3. Enclosed Sections of Open Channel
4. Injection Well Vaults
5. Pump Plants
6. Pressure Reducing Station
7. San Gabriel Dam Tunnel
8. San Gabriel Dam Hydroelectric Silo Unit No. 1
9. Trenches and/or Excavations
10. Big Dalton Dam Arches

### B. "Permit-Required" Confined Spaces

- |  |  |
|--|--|
| 1. Pump Plants                                 | - sump activities  |
| 2. Various Facilities                          | - hotwork (welding)<br>- generic confined space permit                             |
| 3. Storm Drains                                | - continuous inspections<br>- spot inspections<br>- general maintenance activities |
| 4. Subdrain Vaults                             | - general maintenance activities   |
| 5. Catch Basins                                | - general maintenance activities   |
| 6. CDS/Low Flow Diversion Vault                | - general maintenance activities   |
| 7. Debris Basin Tower                          | - general maintenance activities   |
| 8. Dams Tunnel, Vault, and area below Catwalks | - general maintenance activities   |

Each October the areas will be responsible to review their particular permits and suggest changes. These changes will be submitted to the FMD Divisional Safety Coordinator who will review and incorporate the changes as necessary.

"Confined Space" sign-in sheets posted at permanent Flood facilities are valid for a year, however, each month a new sign-in sheet shall be posted. A copy will be kept on file.

"Permit-Required" entry permits will be authorized for individual work assignments by the Construction Superintendent or Flood Control Construction Supervisor. A new permit is required for each new project.