

3.5.3.3 Confined Rescue



YOUR ORGANIZATION
STANDARD OPERATING PROCEDURES/GUIDELINES

TITLE: Confined Rescue

SECTION/TOPIC: Special Rescue Operations

NUMBER: 3.5.3.3

ISSUE DATE:

REVISED DATE:

PREPARED BY:

APPROVED BY:

X

Preparer

X

Approver

These SOPs/SOGs are based on FEMA guidelines FA-197

1.0 POLICY REFERENCE

CFR

NFPA

NIMS

2.0 PURPOSE

This standard operating procedure/guideline addresses response to and operations during confined space rescue situations; may also include information on equipment use and maintenance.

The purpose of this procedure is to establish guidelines for conducting confined space rescue operations. Confined spaces include caverns, tunnels, pipes, tanks, and any other locations 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. Preincident planning is an important factor in dealing with these situations.

3.0 SCOPE

This SOP/SOG pertains to all personnel in this organization.

4.0 DEFINITIONS

These definitions are pertinent to this SOP/SOG.

5.0 PROCEDURES/GUIDELINES & INFORMATION

5.1 Response to and Operations during Confined Space Rescue Situations:

TACTICAL CONSIDERATIONS

Phase I Arrive On-Scene. Take Command. Size-Up.

I. THE PRIMARY ASSESSMENT

- A. Command should attempt to secure an R.P. or witness to the accident to determine exactly what happened.
- B. An immediate assessment of the hazards present to rescuers should be done.
- C Identify any language barriers that may be present between witness(es) and rescuers. If there are language barriers present, Command should call for a bilingual individual to assist with communications with witness(es) and/or victims.
- D. If no witness is present, Command may have to look for clues on the scene that may indicate what has happened.
- E. An assessment of the victim(s) should be done.
- F. Command should determine how many victims have been affected.
- G. Command should determine how long the victims have been down, the mechanism of injury, and the survivability profile of the victim.
- H. **An early decision must be made as to whether the operation will be run in the rescue or recovery mode.** Ask alarm times, from Dispatch to first on-scene companies, plus reaction time.
- I. Establish communications with the victim as soon as possible.
- J. Locate confined space permit and all other information about the space.

II. THE SECONDARY ASSESSMENT

- A. The Confined Space
 - 1. Command should determine what type of confined space this is. This can be done by consulting with the R.P.
 - 2. What type of products are stored in this space.
 - 3. What known hazards are present; mechanical, electrical, etc.
 - 4. Location and number of victims affected.
 - 5. Diagram of confined space, including entry and egress locations.
 - 6. Structural stability of the confined space.
 - 7. Hazardous material size-up.
 - 8. Obtain copy of permit.
- B. On-Scene Personnel and Equipment
 - 1. Command should determine if there is an adequate number of trained personnel on scene to do the rescue/recovery; at least eight (8).
 - 2. Command should consider the effect of temperature extremes on personnel, and consider

early rotation of personnel operating on scene, approximately every 15 to 20 minutes, 30 minutes in the winter.

C. Command should consider if the proper equipment is on-scene to complete the operation. This includes, but is not limited to:

1. Atmospheric monitoring equipment.

*Command shall have at least one hazardous materials response unit with hazmat support unit to provide atmospheric monitoring.

2. Explosion proof lighting.

3. Explosion proof communications.

4. Supplied air breathing apparatus or remote air.

5. Cascade system.

6. Victim removal systems/equipment.

7. Ventilation equipment with a CFM of 4000-5000 with necessary duct work.

Phase II Pre-Entry Operations

I. MAKE THE GENERAL AREA SAFE

- A. Establish a perimeter. The size of the perimeter should be dictated by the atmospheric conditions, wind direction, structural stability, etc.

- B. Stop all unnecessary traffic in the area.

- C. Assure vehicles park downwind from incident if vehicles are running.

- D. Establish ventilation to general area if necessary.

- E. Assign **Lobby Sector** at perimeter entrance.

- F. Assign **Safety Sector**.

- G. Assign **Rehab Sector**.

II. MAKE THE RESCUE AREA SAFE

- A. Command should assign a **Hazard Sector** to determine exactly what hazards and products are within the confined space.

