

Beware: Confined Space

by Firefighter William Lake

Buzz words in the fire service include *confined space*. What is a confined space and how do FDNY members handle these operations? Let's begin with the meaning of confined space as defined by the Occupational Safety and Health Administration (OSHA). OSHA regulation 1910.146 defines a confined space as follows: *large enough and so configured that an employee can bodily enter and perform assigned work, 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.*

Also, members must ascertain if this is a permit-required confined space. A permit-required confined space (permit space) has one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has potential for engulfing an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.

- Contains any other recognized serious safety or health hazard.

What does all this mean and how does it affect FDNY members?

Nationally, 60 percent of all confined space fatalities are would-be rescuers! This is an alarming statistic that should get our attention. When considering the definition of confined space, realize that they are located throughout the City, in virtually every Company's response area. When assigned to a confined space incident, FDNY members must take a more calculated approach to the task at hand, as should be done with a haz-mat incident.

As stated in the FDNY Training Bulletin, Confined Space, *In many ways, the confined space incident is more dangerous than a building fire. These differences must be understood and the limitations of this Bulletin must be complied with if Firefighters are to operate safely in a confined space operation.* This is very important information and cannot be overemphasized. There are far too many hazards that the first-arriving units will not be able to detect.

As the first-to-arrive unit, priority should be information-gathering, *not* entry into the space. Size-up must include:

- How many victims are in the space?
- What is the condition of the victim? Was he overcome or the victim of some kind of trauma?
- How long have the victims been in the space?
- What are the contents of the space? Try to obtain the Material Safety Data Sheet--MSDS.

Members will need to determine any existing and potential atmospheric hazards (e.g., flammable or explosive atmospheres, live electrical supplies, hazardous materials, etc.), alternate means of entry and if this is a permit-required space. If the latter is true, what are the hazards? While this is not a complete listing of size-up requirements, it is sufficient to illustrate that this kind of rescue/recovery requires specialized training and equipment. For the safety of all members, entry into a confined space should be thought out before any entry is attempted.

The first-to-arrive unit will be hindered by the lack of specialized equipment and training. Thus, members should act accordingly. The safety of FDNY members--as always--is paramount. Some of these spaces can be very deceiving in their inherent dangers. For example, consider a metal tank that holds plain water. If this tank is not well-maintained and shows signs of rust, beware. Rusting is oxidation and members could be confronted with an oxygen-deficient atmosphere (defined as 19.5 percent or less).

Another example deals with sludge at the bottom of the space. Even if members had no reading initially with a meter, by walking through the sludge, they will stir it up and release harmful vapors. A final example focuses on a space that contains any kind of petroleum product. In the past, a resuscitator was brought into the space with petroleum residue. This creates an explosion hazard and *never* should be done.

These operations are dangerous and both equipment- and labor-intensive. The Rescue and Squad Companies are trained and outfitted with the specialized equipment to mitigate these incidents. The FDNY response policy for a confined space rescue follows:

- Three Engine Companies
- Two Ladder Companies (One Ladder Company to be a Rescue Support Ladder Company)
- One Battalion Chief
- One Squad (assigned Squad for the Box transmitted)
- Two Rescue Companies



photos by Battalion Chief John Norman

Rescue and Squad Companies are equipped with special low-profile, surface airline-supplied masks and other specialized equipment for dealing with confined space rescues.



Many invisible hazards may be present at a seemingly innocuous response for a “man down” inside a confined space, such as this manhole. Size-up needs to be conducted before entry: What atmospheric hazards are present? What is in the compressed gas tank? What is the liquid spill and why is it diked? Why is the fan not blowing into the hole? Are the two holes connected? Determine what the hazards are and develop a plan for dealing with them before permitting anyone to enter.

- One each--Tactical Support Unit, Safety Battalion, Special Operations Battalion, Field Comm Unit, Haz-Mat Unit, Bureau of EMS ALS (Advanced Life Support) Unit

Because they may be entering a potentially explosive atmosphere, it is imperative that members entering the space are equipped with intrinsically safe equipment. All FDNY radios are intrinsically safe. Additionally, if members suspect an explosive or flammable condition, flashlights must be intrinsically safe also.

In order to determine the atmosphere, FDNY SOC Companies have a variety of meters to test for various hazards. The CO meters currently carried by Ladder Companies are inadequate for this kind of operation. The SOC Companies carry explosimeters, oxygen indicators and multi-gas detectors. These meters help to define the hazards *before* entry is made. They will reveal if the space is oxygen-deficient or -enriched and if it is flammable, explosive or potentially explosive. They also will indicate the presence of various hazardous vapors (e.g., hydrogen sulfide and sulfur dioxide). This kind of monitoring will be ongoing until the operation is complete.

Members must weigh *risk vs. benefit*. If entry into a space is to be attempted, a preferred air system to be used is surface-supplied, with a self-contained escape bottle. Each of the Rescue and Squad Companies is equipped with the Scott Extension System that allows members to penetrate a space up to 300 feet with an *unlimited* air supply. Any time a member enters a confined space, he *must* have a line attached to him and there must be a means of

hauling the rescuer out if he is unable to do so himself.

All Rescues and Squads are equipped with specialized rope systems. This is a system of ropes, pulleys and numerous other accessories designed for safe and effective entry and retrieval. This system could provide mechanical advantages, direction-changing capabilities and a redundant set-up used as an additional safety if operational conditions warrant it.

As you can see, there are many factors to consider when it comes to mitigating confined space jobs and much specialized equipment is required to attempt this kind of operation. The time will come when your computer printout will indicate *non-structural man in hole or tank*. When it does, *beware confined space!*

Editor’s Note: Future issues of WNYF will feature detailed articles on some of the new and specialized equipment and accessories used by the Special Operations Command.



About the Author...

Firefighter William Lake was a 20-year veteran of the FDNY until his untimely death at the World Trade Center on September 11, 2001. He was assigned to Rescue 2.

