RAY DOWNEY'S

THE RESCUE COMPANY

CONFINED SPACE: RESCUER OR VICTIM? PART 2

IN APRIL'S "Rescue Company" we discussed hazards that rescuers encounter when dealing with confined space operations. These hazards —an atmosphere that may be deficient in oxygen, or contain flammable gases, or may be poisonous, for example— must be overcome before entry and egress is possible. Communications, visibility, physical obstructions, and electrical and mechanical hazards are other problems that your operating plan must take into consideration.

Some unusual methods or modifications may be required for successful operations in confined spaces. Your department's resources will dictate what equipment can best be utilized in these incidents. The fire service has drawn on modern technology for equipment that will help overcome many of the hazards and obstacles often encountered during these operations.

In those operations where positive-pressure SCBA is required, and entry or egress is being attempted via a ladder through a narrow space or opening, necessitating the removal of the harness and cylinder from the rescuer's back, a coordinated team effort is a must. The rescuer in descent must cautiously work his way down the ladder as his partner at the opening positions the SCBA mask. The chances of accidently pulling the mask off the descending rescuer is greatest during this phase of the operation. The rescuer crawling through a narrow opening may have to take the cylinder and harness off his back and push it in front of him as he progresses. Extreme care must be used.

Many of these areas are slippery and wet, adding to the hazards. A lifeline (safety line, tag line) should always be attached to the rescuer. It serves as his means back to point of entry and the means by which fellow rescuers can locate him should he fall victim to the hazards of the confined space. The line can also be used for rope signals between rescuers.

As should always be the case in all types of operations, the scene of the confined-space incident is no place to test a procedure; frequent drills that simulate conditions in confined spaces should be part of the unit's drill schedule, and all procedures, including mask operations, should be practiced.

"In-line system," "extension-hose system," and "line mask" are terms for the same type of equipment that can be effectively used in confined-space rescue. These are usually designed to work either as an in-line system only or a combination system that includes a backup cylinder. Some backup systems provide cylinders that are reduced in size for use in narrow spaces, but they provide only limited amounts of air, a factor that the rescuer must consider in the event of primary system failure. Air for in-line systems can be supplied from breathing apparatus, compressors, or cylinders of various sizes.

In preparing for worst-case scenario, the rescue unit should have an air system for remote areas that air hoses from apparatus or compressors cannot reach. An in-line system employing a regulator attached to a 30-, 45-, or 60-minute bottle can be an effective alternative. These systems will allow rescuers to get as close as possible to the incident scene without having to transport the larger, heavier cylinders. The system is not limited when used in conjunction with a second similar system. The systems using quick-connect couplings allow for rapid changeover of air without any noticeable interruption in air supply.

When compressors are used for air supply, possible interruption of air supply, mechanical or electrical failure, power supply, and refueling must be considered in the operational plan. Backup systems, too, are an important safety measure. Recently , a worker lost his life when his in-line system supplied from an electrically powered air compressor lost its power source. Lacking both the means for communications and a backup air supply system, the worker succumbed before rescuers

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could locate him. A number of manufacturers of SCBA equipment have designed systems that allow a wearer to transfer air from his own cylinder to that of another member. This capability could save the life of a trapped victim, wearing an SCBA, who could not be immediately freed. Of course, modifications to your SCBA, in-line, or air-extension systems should only be done by the manufacturers and be NIOSH-approved.

Communications are a vital part of confined-space rescue operations. One of the safest and most effective methods of communication to use with in-line air supply systems is the sound-powered phone. Operating on sound power only, a possible ignition source (from nonexplosion-proof radios, for example) is eliminated. The sound-powered line can be wrapped around the extension hoses of the in-line system and taped or secured by fastener ties to prevent the lines from snagging on objects. Headsets that employ a throat mike for transmitting easily fit under a helmet and are free from the mask facepiece. The nature of confined-space operations places greater emphasis on the need for a workable and safe communications system.

Victim removal from confined spaces often challenges the ingenuity for which rescue firefighters are well-known. Removing victims via basket stretcher may prove ineffective. A number of alternative stretchers, designed specifically for use in confined space, are available. These have lifting points for vertical lifts that prove very effective for narrow openings.

Years ago, a firefighter developed a "Rescue Pak" that was specially designed for rescue operations. The Pak is made of heavy canvas and divided into three sections. A victim is placed on the center panel and the two side panels are folded over the victim and secured with holding straps. Head and feet flaps are adjustable, and the Pak can accommodate victims of any size. Specially designed webbing is interwoven into the Pak and provides openings for a six-inch hook or wooded poles that can convert the Pak into a stretcher and make for easier handling. A steel ring is sewn in the top of the center panel for lifting in a vertical position. One of the main advantages is that the canvas pak can easily be maneuvered through narrow openings because it lacks the rigidity typical of stretchers and baskets.

Usually, a pulley system or block-and-tackle combination must be used to lift stretchers, baskets, or special rescue packs from manholes, vaults, narrow openings, etc. Pre-rigged systems are used by many rescue units. The pulley system or block-and-tackle must be secured to a stable object above the opening. Specially designed tripods are

available for this type of work, or the lashing of two ladders can serve as an A-frame that holds the hauling system.

One manufacturer has designed a rescue and utility system that has a folding tripod, harnesses, safety belts,

boson chairs, chairlift rescue device, and overalls with a built-in harness for various types of rescue lifts. The hauling system uses core-sheathed or chemical-resistant ropes that raise or lower rescuers and/or victims, eliminating the need for block-and-tackle systems.

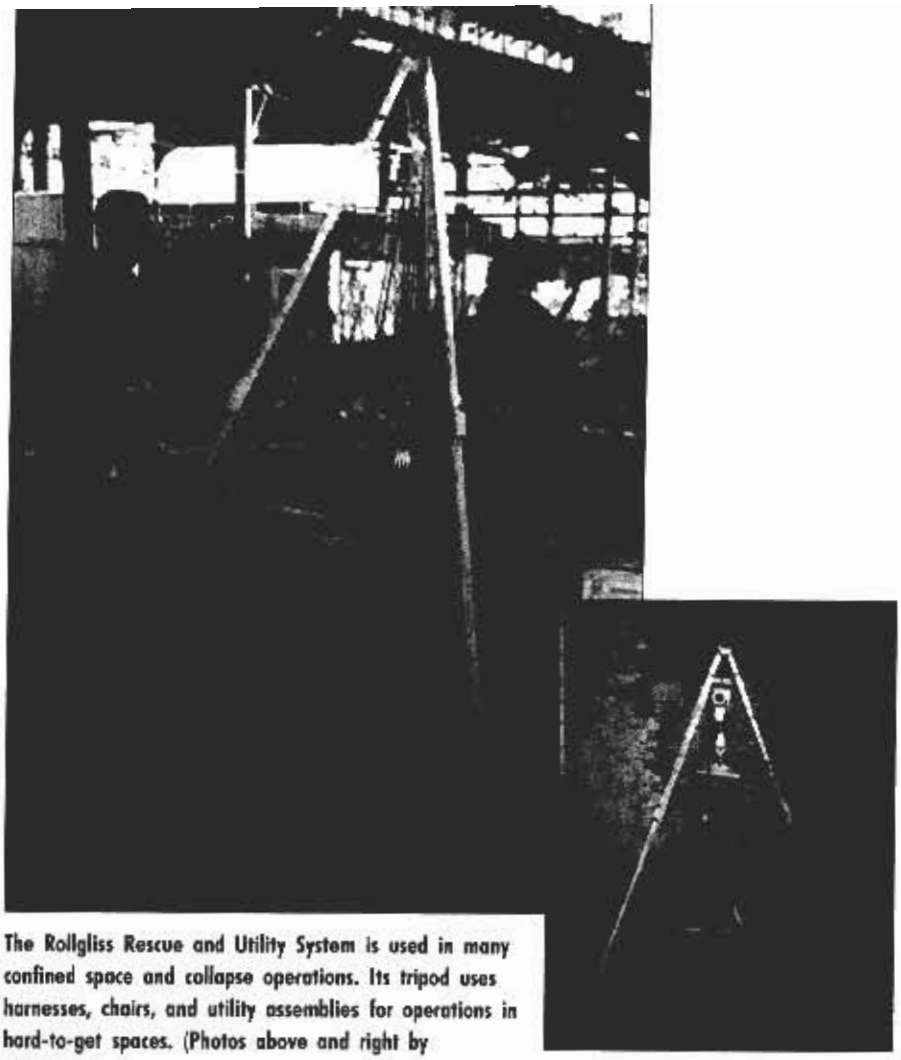
An apparatus can also be used to provide an attachment point for a hauling system. The versatility of a tower ladder bucket (cherry picker, snorkels, aerialscopes, elevating platforms) can be effectively deployed when conditions allow for their placement at the incident scene. Aerial ladders can also be used effectively. In either case, following the manufacturer's recommended safety guidelines for use of apparatus in these incidents is mandatory.

Some heavy-rescue apparatus have the capability for providing an A-frame setup as part of the rig. Portable poles that attach to the body of the apparatus provide the necessary attachment point for hauling systems. Winches can also provide the hauling line for these systems.

Whether you're relying on high-tech equipment or makeshift equipment born of firefighter ingenuity, following proper operating procedures and adhering to your checklist of safety items will help prevent the rescuer from becoming the victim.

Here's a mental checklist for confined-space incidents:

1. Oxygen-deficient atmosphere
2. Flammable or explosive
3. Poisonous or toxic
4. Egress and entry limitations
5. Electrical hazards
6. Mechanical hazards
7. Communications
8. Visibility
9. Ventilation
10. Explosion-proof equipment
11. Eliminate ignition source
12. Proper protective gear
13. Safety lines
14. Positive-pressure SCBA
15. In-line system
16. Back-up system
17. Test meters
18. Removal equipment
19. Stretchers, baskets, rescue pak
20. Medical help
21. Contingency plan ■



The Rollgliss Rescue and Utility System is used in many confined space and collapse operations. Its tripod uses harnesses, chairs, and utility assemblies for operations in hard-to-get spaces. (Photos above and right by Ray Downey.)

Your own apparatus can serve as a crane when equipped with proper fittings to support an A-frame assembly from which any type of pulley system can be adopted. (Photo by John Skelson.)