



# SOUTH LYON FIRE DEPARTMENT

## Manual of Procedures 409

### CONFINED SPACE RESCUE

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Approved: Chief Mike Kennedy

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#### I. SCOPE

Death and serious injury may occur in permit-required confined spaces (PRCS). The South Lyon Fire Department shall strive to maintain full compliance with MIOSHA Parts 90. (Confined Space Entry) and 490. (Permit-Required Confined Spaces) both adopt the Federal OSHA standard 1910.146 (Permit-Required Confined Spaces). Therefore, each of these standards is identical. This procedure will establish procedures for deployment of safe and effective confined space rescue operations.

Members shall consider all operations within confined spaces to be immediately dangerous to life and health (IDLH). Operations within confined spaces shall be approached with extreme caution. Direct supervision is required and all safety precautions and procedures shall be rigidly enforced. Operations shall be conducted in a manner which avoids premature commitment to unknown risks.

The SLFD shall assume command and control of any incident involving confined space entry for rescue in the City of South Lyon. Thus, a thorough knowledge and understanding of the roles, responsibilities, and challenges of performing confined space rescue is essential.

#### II. INCIDENT ANALYSIS

Confined space rescue is one of the most difficult and dangerous tasks performed by emergency personnel. A confined space is any space that has limited or restricted means for entry or exit; is large enough and so configured that an employee can bodily enter and perform assigned work; and is not designed for continuous employee occupancy. Some examples of confined spaces include trenches, excavations, deep shafts, tunnels, vaults, storm drains, sewers, piping, wells, water towers, storage tanks, silos, tank trucks, rail car tanks, collapsed structures, or any other location where ventilation and access are restricted by the configuration of the space. These factors may also apply to basements or attics.

Confined space incidents may involve injured persons, persons asphyxiated or overcome by toxic substances, cave-ins or fires occurring within the space. Pre-incident planning is an important factor to consider when dealing with these situations.

#### III. OVERALL PROGRAM RESPONSIBILITY

The fire chief or designee is responsible for the overall implementation, review and maintenance of written programs and procedures, employee training and rescue concerning the requirements of the permit-required confined space standard.



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### IV. TRAINING

Training Officer is responsible for ensuring that all affected personnel are properly trained and that refresher training is given.

### V. EQUIPMENT

The fire chief or designee will ensure that all equipment needed for safe entry into any permit space or permit space reclassified to a non-permit space is available and in proper working order.

### VI. RESCUE SERVICES

SLFD will serve as the on-site stand-by rescue service whenever a permit space is entered by the City of South Lyon Department of Public Works. On scene SLFD staff shall ensure a confined space entry permit is completed prior to entry by DPW workers.

SLFD will respond to all dispatched confined space rescue incidents. SLFD will not serve as the on-site stand-by rescue service for organizations besides the City of South Lyon Department of Public Works.

### VII. PERMIT-REQUIRED CONFINED SPACE EVALUATION 1910.146 (C)(1)

The fire chief or designee is responsible for evaluating the workplace to determine if any permit spaces are present.

Per 1910.146 (c)(6), if there are any changes in a confined space classified as a non-permit space, then this space will be reevaluated to determine if it has become a permit-required confined space.

*A confined space* is a space which:

- 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 (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); **and**
- Is not designed for continuous employee occupancy.

If a space does not meet all three criteria, as stated above, then the space is not a confined space and 1910.146 does not apply. Bodily enter means that it is possible for an employee's entire body to enter the space. Continuous employee occupancy means that the space could be occupied during normal operations, not that it is always occupied.

*A permit-required confined space* is a *confined space* which has **one or more** of the following characteristics:

- Contains or has a potential to contain a *hazardous atmosphere*; **or**
- Contains a material that has the potential for engulfing an entrant; **or**



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- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; **or**
- Contains any other recognized serious safety or health hazard, e.g., electrical, mechanical, elevated temperature.

All italicized words are defined in 1910.146 (b) "Definitions."

A space cannot be a *permit space*, unless it is a *confined space*. For example, a tank of a very toxic material has a 12" diameter hatch that an employee could put their head through. This hatch is the largest opening in the tank. Since the opening is too small to bodily enter, this space cannot be a *confined space* and therefore cannot be a *permit space*. Of course, this does not mean that this tank poses no potential or actual serious hazard to employees. It only means that this particular standard does not apply to this space.

