

CITY AND COUNTY OF DENVER

Confined Space Entry Procedure		
Occupational Safety and Health Management System No. 65.5.1 This policy was developed and shall be implemented under the authority of Executive Order No. 65 and the Risk Management Office.	April 1995 Revised – January 1, 2008	Prepared / Revised By: Risk Management – Safety Unit

1.0 Introduction

This policy has been developed to ensure employees are trained to recognize confined space and take the necessary precautions before entering a confined space. Hazards that may be encountered are:

- Oxygen-deficient environment
- Flammable atmospheres
- Toxic atmospheres
- Physical hazards such as electrical lines or standing water

Before entry into a confined space, the air must be tested to determine if a hazardous atmosphere is present. In accordance with this policy, a *Confined Space Entry Permit* (Attachment One) must be completed before a confined space entry is made.

2.0 Scope

This Citywide procedure is to be used by all departments and agencies. If an individual department or agency has developed its own procedure then that procedure will be acceptable to use as long as it provides the same level of worker protection.

3.0 Definitions

Confined Space - Described as a space that meets ALL 3 of the following:

- Is large enough and so configured that an employee can bodily enter and perform assigned work; **AND**
- Has limited or restricted means for entry or exit, e.g. tanks, vessels, silos, storage bins, hoppers, vaults, and pits; **AND**
- Is not designed for continuous employee occupancy.

Examples of confined spaces are manholes, vaults, pits, tanks, storage bins, etc.

Atmospheric Testing – The use of a monitoring device to test the air in a confined space to ensure that the oxygen concentration is between 19.5 – 23.5%, combustible gases are below 10% LEL and toxic gases are below 50% TVL.

Attendant – An individual stationed outside a confined space who monitors the entrant’s safety.

Entrant – An employee who is authorized by his/her supervisor to enter a confined space.

Confined Space Entry Permit – A preformatted written document that is to be completely filled out before entering a permit required confined space. The permit requires information on atmospheric testing, names of entrants, location of confined space and emergency response.

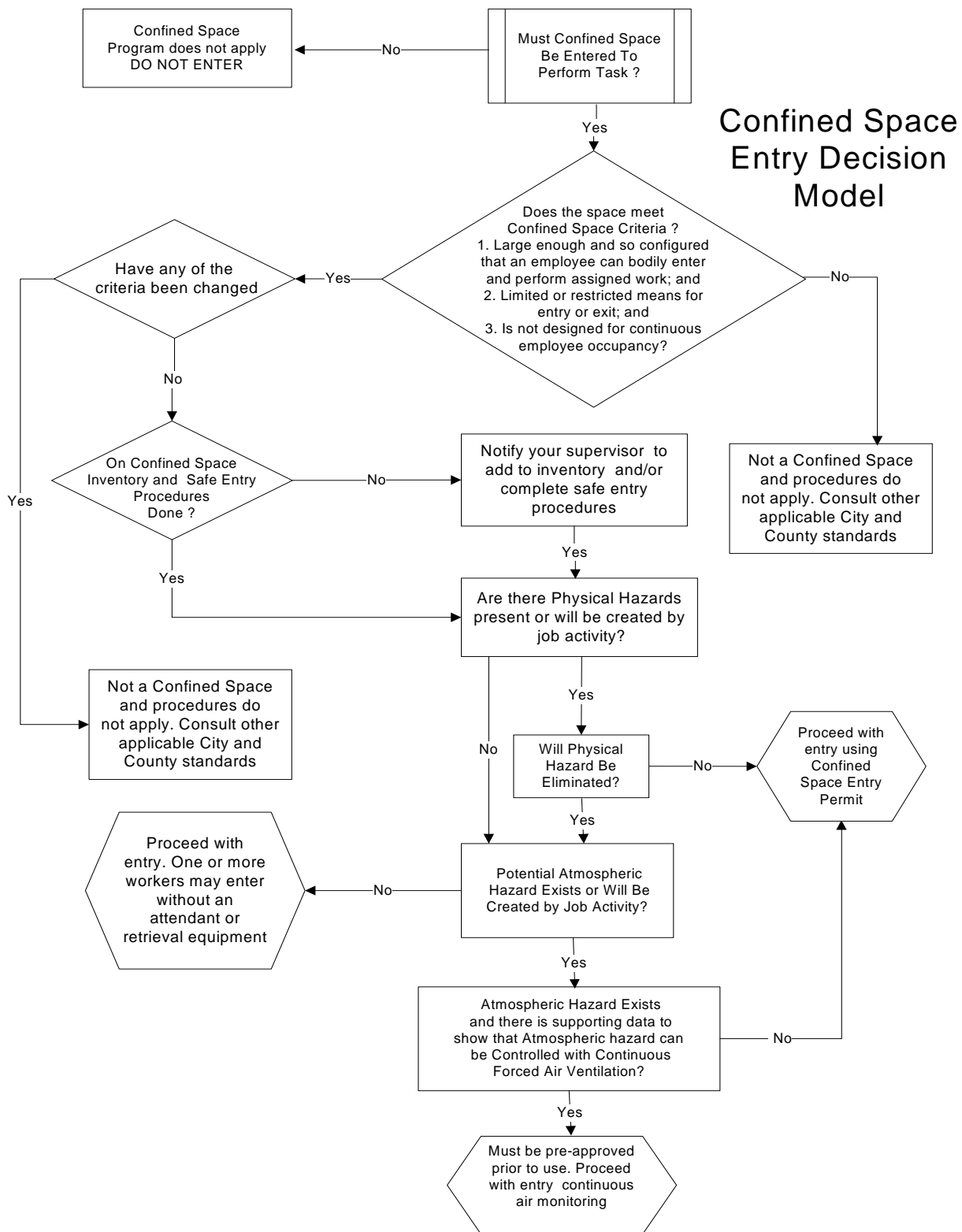
Lower Explosive Level (LEL) – The lower limit of flammability of a gas or vapor at ordinary ambient temperatures expressed in percent of gas or vapor in air by volume.

