



Jackson Hole Fire/EMS

Operations Manual

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Title: **Confined Space
Rescue Procedure**
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PURPOSE

The purpose of this procedure is to establish guidelines for the response of fire department personnel and equipment to confined space rescue incidents. Because confined space rescue operations present a significant danger to fire department personnel, the safe and effective management of these operations require special considerations. This procedure identifies some of the critical issues which must be included in managing these incidents.

SCOPE

This procedure establishes a standard structure and guideline for all fire department personnel operating at incidents involving confined space rescues. The procedure outlines responsibilities for first-responders, Command Officers, and other fire department personnel responding to such incidents. All other Jackson Hole Fire/EMS procedures shall apply to confined space rescue operations where applicable.

TACTICAL CONSIDERATIONS

OSHA Regulations Standard 29 CFR 1910.146 Permit-Required Confined Spaces regulates entry into confined spaces for general industry and the rescue service and shall be considered the basis for confined space rescue operations. For the purpose of emergency response, a confined space is defined as:

- A space large enough for personnel to physically enter and perform assigned work.
- A space not designed for continuous employee occupancy.
- An area with limited entry and egress.

Confined spaces include sewers, wastewater aerators, tunnels, pipes, tanks, mine shafts, utility vaults, and any other location where ventilation and access are restricted by the configuration of the space. These factors may also apply to basements and attics. Confined space incidents may involve injured persons or persons asphyxiated or overcome by toxic substances. Pre-incident planning is an important factor in preparing to handle these types of incidents.

Due to the inherent dangers associated with these operations, a Risk Assessment Process shall be addressed continuously throughout the incident. A phased approach to confined space rescue operations which include; Arrival, Pre-entry operations, Entry operations, and Termination, can be utilized to safely and effectively mitigate these high-risk / low-frequency events.

Additional technical information is available in the issued *Technical Rescue Field*

Phase I Arrival.

I. ESTABLISH COMMAND

- A. First arriving company officer shall assume *Command* and begin an immediate size- up of the situation while isolating the immediate hazard area and denying entry to all non-rescue personnel.
- B. First arriving Confined Space Rescue Technician (CSRT) should be assigned *Rescue Group*. Rescue Group responsibilities include:
 - Assuming technical rescue operations control.
 - Identifying hazards and critical factors.
 - Developing a rescue plan and back-up plan.
 - Communicating with and directing resources assigned to Rescue Group.
 - Informing Command of conditions, actions, and needs during all phases of the rescue operation.
- C. Designate a *Safety Officer*. Considerations for Safety Officer include:
 - A Chief Officer trained to Confined Space Rescue Operations level.
 - A CSRT trained member with the skills and ability to perform as Safety Officer.

A Safety Officer shall be established prior to the implementation of any rescue plan proposed by Rescue Group.

II. Size-Up

- A. If possible, secure a witness.
- B. Assess the immediate and potential hazards to the rescuers.
- C. Isolate immediate hazard area, secure the scene, and deny entry for all non-rescue personnel.
- D. Establish communications with victim(s) and determine if non-entry retrieval can be made.
- E. Assess on-scene capabilities and determine the need for additional resources.

III. SECONDARY ASSESSMENT

- A. Secure the entry permit and any other information about the confined space including diagrams showing entry and egress locations.
- B. Determine what products may be stored in the confined space and conduct a HazMat assessment.

- C. Determine known hazards present in the confined space; atmospheric, mechanical, electrical, etc.
- D. Assess the structural stability of the confined space.

Phase II Pre-entry Operations

It must be determined if this will be a RESCUE operation or a RECOVERY operation based on the survivability profile of the victim(s) which include factors such as the location and condition of the victim(s), and elapsed time since the accident occurred.

Pre-entry operations shall be conducted under the direction of Rescue Group by individuals trained to the CSRT and Confined Space Rescue Operations.