- B. **Hazard Sector shall** do atmospheric testing in the space to determine oxygen level, flammability, and toxicity. Based on readings, **Hazard Sector** should advise Command of the proper level of personal protective equipment. Any instruments used to monitor the confined space shall have:

1. An audio-alarm.

2. Be calibrated to 10% of the LEL of the calibrant gas.

3. Have the audio-alarm set at:

- O₂ 19.5%, low ad O₂ enriched 23.5%

- flammability 10% alarm set

- toxicity carbon monoxide 35 ppm

- hydrogen sulfide 10 ppm

4. Any O₂ readings below 12%, Command should recognize that the LEL reading will not be accurate.

Hazard Sector shall give Command atmosphere readings at least every 5 minutes with an announcement of offensive or defensive mode (i.e., rescue or recovery).

The **Hazard** and **Ventilation Sectors** are extremely important parts of a confined space operation. They should be staffed by personnel with thorough knowledge of atmospheric monitoring and ventilation technique.

- C. Utilities, including electrical, gas and water should be secured and locked out. If it is not possible to lock/tagout/blankout, **Safety Sector shall** post a guard to assure the utilities are not turned on during the operation.
- D. Any product that is in or flowing in the confined space must be secured and blanked off if possible. It may be determined that the space must be drained of any product prior to entry.
- E. Any manufacturing or processing equipment must be shut down prior to entry. If possible, all equipment should be locked/tagged out and brought to a zero energy state.
- F. The structural stability of the confined space should be evaluated. If there is a potential for collapse, appropriate measures must be taken to assure the structural stability of the space.

III. VENTILATION

- A. Command should assign a **Ventilation Sector** to establish the proper ventilation of the confined space.
- B. **Ventilation Sector** should consult with **Safety Sector** and **Hazard Sector** to determine the proper type of ventilation for the space.
- C. **Ventilation Sector** must consider the effects on the atmosphere that positive or negative pressure ventilation will have (i.e., increase or decrease flammability of atmosphere). It could require both positive and negative ventilation (pushing and pulling). This will be based on the vapor density or molecular weight of the product.
- D. **Ventilation Sector** may consider negative pressure ventilation if there is only one entry point. Atmospheric monitoring will be required to ensure a non-explosive environment is present in the exhausted vapor area.
- E. **Ventilation Sector** must also consider the effects the exhaust is having on the operation.

Phase III Entry Operations. Victim Removal.

I. SELECTION OF PERSONNEL

- A. The proper personnel shall be selected to make entry into the confined space. A minimum of two persons should be assigned to make entry. All personnel on the entry team shall have vital signs taken and recorded prior to entry, if time permits.
- B. Command shall assign a Rescue Sector. Rescue Sector shall provide a minimum 2:1 ratio of personnel outside the confined space to support personnel inside. This shall include a standby rescue team with a 1:1 ratio to provide immediate assistance to personnel in the confined space.
- C. All entry and back-up personnel should be properly trained in confined space rescue procedures and capable of carrying out the rescue/recovery.

- D. **Extrication Sector** should be assigned to conduct the actual entry into the confined space.
- E. **Extrication Sector** should consider the size of entry and back-up personnel to make entry.

II. SELECTION OF PERSONAL PROTECTIVE EQUIPMENT

- A. The proper level of personal protective equipment should be worn by all entry and backup personnel. This shall include helmet, gloves, proper footwear, goggles, turnouts, Nomex or PBI jumpsuits, and a Class II harness as a minimum, Class III is recommended.
- B. **Extrication Sector** should determine this by consultation with **Safety** and **Hazard Sectors**.
- C. All entry and back-up personnel **shall** wear SABA or SCBA when making entry into the confined space. SABA (supplied air breathing apparatus) 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: 2000 PSI tank gauge pressure-- $1/2 = 1000$ PSI minus 500 PSI = 500 PSI usage.
- E. Entry personnel shall use personal air monitoring devices that monitor flammability and O₂ 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.

III. COMMUNICATION AND LIGHTING

- A. If the confined space has a flammable atmosphere, entry personnel should have intrinsically safe or explosion proof communication equipment. If this equipment is not available, **Extrication Sector** may decide to use a tag line for communication or a message relay person. Remember, these are Class I/Division I A-D type atmospheres until proven otherwise.
- B. If the entry team is entering a dark confined space, **Extrication Sector** must ensure that the proper type of lighting is used. If explosion proof lighting is not available, then cyalume type lights must be used by the entry team.