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

Retrieval System – The equipment (including a retrieval line, full body harness and lifting device) used for non-entry rescue of persons from a confined space.

Threshold Limit Value (TLV) – A term used to express the airborne concentration of a material to which nearly all persons can be exposed day after day without adverse effects.

4.0 Confined Space Entry Decision Model



5.0 Entry Procedures

- 5.1. Before entering a confined space obtain a blank *Confined Space Entry Permit* from your supervisor, safety representative or the Risk Management office. (Attachment One - Blank Permit can be photocopied).
 - 5.1.1. The permit shall be filled out as the following steps are completed:
 - a. Any condition making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
 - b. When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
 - c. Before an employee enters the space the person in charge shall test the internal atmosphere with a calibrated direct-reading instrument. The test shall consist of the following in the order given:
 - (1) Oxygen content
 - (2) Flammable gases and vapors
 - (3) Potential toxic air contaminants
 - d. Employees may not enter the space if the atmosphere is hazardous.
 - e. Continuous forced air ventilation shall be used as follows:
 - (1) An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere.
 - (2) The forced air shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have exited the space.
 - (3) The air supply from the forced air ventilation shall be from a clean source and may not increase the hazards in the space.
 - f. The atmosphere within the space shall be periodically tested as necessary to ensure that continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.
 - g. If a hazardous atmosphere is detected during entry:
 - (1) Each employee shall leave the space immediately.

- (2) The space shall be evaluated to determine how the hazardous atmosphere developed.
- (3) Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
- h. A communication device such as a telephone (cellular or hardwired) or a two-way radio must be available for use in the event of an emergency.
- i. To expedite rescues in the event of an emergency, all entrants must wear a full body harness at all times while in a confined space.

6.0 Duties and Responsibilities

6.1. Department Heads, Managers and Supervisors

Shall ensure that all employees are properly trained and the necessary safety equipment is available to workers whose work assignments include entry into a confined space. ***Workers shall not be assigned or allowed to enter a confined space without the following:***

- a. An atmospheric monitor to measure oxygen concentration, any presence of combustible gases and any presence of toxic gases.
- b. A mechanical ventilation device.
- c. Emergency communication equipment.
- d. Full body harnesses for all entrants

6.2. Entrants

Entrants shall ensure that all necessary preliminary steps are taken, including the completion of a Confined Space Entry Permit before making entry into a confined space. Entrants shall not enter confined spaces if they are not properly trained or if the space is unsafe. Entrants have the following responsibilities:

- a. Know the hazards that may be faced during the entry.
- b. Properly use safety equipment.
- c. Communicate with the attendant as necessary to enable the attendant to monitor entrant's status and to enable the attendant to alert entrants of the need to evacuate the space if the atmosphere becomes hazardous.
- d. Alert the attendant whenever the entrant recognizes any symptom of exposure to a dangerous situation.
- e. Exit the space as quickly as possible whenever ordered to by the attendant, if a dangerous situation is identified or if an evacuation alarm is activated.