I. INITIATE FIRE DEPARTMENT CONFINED SPACE RESCUE PERMIT

- A. A confined space permit is required if the space has one or more of the following hazards:

Atmospheric hazards

Configuration hazard

Engulfment Hazard

Any other recognized hazard

II. MAKE THE GENERAL AREA SAFE

- A. Establish a perimeter determined by factors such as atmospheric conditions, wind direction, structural stability, etc.
- B. Stop all unnecessary traffic and park all running vehicles downwind.
- C. Provide for ventilation to general area if necessary.

III. MAKE THE RESCUE AREA SAFE

A. Hazard Assessment / Atmospheric Monitoring

- Determine exactly what hazards and products are present and conduct atmospheric testing for oxygen level, flammability, and toxicity within the confined space. The hazards identified and the results of atmospheric testing will determine the proper level of PPE to be worn by rescuers. OSHA acceptable entry conditions:
 - Oxygen: 19.5-22.5%
 - LEL: <10% of LEL
 - Toxicity <IDLH
- Atmospheric monitoring shall be done continuously and readings shall be communicated to Rescue Group at least every 5 minutes. Readings must be obtained by personnel with a thorough knowledge of atmospheric monitoring.
- Implement Lock-Out / Tag-Out procedure if applicable.
- Take appropriate measures to ensure the structural stability of the confined space.
- Any product that is in or flowing into the confined space must be secured and blanked off if possible.

B. Ventilation

- Rescue Group should assign personnel to establish the proper type of mechanical ventilation of the confined space considering the effects that positive and/or negative pressure ventilation will have on the atmosphere.
- Consider positive and negative ventilation together in a push-pull configuration to obtain the greatest effect from ventilation. Consider negative pressure ventilation if there is only one entry point.
- Ventilation personnel shall work closely with air monitoring personnel to ensure safe atmospheric conditions in the confined space as well as the exhaust area and the general working area.

C. Equipment

- Personal Protective Equipment (PPE) shall include helmet, leather gloves, steel toe boots, ANSI approved eyewear, turnouts/1951 certified coveralls/duty uniform (approved by Safety Officer), and a class III harness at a minimum. Additional PPE may be indicated by the hazard and atmospheric assessment.
- Based upon atmospheric monitoring and potential atmospheric hazards, Supplied Air Breathing Apparatus (SABA) or Self-Contained Breathing Apparatus (SCBA) shall be utilized by all entry and back-up personnel. SABA is the breathing apparatus of choice however, if SCBA must be used, personnel shall maintain line of sight and exit the confined space prior to low air alarm activation, following the 33% rule.
- Air monitoring device that monitors oxygen levels, flammability, and toxicity for the entry team.
- Intrinsically safe communication equipment shall be available for entry personnel. If this equipment is not available, entry personnel may use Rope Tugs for communication or a message relay person. Primary and secondary communications will be established prior to entry.
- Intrinsically safe lighting equipment shall be available for entry personnel. If this equipment is not available, entry personnel may use cyalume type lighting sticks.
- A retrieval system with a back-up system shall be readied and in place. 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.

Phase III **Entry Operations**

Entry operations shall be conducted under the direction of Rescue Group by individuals trained to the CSRT and Confined Space Rescue Operations.

I. MAKE A SAFE ENTRY

Rescue Group shall be responsible for entry operations. The rescue plan will be discussed by Rescue Group, Safety, Command and a Technical Specialist if available. Rescue Group shall ensure that all personnel operating in the confined space and the area immediately surrounding the confined space are accounted for and wearing appropriate PPE.

- A. Conduct a system safety check prior to entry into the confined space.
- B. Prior to entry, Rescue Group shall ensure that an attendant, entry team and a back-up team are in place and have been briefed on:
 - Anticipated hazards within the confined space.
 - The space being entered including the configuration (if known).
 - The rescue plan.
 - The back-up plan.
 - Emergency procedures.
 - Time limits for the rescue operation.
 - Primary and Secondary Communications.
- C. Rescuer Belay/tag-lines will be utilized for each entrant with the understanding that tag-lines may create an entanglement hazard.
- D. Maintain constant communication with the entry team.
- E. Entry personnel shall continually monitor atmospheric conditions inside the confined space regarding oxygen level, flammability, and toxicity.
- F. Locate victim(s).

II. VICTIM REMOVAL

- A. Upon reaching victim, conduct a primary survey looking for immediate life-threatening injuries and initiate C-spine precautions if necessary. If conditions permit, entry personnel should attempt to treat serious injuries prior to removal, while considering that it may be more appropriate to remove the victim(s) from danger prior to treatment.

NOTE: due to the configuration of the confined space, optimum C-spine precautions may not be possible and should be addressed as soon as possible.

- B. When possible, provide respiratory protection for the victim(s). Rescuers *shall not* administer pure oxygen to a victim(s) in a confined space that has a potentially flammable atmosphere and rescuers *shall not* remove their breathing apparatus and give it to the victim(s).
- D. Properly package the patient for removal from the confined space. This may include using a Yates Spec Pac, backboard, stokes basket, SKED, KED, or similar device designed for extrication. Secure any loose webbing buckles, straps, or device that may hinder the extrication process.
- E. Rescuers should not allow the victim between the rescuer and the point of egress except in situations where it is necessary for one rescuer to pull the victim while another rescuer pushes the victim.

III. TREATMENT

- A. Immediately upon egress, the victim(s) shall be transferred to treatment personnel for ALS level examination.
- B. If the victim has been contaminated from product inside the confined space, a thorough decontamination of the victim should be conducted prior to transporting to the hospital.
- C. Provide ALS level treatment and transportation to a hospital as indicated.

Phase IV Termination

- A. Ensure personnel accountability.
- B. Remove all tools and equipment used in the rescue/recovery and return to proper apparatus. In cases of a fatality, consider leaving everything in place until the investigative process has been completed.
- C. If entry personnel and/or equipment have been contaminated, proper decontamination procedures shall be followed prior to returning to service.
- D. Conduct a Tailboard Debriefing and consider a formal After Action Review (may be more appropriate at a later date).
- E. Return to service after turning the scene over to the responsible party and ensuring the scene is secure.

ADDITIONAL CONSIDERATIONS

I. COMMAND STRUCTURE

- A. The first arriving unit shall assume *Command* of the incident. This unit shall remain in Command until Command is transferred to improve the quality of the Command organization. Unified Command should be considered with a multi-agency response.
- B. Considerations for the *Technical Specialist* include:
 - Fire Department and/or non-Fire Department personnel can be deemed a Technical Specialist.
 - Have specialized skills and/or knowledge that would benefit safety and efficiency of rescuers.
- C. Rescue crews, Ventilation, Air monitoring, Shoring, Cut teams, and any other such functional team operating in the hazard zone shall be under the direction of Rescue Group. Rescue Group will communicate directly with crews assigned to these functions within Rescue Group and shall keep Command informed during all phases of the rescue operation.

II. OTHER CONSIDERATIONS

- A. Consider the effects of inclement weather on the hazard profile, the victim(s), and the rescuers.
- B. Maintain awareness of the time of day and ensure sufficient lighting is available on the scene if operations extend into the night.

C. Confined Space rescue incidents attract the news media; consider assigning a P.I.O.

D. Request OSHA response if there has been a serious injury or death.

CONFINED SPACE RESCUE STAND-BY

Entities making permit-required confined space entries will be responsible for contacting non-emergency Dispatch at 307-733-2331. Dispatch will notify the Fire Department Duty Officer of the permit-required confined space entry. If the entity making the permit-required confined space entry determines the need for a Confined Space Rescue Stand-by, they must contact the Fire Department at 307-733-4732 at least 48-hours in advance (exceptions for non-planned emergency work may be given). The Fire Chief and/or Battalion Chief overseeing Special Operations can approve stand-by rescues for confined space entry. Fees associated with rescue standby will be listed with Special Events Rates, as applicable.





CONFINED SPACE RESCUE ENTRY PERMIT



Confined Space Location/Description/Incident Number	Incident Date

Purpose of Entry:	Circle RESCUE RECOVERY
Describe Activities:	
Rescue Start Time:	Rescue End Time:

ICS Assignments

Rescue Group Supervisor: _____ **Attendant:** _____
Authorized Entrant #1: _____ **Backup Entrant #1:** _____
Authorized Entrant #2: _____ **Backup Entrant #2:** _____
Safety Officer: _____ **Air Monitoring:** _____
Air Supply: _____ **Riggers:** _____
Other Rescue and Emergency Services Involved –

Hazards of Confined Space	Yes	No	Special Requirements	Yes	No
Oxygen deficiency			Hot Work Permit Required		
Combustible gas/vapor			Lockout/Tagout		
Combustible dust			Lines broken, capped, or blanked		
Carbon Monoxide			Purge-flush and vent		
Hydrogen Sulfide			Secure Area-Post and Flag		
Toxic gas/vapor			Ventilation		
Toxic fumes			Other- List:		
Skin- chemical hazards			Special Equipment		
Electrical hazard			Breathing apparatus- respirator		
Mechanical hazard			Escape harness required		
Engulfment hazard			Tripod emergency escape unit		
Entrapment hazard			Lifelines		
Thermal hazard			Lighting (explosive proof/low voltage)		
Slip or fall hazard			PPE- goggles, gloves, clothing, etc.		
			Fire Extinguisher		

Pre-Entry Checklist

- € Operations Perimeter Setup
- € Atmospheric Monitoring
- € Ventilation
- € Eliminate Ignition Sources
- € Confirm Lockout/Tagout
- € Provide Lighting
- € Respiratory Protection
- € Protective Clothing
- € Communications
- € Pre-Entry Briefing

Communication Plan

- € Visual/Hand Signals
- € Voice
- € Radio (Intrinsically Safe)
- € Rope Signals (OATH)
- € Hardwire
- *Identify Backup Commo Plan

Ventilation Plan

- € Natural
- € Forced Exhaust
- € Forced Supply
- € Microatmosphere
- € Other:

The following information will be reviewed **PRIOR TO ENTRY**:

- € The hazards that may be encountered specific to this entry. (Atmospheric, Engulfment, Mechanical, Physical, Corrosive, Biological)
- € The primary and backup communications plan
- € A confirmation that entrant has all equipment needed to perform a successful entry and is trained on all of the equipment. (PPE, Respiratory Equipment, Communication, Rigging, Patient Packaging)
- € A review of any potential self-rescue plans if possible.

DO NOT ENTER IF PERMISSIBLE ENTRY LEVELS ARE EXCEEDED			
	Permissible Entry Level	Start Time	End Time
% of Oxygen	19.5 % to 23.5 %		
% of LEL	Less than 10%		
Carbon Monoxide	35 PPM		
Hydrogen Sulfide	10 PPM		
Other			

Test Instrument(s) used- Include Name, Model, Serial Number and Date Last Calibrated:

ENTRANT	ENTRY TIME	SCBA PRESSURE	SAR PRESSURE	EXIT TIME

CFM-Ventilation	Size-Cubic Feet	Pre Entry Time	<input type="checkbox"/> AHJ Dispatch Notified Before Entrance	Time Notified:
			<input type="checkbox"/> AHJ Dispatch Notified After Entrance	Time Notified:

CONFINED SPACE ENTRY AUTHORIZATION	
IC/Safety Officer-Print:	
Signature:	
Rescue Group Supervisor-Print:	
Signature:	
Date:	Time:

Notes:

CONFINED SPACE ENTRY CANCELLED	
IC/Safety Officer-Print:	
Signature:	
Date:	Time:
Reason Permit was Cancelled:	

Equipment Needs: