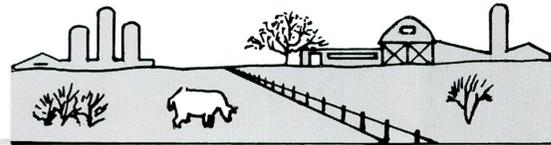


Flood Control
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Confined Space Entry Program

Version 1.0

June 18, 1998

FLOOD CONTROL
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OF
MARICOPA

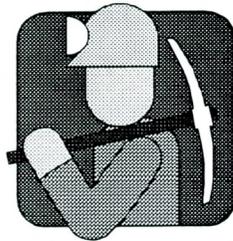
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Confined Space Entry Program

of the

Flood Control District of Maricopa County

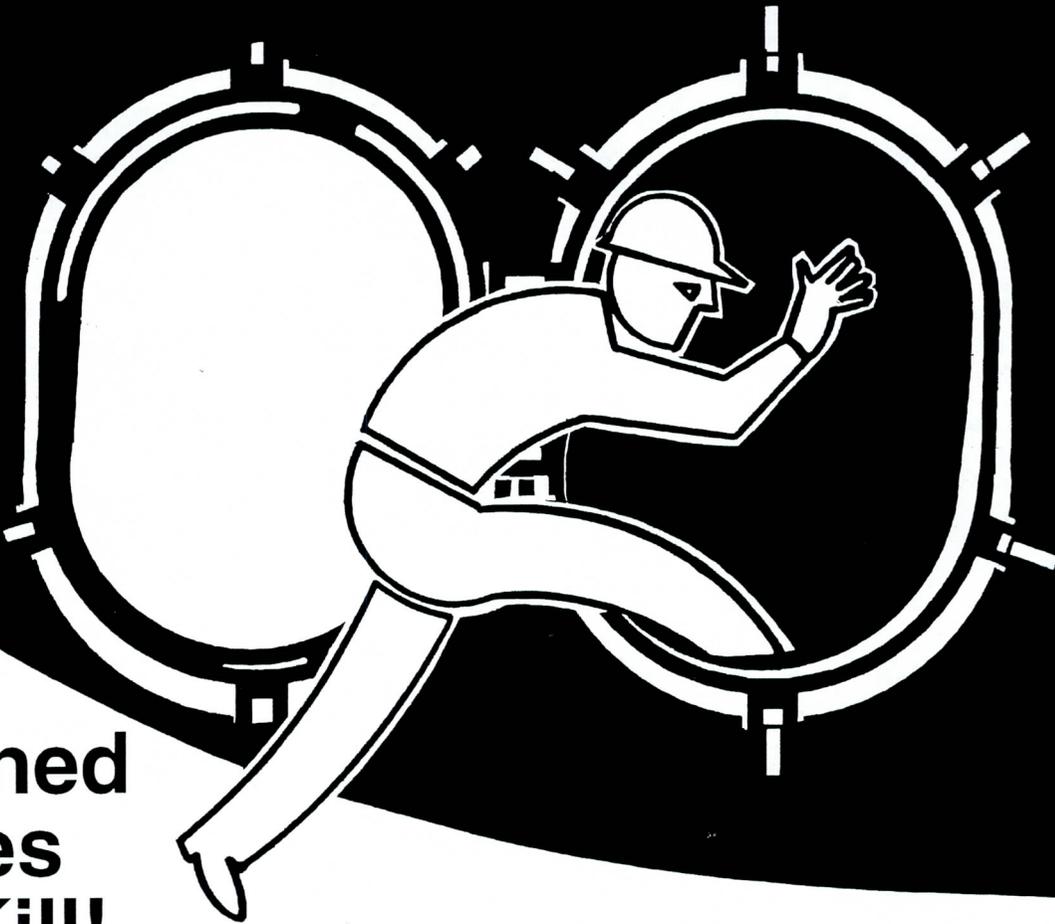
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Confined Spaces Can Kill!

Make sure you know all of the appropriate procedures and precautions to take for entry into and exit from confined spaces. If there are hazardous confined spaces where you must work, your employer is required by law to have a permit-required confined space program, permit system, emergency procedures, appropriate engineering and work practice controls and to provide you with training and appropriate personal protective equipment. See OSHA's standard on confined spaces

in Title 29 of the *Code of Federal Regulations*, Part 1910.146. For related OSHA publications, contact your regional or area office, or call (202) 219-4667, FAX (202) 219-9266.