### VIII. SIZE-UP AND ASSESSMENT

SLFD shall handle scheduled South Lyon DPW stand-by requests autonomously.

Whenever SLFD is dispatched to a confined space rescue, the Oakland County Technical Rescue Team shall be requested to respond in addition to SLFD.

Prior to operations and following establishment of command, the first arriving unit shall attempt to address the following:

- A. What type of space is it?
- B. Are there any residual hazardous products present? Obtain MSDS.
- C. Locate and secure the responsible job supervisor or reliable witness.
- D. Determine the location and number of victim(s).
- E. Obtain blue prints, maps, or have on site personnel draw a sketch of the site.
- F. Determine the mechanisms of entrapment or injury.
- G. Make a conscious decision as to rescue, or recovery.
- H. Determine number and location of entry/exit points.
- I. Determine electrical, mechanical, or other hazards.
- J. Assign aide or scribe to start documentation records.
- K. Assign Rescue Team personnel responsibilities.
- L. Determine need for additional Advance Life Support (ALS) Ambulance on scene for rescuers, and victims.

### IX. RESCUE TEAM PERSONNEL ASSIGNMENTS

- A. Rescue Team Leader (RTL)
  - i. Responsible for confined space operations
  - ii. Reports to IC
- B. Entry Safety Officer
  - i. Responsible for accountability, air supply, and general safety
  - ii. Reports to RTL



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- C. Assistant Team Leader
  - i. Responsible for atmospheric testing, and ventilation
  - ii. Reports to RTL
- D. Rescue Team Attendant (RTA)
  - i. Responsible for entry and back-up teams, tag line attendant
  - ii. Reports to RTL
- E. Entry Team – Minimum 2 members
  - i. Responsible for operations tasks
  - ii. Reports to RTA
- F. Back-up Team – Minimum 2 members
  - i. Responsible for operations tasks
  - ii. Reports to RTA

### X. PERSONAL PROTECTIVE EQUIPMENT

- A. Protective clothing shall be worn as required by the situation, depending on an evaluation of the hazards and the products which may be inside the confined space. This may include helmet, gloves, proper footwear, goggles, turnouts, Nomex or PBI jumpsuits, and a Class II or Class III harness system.
- B. The Rescue Team Leader should determine the level of personal protective equipment.
- C. All entry and back-up personnel shall wear supplied air breathing apparatus (SABA) or SCBA when making entry into the confined space. SABA is recommended.
- D. If entry personnel use an SCBA, they shall enter no farther than one half the amount of supplied air minus 500 lbs. EXAMPLE: 4500 PSI tank gauge pressure --  $1/2 = 2250$  PSI minus 500 PSI = 1750 PSI usage.
- E. Entry personnel shall use personal air monitoring devices that monitor flammability and O<sub>2</sub> as a minimum.
- F. Entry personnel shall have a Class II or III harness on prior to entry. Class III harness shall be used if inversion of the rescuer is possible.

### XI. PHASE ONE: PRE-ENTRY OPERATIONS

- A. Establish a perimeter with tape or other means to maintain a safe work area.
- B. Ventilate the general area, if necessary.
- C. Ventilation of confined space
  - i. Ventilation efforts should be continuously evaluated by atmospheric monitoring.
  - ii. This information will provide clues as to the efficiency of your ventilation program and will allow you to make adjustments.
- D. Eliminate all potential ignition sources.
- E. Assure lock out tag out and blank out procedures are completed.
  - i. All mechanical devices and equipment capable of causing injury shall be placed in a zero mechanical state.
  - ii. All electrical (excluding lights) shall be locked out in the off position with keyed padlock (key is to remain with IC).