6.3. Attendants

Shall be assigned to remain outside of the confined space and be in constant contact (visual or speech) with the workers inside. The attendant shall not have any other duties which could distract him/her from monitoring the workers in the confined space and shall know who to contact in the event of an emergency. Attendants shall have the following responsibilities:

- a. Know the hazards that may be faced during entry.
- b. Be aware of possible behavior effects of hazard exposure to entrants.
- c. Maintain an accurate count of the number of entrants in the space at all times.
- d. Remain outside the permit space at all times until relieved by another entrant.
- e. Communicate with entrants as necessary to monitor entrant's status and to alert them to the need to evacuate if conditions become hazardous.
- f. Monitor the activities inside and outside the space to determine if it is safe for the entrants to remain in the space and order an immediate evacuation if dangerous conditions develop.
- g. Summon rescue and other emergency services as soon as the attendant determines that the entrants may need assistance to escape from the space.
- h. Ensure that unauthorized persons do not enter the space.
- i. Perform no duties which might interfere with the attendant's primary duty to monitor and protect the entrants.

7.0 **Emergency and Rescue Procedures**

7.1. Denver Fire Department

Shall perform rescues in confined space in the City and County of Denver. To ensure timely rescues the following requirements have been established:

- a. The Denver Fire Department shall maintain the required equipment to perform confined space rescues and ensure that fire department personnel are properly trained on the hazards of confined spaces and rescue techniques.
- b. City work crews shall have a means of communications readily available prior to entering a confined space. A two-way radio or telephone must be immediately accessible to the attendant so that there will be no delay in reporting an emergency situation.
- c. If a cellular or hardwired telephone is used for communications, the attendant shall dial 911 to report the emergency. If a department or agency two-way radio is used, procedures for reporting emergencies shall be developed and implemented.

- d. Confined space entrants shall wear a full body harness at all times when in a confined space. The harness shall be equipped with a connecting ring on the back between the shoulders so that a rescue line can be quickly attached in the event of an emergency.

8.0 References

29 CFR 1910.146 (OSHA) Permit Required Confined Space

Attachment One

CITY AND COUNTY OF DENVER

Confined Space Entry Permit

Date Issued: _____ Time of initial entry _____ AM/PM Permit Expires (time) _____ AM/PM

Expiration Date: _____ Location of Work: _____

Description of Work: _____

Note: Form must be completed before entering a confined space.

Section A: Hazards – What hazards exist or could develop? (Check “yes” or “no” for each type of hazard)

	Yes	No		Yes	No		Yes	No
Fire	<input type="checkbox"/>	<input type="checkbox"/>	Pneumatic/Hydraulic	<input type="checkbox"/>	<input type="checkbox"/>	Engulfment	<input type="checkbox"/>	<input type="checkbox"/>
Burns	<input type="checkbox"/>	<input type="checkbox"/>	Falling Objects	<input type="checkbox"/>	<input type="checkbox"/>	Chemical/Corrosive	<input type="checkbox"/>	<input type="checkbox"/>
Electrical	<input type="checkbox"/>	<input type="checkbox"/>	Steam/Thermal	<input type="checkbox"/>	<input type="checkbox"/>	Moving Parts/Mechanical	<input type="checkbox"/>	<input type="checkbox"/>
Heat/Cold	<input type="checkbox"/>	<input type="checkbox"/>	Excavation/Trenching	<input type="checkbox"/>	<input type="checkbox"/>	Noise	<input type="checkbox"/>	<input type="checkbox"/>
Slips/Falls	<input type="checkbox"/>	<input type="checkbox"/>	Flowing Material	<input type="checkbox"/>	<input type="checkbox"/>	Other: _____	<input type="checkbox"/>	<input type="checkbox"/>
			Toxic Gas/Vapor (>PEL)	<input type="checkbox"/>	<input type="checkbox"/>			

Section B: Equipment – What equipment must be on site and available for immediate use?

	Yes	No		Yes	No		Yes	No
Fire Protection	<input type="checkbox"/>	<input type="checkbox"/>	Ladder	<input type="checkbox"/>	<input type="checkbox"/>	Full Body Harness*	<input type="checkbox"/>	<input type="checkbox"/>
Protective Clothing (type) _____	<input type="checkbox"/>	<input type="checkbox"/>	Explosion-proof Lighting	<input type="checkbox"/>	<input type="checkbox"/>	Retrieval Line*	<input type="checkbox"/>	<input type="checkbox"/>
Goggles/Faceshield	<input type="checkbox"/>	<input type="checkbox"/>	Non-sparking Tools	<input type="checkbox"/>	<input type="checkbox"/>	Tripod/Retrieval Unit*	<input type="checkbox"/>	<input type="checkbox"/>
Safety Tape/Barriers	<input type="checkbox"/>	<input type="checkbox"/>	Hearing Protection	<input type="checkbox"/>	<input type="checkbox"/>	Respirator (type) _____	<input type="checkbox"/>	<input type="checkbox"/>
Boots (type) _____	<input type="checkbox"/>	<input type="checkbox"/>	Air Mover/Ventilation	<input type="checkbox"/>	<input type="checkbox"/>	Other _____	<input type="checkbox"/>	<input type="checkbox"/>
Hot Work Permit	<input type="checkbox"/>	<input type="checkbox"/>	Gloves (type) _____	<input type="checkbox"/>	<input type="checkbox"/>			

* Required unless it would increase the Entry risk, or would not aid in a rescue.

Material Isolation	Power and Energy Isolation	Other Hazards																																				
Are all line/pipe/duct connections safe? (Check one) N/A <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> How? (Check all that apply) Line Break <input type="checkbox"/> Blank/Blind <input type="checkbox"/> Double Block & Bleed <input type="checkbox"/>	Is each type at zero energy state? (Check one box for each type) <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;"></td> <td style="width: 33%; text-align: center;">N/A Yes No</td> <td style="width: 33%;"></td> <td style="width: 33%; text-align: center;">N/A Yes No</td> </tr> <tr> <td>Mechanical <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></td> <td></td> <td>Hydraulic <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></td> <td></td> </tr> <tr> <td>Electrical <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></td> <td></td> <td>Gravity <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></td> <td></td> </tr> <tr> <td>Pneumatic <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></td> <td></td> <td>Other <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></td> <td></td> </tr> </table>		N/A Yes No		N/A Yes No	Mechanical <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Hydraulic <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Electrical <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Gravity <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Pneumatic <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Other <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;"></td> <td style="width: 10%; text-align: center;">N/A</td> <td style="width: 10%; text-align: center;">Yes</td> <td style="width: 10%; text-align: center;">No</td> </tr> <tr> <td>Space cleaned/purged/neutralized</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Work area isolated with signs/barriers</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Other Hazards Explain: _____</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Hot work permit completed/approved</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>		N/A	Yes	No	Space cleaned/purged/neutralized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Work area isolated with signs/barriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other Hazards Explain: _____				Hot work permit completed/approved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Note:
Closing a single valve does not eliminate the hazard

Meter calibrated Date: _____ Meter bump tested Meter No.: _____ Time: _____ AM/PM Sampled by: _____

Periodic Atmospheric Testing: Record Continuous Monitoring Results every 2 hours

Atmosphere	Safe Limits	Reading	Reading	Reading	Reading	Reading
Sample time	—	AM/PM	AM/PM	AM/PM	AM/PM	AM/PM
Oxygen Level (O ₂)	>19.5 - 23.5%<	AM/PM	AM/PM	AM/PM	AM/PM	AM/PM
Lower Explosive Limit (LEL)	Below 10% LEL	AM/PM	AM/PM	AM/PM	AM/PM	AM/PM
Carbon Monoxide (CO)	<12.5 ppm	AM/PM	AM/PM	AM/PM	AM/PM	AM/PM
Hydrogen Sulfide (H ₂ S)	<10.0 ppm	AM/PM	AM/PM	AM/PM	AM/PM	AM/PM

Other potential gases (This will depend on the space)

Other	NA	AM/PM	AM/PM	AM/PM	AM/PM	AM/PM
Other	NA	AM/PM	AM/PM	AM/PM	AM/PM	AM/PM

Entrants (Name)	Initial	Time In/Out					
		Time In/Out	Time In/Out	Time In/Out	Time In/Out	Time In/Out	Time In/Out
		/	/	/	/	/	/
		/	/	/	/	/	/
		/	/	/	/	/	/

Attendant(s)

(Name) _____ (Signature) _____

(Name) _____ (Signature) _____

Communications

the Attendant communicate with: _____ *Emergency entry/exit discussed? Yes* *No*

Entrants (Check one) _____ Signature _____ Time _____ AM/PM

Visual Radio Voice

Is it working? Yes No

Rescue (Check One) _____ Rescue person notified

Radio Telephone # 911

Is it working? Yes No

EMERGENCY PHONE NUMBER: _____

Entry is prohibited until all “yes” boxes are checked.

Authorization for Full Permit Entry

Authorization for Entry _____ Authorizing Person: _____

I certify that all required precautions have been taken and the space is safe for entry. (Name) _____

(Signature) _____

(Date) _____ (Time) _____

Completion of Work _____ Authorizing Person: _____

Work in confined space completed, and all personnel have evacuated. (Name) _____

(Signature) _____

This permit is valid for no longer than 1 shift. (Date) _____ (Time) _____

Rescue person notified that work is complete: Name _____ Date _____ Time _____ AM/PM

Did work proceed as planned? Yes No

Any problems encountered? Yes No If yes, describe: _____