U.S. Department of Labor

Robert B. Reich, Secretary
Occupational Safety and Health Administration
OSHA 3140
1993



24-Hour OSHA Hotline: 1-800-321-OSHA

(To report suspected fire hazards, imminent danger safety and health hazards in the workplace, or other job safety and health emergencies.)

Region I - Boston, MA (617) 565-7164
Region II - New York, NY (212) 337-2378
Region III - Philadelphia, PA (215) 596-1201
Region IV - Atlanta, GA (404) 347-3573
Region V - Chicago, IL (312) 353-2220

Region VI - Dallas, TX (214) 767-4731
Region VII - Kansas City, MO (816) 426-5861
Region VIII - Denver, CO (303) 844-3061
Region IX - San Francisco, CA (415) 744-6670
Region X - Seattle, WA (206) 553-5930

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I. Introduction

The Flood Control District of Maricopa County in its stormwater monitoring program frequently accesses storm drain pipes to repair, replace, and calibrate monitoring equipment in storm pipes.

Because these locations have limited access and potentially dangerous working conditions, storm drain pipes are considered confined spaces. Confined spaces can be dangerous and require special rules and regulations to ensure that safe working conditions are maintained. The Federal government through OSHA sets rules for working in confined spaces.

II. Permit Confined Spaces

Confined spaces that Flood Control District employees encounter are storm drain pipes. The size of the storm pipes range from 30 inches to 96 inches. The location of the storm drains is usually in or near a street, with some streets much busier than others.

Each site poses different hazards. Below is a list of the permit confined spaces and the site specific hazards.

Horne and Sixth Street

Access point is located in the northbound lanes of Horne just south of Sixth Street. Northbound traffic on Horne must be routed around the access manhole. The pipe where the level sensor and intake tubing is located is a 36-inch round concrete pipe. The invert of the 36-inch pipe is approximately 20 feet below ground.

The hazards here are traffic problems, automobile exhaust, limited work space, lack of ventilation, lack of adequate lighting, potential toxic gases in the storm drain, and drowning due to flows.

Horne and Grandview Avenue

Access point is located in the northbound lanes of Horne just south of Grandview Road. Northbound traffic on Horne must be routed around the access manhole. The pipe where the level sensor and intake tubing is located is a 54-inch round concrete pipe. The invert of the 54-inch pipe is approximately 15 feet below ground.

The hazards here are traffic problems, automobile exhaust, limited work space, lack of ventilation, lack of adequate lighting, potential toxic gases in the storm drain, and drowning due to flows.

Falcon Field Airport

Access point is located on the south side of Fighter Aces Road next to the aluminum sampler housing box. Traffic problems are not a serious problem at this site. The pipe where the level sensor and intake tubing is located is a 48-inch round concrete pipe.

The hazards here are automobile exhaust, limited work space, lack of ventilation, lack of adequate lighting, potential toxic gases in the storm drain, and drowning due to flows.

Broadway and Lindsay Roads

Access point is located in the center of the westernmost entry to the shopping center on Broadway Road. Traffic must be routed past this entry from both Broadway and in the parking lot itself. The pipe where the level sensor and intake tubing is located is a 72-inch round concrete pipe. The invert of the 72-inch pipe is approximately 10 feet below ground.

The hazards here are traffic problems, automobile exhaust, limited work space, lack of ventilation, lack of adequate lighting, potential toxic gases in the storm drain, and drowning due to flows.

Broadway and Dobson

Access point is located in the center turn lane of Dobson Road approximately 1/4 mile south of Broadway Road. Traffic must be routed out of the center lane and out of the inside southbound lane of Dobson Road. The pipe where the level sensor and intake tubing is located is a 30-inch round concrete pipe. The invert of the 30-inch pipe is approximately 20 feet below ground.

The hazards here are traffic problems, automobile exhaust, limited work space, lack of ventilation, lack of adequate lighting, potential toxic gases in the storm drain, and drowning due to flows.

35th Avenue near Salt River

Access point is located on the west shoulder of 35th Avenue in front of the aluminum sampler storage box. There is no traffic rerouting required. However, 35th Avenue has only one northbound and one southbound lane. The access manhole is less than ten feet from the edge of the pavement. The pipe where the level sensor and intake tubing is located is a 75-inch round concrete pipe. The invert of the 75-inch pipe is approximately 20 feet below ground.

The hazards here are traffic problems, automobile exhaust, limited work space, lack of ventilation, lack of adequate lighting, potential toxic gases in the storm drain, and drowning due to flows.

