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SCOPE

Incidents, which require fire department personnel to enter, confined spaces to fight fires or to rescue and remove persons in need of assistance present very serious potential dangers. In order to operate safely in these situations, special precautions must be taken and rigidly enforced.

PURPOSE

A confined space is any area or vessel, which meets **all three** of the following:

- Is large enough and so configured that an employee can enter and perform work; and
- Has limited means of entry or exit.
- Is NOT designed for continuous occupancy. Confined spaces include storm drains, 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. Pre-incident planning is an important factor in dealing with these situations.

Permit required confined spaces are defined as confined spaces which have **one or more of the following:**

A. Contains or has a potential to contain a hazardous atmosphere;
B. Contains a material with potential for engulfment (i.e., water, grain, etc.);
C. Is so structured than an entrant could become trapped or asphyxiated; or
D. Contains any other recognized serious safety or health hazard, such as moving parts, radiation or noise.

Examples of permitted spaces may include, but are not limited to, pipelines and structures, boilers, storage tanks and sewers.

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.

DEFINITIONS

A. ATMOSPHERIC HAZARDS

1. Oxygen Content
    a. Oxygen Deficiency - Atmospheres containing less than 19.5 percent oxygen by volume.

b. Oxygen Enriched - Atmospheres containing more than 23.5 percent oxygen by volume.

2. Flammable Atmosphere - Atmospheres which contain a flammable gas, vapor or mist in excess of 10% of its lower flammable or explosive limit.
3. Toxic Atmosphere - Atmospheres with contaminants which may cause serious illness or death. These contaminants may be generated by material(s) in the space, or generated by work performed in the space (examples are cutting, welding, spray painting, cleaning, etc.)

B. ATTENDANT

An employee who is stationed and remains outside the permit required confined space at all times and has received the appropriate training as outlined in this program. The attendant does not enter the permit required confined space to attempt rescue or for any other reason, unless replaced by another attendant and has received the appropriate rescue training.

C. ENTRANT

An employee who enters permit required confined spaces and has received the appropriate training.

D. ENTRY

Entry into a permit required confined space is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

E. ENTRY PERMIT

A written document used for entry into permit required confined spaces. It outlines the conditions under which the permitted space may be entered.

TACTICAL CONSIDERATIONS

PHASE I SIZE-UP

I. THE PRIMARY ASSESSMENT

A. Command should attempt to secure an RP or witness to the accident to determine exactly what happened.
B. Locate confined space permit and all other information about the space.
C. Identify immediate hazards and make an assessment of the hazards present to the rescuers.
D. Determine the number, location and conditions of the victim(s).
E. Decide if the operation will be rescue or recovery.
F. Seek additional appropriate resources.

II. THE SECONDARY ASSESSMENT

A. The Confined Space Considerations
   1) Determine the type of confined space.
   2) Determine type of products stored in space.
   3) Determine what hazards are present; mechanical, electrical, etc.
   4) Obtain/draw a diagram of confined space, including entry and egress locations.
   5) Assess the structural stability of the confined space.
   6) Complete a hazardous material size-up.

B. On-Scene Personnel
   1.Determine if there is an adequate number of trained personnel, on scene, to do the rescue/recovery.
   2. Consider the effect of temperature extremes on personnel, and consider early rotation of personnel operating on scene.

C. Equipment
   Determine if the proper equipment is on scene to complete the operation. This may include:
   1. Hazardous Materials Team (Hazard Sector) support in providing atmospheric monitoring;
   2. Technical Rescue Team support (Extrication Sector) in providing:
      a. Supplied air breathing apparatus or remote air;
      b. Victim removal systems/equipment; and
      c. Ventilation equipment with a CFM of 2500 with necessary duct work.
   3. Explosion proof lighting.

PHASE 2 PRE-ENTRY OPERATIONS

I. MAKE THE GENERAL AREA SAFE

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

B. Evacuate, if necessary.

C. Stop all unnecessary traffic in the area.

D. Assure emergency vehicles park downwind from incident if vehicles are running.

II. MAKE RESCUE AREA SAFE

A. Lobby Sector/Attendant

A lobby sector/attendant shall be established at the entrance/exit to control access to the confined space.

Lobby sector responsibilities include:

1. Maintain safety by controlling the number of personnel entering the confined space;
2. Maintain safety by preventing crowding at the entrance to the confined space;
3. Collect passports of all personnel entering confined space;
4. Note entry times and SCBA cylinder pressures of all personnel entering the confined space;

5. Maintain a time awareness of the expected exit time for each individual based on air supply at the time of entry and provide a warning at the predetermined time to begin exit procedures;
6. Provide a communication and warning system by radio or other audible system; and
7. Provide progress reports to Command.

B. Hazard Sector

All confined spaces that Salt River Fire Department personnel will enter **MUST** be tested to determine atmospheric conditions. Responsibilities of the hazard sector include:

1. Monitor the oxygen concentration;
2. Monitor for flammable or explosive gas or vapor concentrations;
3. Monitor for the presence of hydrogen sulfide;
4. Monitor for airborne combustible dust (This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less);
5. Ensure readings are taken prior to anyone entering and continuously while entrants/rescuers are in the space;
6. Coordinate readings with ventilation sector; and
7. Provide progress reports to Command.

C. Ventilation Sector

When feasible, Command should establish a ventilation sector to begin operations directed at providing fresh air and/or exhausting contaminated air from the confined space. Ventilation Sector responsibilities include:

1. Determine the most effective method to ventilate space;
2. Ensure all electrical and mechanical equipment are of an explosion-proof type, when any flammable hazard is suspected;
3. Consider where flammable vapor concentrations will be moved while pressurizing the confined space;
4. Coordinate ventilation with Hazard Sector; and
5. Provide progress reports to Command.

D. Lockout/Tagout

Lockout/tagout procedures for controlling hazardous energy will be utilized before allowing entry into the confined space. Energy sources may be in the form of water, steam, electrical, mechanical, hydraulic, pneumatic, etc., and **must be** eliminated prior to entry. 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.

E. 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.

PHASE 3 ENTRY OPERATIONS VICTIM REMOVAL

I. EXTRICATION SECTOR RESPONSIBILITIES

A. Ensure that properly trained personnel shall be designated to make entry into the confined space. A minimum of two persons should be assigned and all personnel on the entry team should have vital signs taken and recorded prior to entry, if time permits.

B. Assure that for every person making entry into the confined space, there is at least one rescuer appropriately dressed and ready as a back up. EXAMPLE: Two rescuers; two back-ups.
C. Ensure all entry and back-up personnel are properly trained in confined space rescue procedures and capable of carrying out the rescue/recovery.
D. Consider the size of the opening and assign the correct size of entry and back-up personnel to make the entry, as well as conduct/coordinate the actual entry into the confined space.
E. Coordinate with Hazard and Ventilation Sector.
F. Assure permit is completed prior to entry.
G. Provide progress reports to command.

II. SELECTION OF PERSONAL PROTECTIVE EQUIPMENT

A. The proper level of personal protective equipment should be worn by all entry and back-up personnel. This includes helmet, gloves, turnouts or jumpsuits, and a harness system.
B. All entry and back-up personnel shall wear an SCBA when making entry into the confined space. Personnel must ensure that they have more than ample respirable air to return out of the confined space.

III. ORIENTATION OF CONFINED SPACE

A. Prior to entry into the confined space, the Extrication Sector, with the help of the RP, should obtain a blue print or diagram of the space. All entry and back-up personnel should be made aware of the layout of the space to be entered.
B. The attendant, 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.

IV. 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.
C. Entry team should consider the necessary victim retrieval equipment prior to entry. This includes respiratory protection for the victim.

V. ASSESSING CONDITION OF VICTIM

A. Upon reaching the victim, entry personnel must have decided if the atmosphere is Immediately Dangerous to the Life and Health (I.D.L.H.) of the victim. If this is the case, immediate victim removal is indicated. If the atmosphere is safe they 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.
D. If the victim is conscious, he/she should be encouraged to wear the appropriate breathing apparatus.

VI. 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, KEDS board, 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.

VII. 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 901H, Extrication Sector may want to leave the body and related equipment in place for investigative purpose.

VIII. TRANSFER TO TREATMENT SECTOR

A. If the victim is contaminated from product inside the space, a Decontamination Sector and corridor shall be set up and used prior to treatment of victim. (See Section 208.02 - Hazardous Materials Action plans.)

B. Immediately after decontamination, or reaching the point of egress, entry personnel shall transfer the victim to treatment personnel.
C. ALS level treatment will be conducted on the victim.

PHASE IV DECOMMITMENT

I. PREPARATION FOR DECOMMITMENT
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 RP, one final reading of atmospheres is recommended and should be recorded. Command may consider activating the CISD if the situation dictates it.
E. Consider debriefing.
F. Return to service.

ADDITIONAL CONSIDERATIONS

I. ESTABLISH COMMAND EARLY
Sectorize critical functions. Common sectors for this type of rescue include:

- Safety Sector
- Lobby Sector
- Ventilation Sector
- Extrication Sector
- Hazard Sector when H.M.T. units arrive
- Treatment Sector
- Staging Sector
- Resource Sector

The fire department safety officer will be assigned to all confined space incidents to consult with Command on the safety measures and precautions to be taken in each case. Command will assign safety sector responsibilities to a company officer, chief officer, or a staff officer during the initial stages of the incident until the safety officer arrives on the scene.

The safety sector officer shall evaluate the risks and enforce all safety requirements associated with the particular situation. If the safety sector officer judges that an operation is unsafe, the operation shall be suspended and Command notified immediately.

A transportation sector may be required if multiple patients are encountered.

A rescue sector may be established to provide backup rescue personnel and coordinate the Rapid Intervention Crews (RIC).

A Resource sector may be required to provide equipment and supplies, and a reserve pool of personnel.

A staging sector may be established to stage equipment, and apparatus, particularly ambulances.

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: Consider lighting for operations extending into the night.
E. Consider the effect on family and friends; keep family informed.
F. Consider the news media; assign a P.I.O.
G. Command should call for an OSHA representative if there has been a serious injury or death.