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- iii. In cases where lockout is not possible, equipment shall be tagged and a physical security provided.
- F. Post non-essential personnel at those areas tagged, blanked, or locked.
- G. If you must remove your self contained breathing apparatus (SCBA) to fit in the opening or move in the space – *do not enter!*
  - i. If you can safely enter with SCBA go no further than 25 ft. or direct line of sight.
  - ii. Entry with a standard SCBA should be limited to reconnaissance only, unless the victim is easily accessible.
- H. Have a back-up team in place with a minimum of two personnel.
- I. No one shall enter a confined space alone, always work as a team.
- J. Only approved intrinsically safe devices will be used.
- K. Each entry team shall be equipped with the following:
  - i. One member maintaining communications with attendant.
  - ii. Explosion proof lighting
  - iii. An appropriate atmospheric monitor
  - iv. Proper protective gear, as deemed necessary by IC
  - v. A tag line accompanying the first entry team, anchored at their furthest point of penetration (to the victim)
  - vi. A life line/retrieval line for the first-in entry team
  - vii. A form of rapid extrication harness for the victim
  - viii. In vertical shafts greater than 5 feet, entry team members must enter wearing a personal harness, and attachment to a fall arrest system should be made prior to entry
  - ix. A victim SABA or SCBA should be a consideration, if equipment is available.

## **XII. PHASE TWO: ATMOSPHERIC MONITORING**

Atmospheric monitoring shall occur prior to and during all entries into a confined space. It should be stressed that the lack of positive or alarm level readings does not eliminate the requirement for proper respiratory protection.

- A. Atmospheric monitoring should be done at high and low areas of the confined space.
- B. Atmospheres require testing for:
  - i. Oxygen-deficiency
  - ii. Oxygen-enrichment
  - iii. Toxicity levels
  - iv. Flammability levels
- C. The following levels shall be considered as immediately dangerous to life and health (IDLH):
  - i. Oxygen deficient < 19.5 %
  - ii. Oxygen enriched > 23.5%
  - iii. Flammability at or above 10% of the Lower Explosive Limits (LEL)
  - iv. Toxicity shall be any limit whose numerical value exceeds the Permissible Exposure Limit (PEL)



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1. Entry can continue if proper Respiratory Protection and PPE are used, as determined by the Incident Commander.
- D. Atmospheric monitoring shall occur during occupancy (entry and rescue operations) at intervals dependent on the possibility of changing conditions, but not less than hourly.
- E. Atmospheric readings are to be recorded and evaluated.
- F. During entry operations, it is recommended to take monitor readings every 10 feet vertically and every 15 feet horizontally.
- G. In the event that the readings indicate an unsafe or unacceptable condition, the Incident Commander or Safety Officer should remove all entry teams immediately. Emergency operations may continue once the unsafe condition is corrected.

### XIII. PHASE THREE: ENTRY AND RESCUE OPERATIONS

- A. Once the safest method and location for entry has been determined, teams may begin entry and reconnaissance/rescue/recovery operations.
- B. Entry decisions are best made based on known location of victims, safety of the opening, atmospheric readings, and ease of recovery points.
- C. The RTA records the time of entry of each team member.
- D. Teams will be limited to thirty (30) minutes in any confined space.
- E. Each team will be assigned to rehab upon removal from the confined space, until re-hydrated and vital signs are within normal limits, as determined by the Rehab Officer.
- F. For entry into the confined space:
  - i. Assure adequate interior team communications
  - ii. Assure adequate communication with the RTA
  - iii. Mark, if necessary, movement patterns to assist in egress, e.g., chalk, cylume sticks.
  - iv. Move toward the reported victim(s) last known location as a team
  - v. Be aware of elevation differences and unstable footing
- G. Once victim is located:
  - i. Determine rescue or body recovery (ABC's)
  - ii. Place SABA/SCBA on victim (with positive ABC's)
  - iii. If additional equipment/ staffing is needed, make request through the RTA

### XIV. PHASE FOUR: VICTIM REMOVAL

- A. Place victim on/in proper extrication device.
- B. Protect for cervical spine injuries, if mechanism of injury warrants.
- C. If applicable, attach haul line to extrication device and victim when possible.
- D. Haul systems operated from the outside are preferred.
- E. Electric winches should never be used to remove victims.
- F. *Avoid being blocked in by victim*, keep rescuers between the opening and the victim.
- G. In the event of an airline failure or breathing air problem, both team members shall immediately leave the confined space.
  - i. Immediately notify the RTA of the problem



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- ii. Never leave your partner, unless it's to clear a pathway to exit
- H. Do not disconnect a "non-functional" supplied airline; it may potentially be restored from the outside.

### **XV. PHASE FIVE: TERMINATION**

- A. Assure ALL personnel are accounted for.
- B. Complete equipment inventory.
- C. Secure confined space.
- D. Release to appropriate authority.
- E. Assure that MIOSHA is notified of incident.

Approved by  
/s/ Chief Mike Kennedy