40th Street at Indian Bend Wash

Access is through a gate in a grate over a mixing box at the outlet of the pipe. Traffic problems are not a problem at this site. The pipe where the level sensor and intake tubing is located is a 66-inch round concrete pipe.

The hazards here are automobile exhaust, limited work space, lack of ventilation, lack of adequate lighting, potential toxic gases in the storm drain, and drowning due to flows.

The remaining sites are not considered permit confined spaces because the hazards are minimized. The intake tubing level sensor equipment is located at the outlet of the storm drain pipe.

III. Confined Space Employee Duties

There are a number of critical duties and essential personnel involved in any confined space entry. Each employee and its associated duties are listed below.

Entry Supervisor

The Entry Supervisor is responsible for the confined space entry. He authorizes the entry by signing the Entry Permit. He ensures that the confined space guidelines are followed.

Entry Attendant

The duties of the Entry Attendant include ensuring that only those permitted to enter the confined space do so. He also provides support to the workers in the confined space. He maintains communication with those in the confined space, and summons emergency services as required.

Entry Workers

The duties of the entry workers are to perform the required work in the confined space, maintain safe practices within the confined space, and follow direction from the entry attendant.

IV. Training

Each employee involved in the confined space entry program must be trained in the procedures and equipment involved in confined space entry. Upon completion of training, each worker must have acquired the skills necessary to perform their duties.

Additional training is required when job duties change, there is a change in the permit space program or a new hazard is identified, and when an employee's job performance shows deficiencies.

V. Entering Confined Spaces – Procedures and Equipment

Completion of work in a confined space involves proper procedures and equipment. Procedures are discussed first followed by equipment.

Procedures

The procedures involved in entering a confined space are uncomplicated. Since all of the confined spaces involve the same hazards to one degree or another, only one procedure is needed for all locations.

Before leaving the office for the work location, all equipment should be checked and loaded on the truck. Once on site, a Confined Space Entry Permit should be completed, including the confined space atmospheric testing.

The atmosphere of the confined space must be tested to determine if any hazards exist. The order of the tests is also important and must be the following:

Oxygen Levels O₂
LEL – explosive gases
Toxic Gases – H₂S, CO

The levels should be recorded on the Confined Space Entry Permit. Once it has been determined that the atmosphere is acceptable for entry, the Entry Permit is completed and signed by the Entry Supervisor.

A forced air blower should be started and the air tube placed into the confined space. At this time, all Entry Workers should be outfitted with a body harness. Each harness must be attached to the winch/tripod set over the manhole.

All tools will be taken into the confined space by the Entry Workers. Alternatively, the Entry Attendant can lower equipment into the confined space.

While the entry workers are in the confined space, the Entry Attendant should be constantly monitoring the condition of the workers and monitoring any changes to

the ambient conditions which may affect the safety of the confined space entry. It is also the duty of the Attendant to maintain communication with those in the confined space. If an emergency arises, the Attendant will summon help.

The Entry Supervisor must also be aware of the condition of the confined space entry by monitoring activities and ambient conditions that may adversely affect the confined space entry. Once work in the confined space is complete, the Entry Supervisor cancels the Entry Permits.

Equipment

The following is a list of equipment needed for a confined space entry. This list is not exhaustive because not all equipment needs can be anticipated. However, this list gives the basic needs to ensure that the confined space entry is safe.

Body Harness – attaches to body of worker allowing a non-entry means of removing a person during an emergency.

Tripod/winch – attaches to the body harness allowing a non-entry means of removing a person in case of emergency.

Forced Air Blower – forces fresh air into the confined space, either to provide air or to evacuate the confined space of hazardous atmospheres.

Flashlights – provide artificial light to those working in a confined space.

Gas Meters – devices calibrated and specific for a gas such as oxygen, explosive gases, and toxic gases. Used to determine concentrations of these gases.

Ladder – use to access the confined space.

Tools – any tools needed to complete a particular job in the confined space.

Cellular Telephone – needed to call 911 in emergencies.

VI. Atmospheric / Ambient Testing

As previously discussed, the atmospheric conditions of the confined space must be tested before entry of the confined space. Testing of oxygen, explosive gases, and toxic gases must be done to determine that the atmosphere is safe for entry. Testing must be done before using forced air. If forced air is used to alleviate a hazardous atmosphere, testing must be done again before entry. If the atmosphere is too hazardous before applying forced air, the confined space entry should be attempted later and the source of the hazard should be identified.

Other conditions that may cause problems in a storm drain include automobile exhaust entering the confined space through inlets and water entering the drainage system. Automobile exhaust could enter the storm drain and cause carbon monoxide (CO) poisoning. Continued atmospheric monitoring should be done during the entry.

Water could enter the storm drain even during dry periods. There is the possibility of lawn runoff, car wash runoff, firefighting use, or hydrant testing entering the storm drains. The Entry Attendant and the Entry Supervisor must be constantly watching for these hazards. The Entry Workers should also be listening for water rushing toward them in the pipes. The confined space should be vacated at any sign of rising water.

VII. Confined Space Entry Permits

A Confined Space Entry Permit is required for any confined space entry procedure. An example of a confined space entry permit is in the Appendix. The permit must be completed in its entirety.

A Confined Space Entry Permit is not valid unless signed. The permit must be at a site and must be available to anyone who wants to see it.

Confined Space Entry Permits must be kept on file for at least one year.

VIII. Emergencies

For all emergencies, dial 9-1-1.

IX. Unauthorized Entry

During a confined space operation, it is the responsibility of the Entry Attendant to ensure that only those authorized on the Confined Space Entry Permit enter the confined space. When the District is not accessing the confined spaces, there is no practical way to limit entry into the confined space except to ensure that the manhole cover is replaced when the work is complete. It is the responsibility of each municipality to ensure that no one enters its manholes and storm sewer system.

Appendix

Equipment Check List

Confined Space Entry Permit

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONFINED SPACE ENTRY PERMIT

PERMIT VALIDITY			
DATE OF ENTRY	ENTRY TIME	EXIT TIME	
LOCATION			
ESTIMATED DURATION OF ENTRY	HRS	ACTUAL ENTRY TIME	ACTUAL EXIT TIME
PERMIT STATUS	ACTIVE	CANCELLED	
PERSONNEL			
PERSONS TO ENTER SPACE	1. 2. 3.		
ENTRANCE ATTENDANT	1. 2.		
ENTRANCE SUPERVISOR	1.		
TESTS PERFORMED			
	ACCEPTABLE	READINGS	TESTER
OXYGEN	> 19.5 %		
EXPLOSIVE GASES	0.0		
TOXIC GASES	0.0		
PURPOSE OF ENTRY			
KNOWN HAZARDS			
MEASURES TAKEN TO ELIMINATE HAZARDS			
COMMUNICATION PROCEDURES			
IN CASE OF EMERGENCY CALL 911			
AUTHORIZED SIGNATURE	DATE	TIME	

Confined Space Entry Checklist

	Are confined spaces thoroughly emptied of any corrosive or hazardous substances, such as acids or caustics, before entry?
	Are all lines to a confined space, containing inert, toxic, flammable, or corrosive materials valved off and blanked or disconnected and separated before entry?
	Are all impellers, agitators, or other moving parts and equipment inside confined spaces locked-out if they present a hazard?
	Is either natural or mechanical ventilation provided prior to confined space entry?
	Are appropriate atmospheric tests performed to check for oxygen deficiency, toxic substances, and explosive concentrations in the confined space before entry?
	Is adequate illumination provided for the work to be performed in the confined space?
	Is the atmosphere inside the confined space frequently tested or continuously monitored during conduct of work? Is there an assigned safety standby employee outside of the confined space, when required, whose sole responsibility is to watch the work in progress, sound an alarm if necessary, and render assistance?
	Is the standby employee appropriately trained and equipped to handle an emergency?
	Is the standby employee or other employees prohibited from entering the confined space without lifelines and respiratory equipment if there is any question as to the cause of an emergency?
	Is approved respiratory equipment required if the atmosphere inside the confined space cannot be made acceptable?
	Is all portable electrical equipment used inside confined spaces either grounded and insulated, or equipped with ground fault protection?
	Before gas welding or burning is started in a confined space, are hoses checked for leaks, compressed gas bottles forbidden inside of the confined space, torches lighted only outside of the confined area and the confined area tested for an explosive atmosphere each time before a lighted torch is to be taken into the confined space?
	If employees will be using oxygen-consuming equipment such as salamanders, torches, and furnaces, in a confined space is sufficient air provided to assure combustion without reducing the oxygen concentration of the atmosphere below 19.5 percent by volume?
	Whenever combustion-type equipment is used in a confined space, are provisions made to ensure the exhaust gases are vented outside of the enclosure?
	Is each confined space checked for decaying vegetation or animal matter which may produce methane?
	Is the confined space checked for possible industrial waste which could contain toxic properties?
	If the confined space is below the ground and near areas where motor vehicles will be operating, is it possible for vehicle exhaust or carbon monoxide to enter the space?