IV. ORIENTATION OF CONFINED SPACE

- A. Prior to entry into the confined space, the **Extrication Sector**, with the help of the R.P., should obtain a blue print or diagram of the space. All entry and backup personnel should be made aware of the layout of the space to be entered.
- B. All entry and back-up personnel, Command and Safety shall be made aware of the action plan and the back-up plan prior to entry.
- C. Rescuer tag lines may or may not be appropriate in the confined space, depending on the specific layout. It could be an entanglement hazard.

V. VICTIM REMOVAL EQUIPMENT

- A. If possible, the entry team should bring a supply of breathable air for the victim.
- B. Pure oxygen shall not be used in a confined space that has a potentially flammable atmosphere. Rescuer should not remove their breathing apparatus and give it to the victim.
- C. Entry team should consider the necessary victim retrieval equipment prior to entry. This includes respiratory protection for the victim.

VI. ASSESSING CONDITION OF VICTIM

- A. Upon reaching the victim, entry personnel should do an immediate primary survey of the victim. If appropriate, treatment should be started immediately.
- B. A quick but thorough secondary assessment of the victim should be done. If time permits, entry personnel should attempt to treat serious injuries prior to removal.
- C. If indicated, complete C-spine precautions should be administered. NOTE: Because of the difficulty removing the victim from the space, optimum C-spine precautions may not be possible.
- D. If the victim is conscious, he/she should be encouraged to wear the appropriate breathing apparatus.

VII. PATIENT PACKAGING

- A. After treatment of immediate life threatening injuries, the victim(s) should be packaged up for removal from the space. This may include using a backboard, stokes basket, kyd board, LSP half back, or some other similar device designed for extrication.
- B. Prior to removal from the space, the entry team should secure any loose webbing, buckles, straps, or any other device that may hinder the extrication process.

VIII. VICTIM REMOVAL SYSTEM

- A. Prior to removal of victim, the entry team should have determined the appropriate method of extrication. This may include a vertical or horizontal haul system constructed of ropes, pulleys, and other hardware, with a minimum of a 2:1 mechanical advantage.
- B. As a general rule, entry personnel should never allow the victim between the rescuer and the point of egress.
- C. At times, the situation may preclude the use of that procedure due to the fact that one rescuer may have to pull the victim while the other rescuer pushes the victim. NOTE: IF the victim is a 901-H, **Extrication Sector** may want to leave the body and related equipment in place for investigative purposes.

IX. TRANSFER TO TREATMENT SECTOR

- A. Immediately after reaching the point of egress, entry personnel shall transfer the victim to treatment personnel.
- B. ALS level examination should be conducted on the victim
- C. If the victim is contaminated from product inside the space, a **Decontamination Sector** and corridor **shall** be set up and used prior to transport of victim.

Phase IV. Termination

I. PREPARATION FOR TERMINATION

- A. Personnel accountability.
- B. Remove tools and equipment used for rescue/recovery. If there has been a fatality, **Extrication Sector** may consider leaving tools and equipment in place for investigative purposes.
- C. If entry personnel and/or equipment have been contaminated during the

rescue/recovery, proper decontamination procedures shall be followed prior to putting the equipment back in service.

- D. Secure the scene. Prior to turning the property back over to the R.P., one final reading of atmospheres shall be taken and recorded. Command may consider activating the CID if the situation dictates it.
- E. Consider debriefing.
- F. Return to service.

Sectors

I. ESTABLISH COMMAND EARLY

- A. Assign **Safety Sector**.
- B. Assign **Lobby Sector**.
- C. Assign **Ventilation Sector**.
- D. Assign **Extrication Sector**.
- E. Assign **Rescue Sector**.
- F. Assign **Hazard Sector** when T.R.T. or H.M.R.T. units arrive.
- G. Assign **Treatment Sector**.
- H. Assign **Staging Sector**.
- I. Assign **Resource Sector**.

II. CONSIDER AMBIENT CONDITIONS

- A. Heat. Consider rotation of crews.
- B. Cold. Consider effects of hypothermia on victim and rescuers.
- C. Rain. Consider the effects of rain on the hazard profile.
- D. Time of Day. Is there sufficient lighting for operations extending into the night.
- E. Consider the effect on family and friends; keep family informed.
- F. Consider news media; assign a P.I.O.
- G. Command should call for an OSHA representative if there has been a serious injury or death

5.2 Use of Equipment during Confined Space Rescue Situations:

5.3 Maintenance of Equipment used during Confined Space Rescue Situations: