Working Safely in Confined Spaces

4/30/2013 By Roy Maurer

Working in confined spaces presents many challenges. In addition to restricted movement, confined spaces could contain a hazardous atmosphere, material that could engulf a worker, a configuration that could trap or asphyxiate a worker, or other safety and health hazards such as unguarded machinery, exposed live wires or dangerous temperatures.

Even though confined-space work has been regulated since 1993, an average of 92 workers are killed each year in this type of environment. Sixty percent of those fatalities are untrained rescuers who succumb to the same hazard as the initial victim.

A confined space is defined by the Occupational Safety and Health Administration (OSHA) as having limited openings for entry or exit, large enough for entering and working but not designed for continuous worker occupancy. Confined spaces include underground vaults, tanks, storage bins, manholes, pits, silos and pipelines.

Confined-space hazards are addressed in specific standards for the general industry and shipyard employment. The general industry standard has not yet been extended to construction; however, general industry rules cover some work on construction sites. The agency intends to issue a confined space in construction rule in July 2013, according to the semiannual regulatory agenda published Jan. 8.

Hazards Found in Confined Spaces

There are two types of confined spaces: nonpermit and permit-required, said Stuart Becker, senior manager at MSA, a safety-products manufacturer that specializes in confined-space

work. The spaces that OSHA requires a permit to enter and work in are the ones that potentially contain hazards, Becker explained during a webinar sponsored by Occupational Health & Safety magazine and MSA.

Confined-space hazards vary and include atmospheric, physical, corrosive or biological dangers.

Atmospheric hazards are some of the most dangerous and can be attributed to:

- Oxygen deficiency. “This occurs when oxygen levels in confined spaces dip below 19.5 percent of the total atmosphere,” said Becker. Normal ambient air contains an oxygen concentration of 20.8 percent by volume. Workers also have to be aware of an oxygen-enriched atmosphere containing more than 23.5 percent oxygen by volume, which has the potential for combustion, Becker cautioned.

- An atmospheric concentration of any toxic contaminant above OSHA’s permissible exposure limits.

- Airborne combustible dust.

Although airborne dust may be easily spotted with the naked eye, oxygen deficiency or enrichment conditions, as well as hazardous vapor and gas concentrations, must be detected with reliable instrumentation, said Becker.

Other hazards in confined-space work include moving machinery; uneven or wet surfaces; engulfment within areas where loose materials such as grains, crushed stone or sawdust are stored; corrosive acids; molds; and dangerous animals and insects.

Entering Confined Spaces

Supervisors must complete an entry permit before anyone may go into a permit-required confined space, said Becker. A permit, signed by the entry supervisor, must be posted at all entrances or otherwise be made available to entrants before they enter a permit space. The permit must verify that pre-entry preparations outlined in the standard have been completed. Specifically, the permit must clearly identify the location of the confined space; the purpose of entry; the date of entry; the authorized duration of occupancy, the lists of authorized entrants, attendants, equipment and hazards; the results of initial and periodic tests; and a list of rescue and emergency services.

After confined-space work is completed, permits are canceled but must be retained for at least one year.

A formal safety procedure should also be documented to cover critical safety concerns such

as first aid and decontamination. To help ensure that entrants understand the responsibilities and hazards found within confined spaces, they should attend pre-entry sessions before going into such spaces.

Employee Requirements and Responsibilities

All personnel involved in confined-space entry, including supervisors, entrants and attendants, should be well-trained and know their roles and responsibilities.

Confined-space training should include such precautions as lockout/tagout protocols, testing of breathable air quality, forced ventilation, observation of workers in the space, and a predetermined rescue plan with an appropriate safety harness and other rescue equipment.

Entry supervisors are required to:

- Know the space hazards.
- Verify emergency plans and specified entry conditions, such as permits, tests, procedures and equipment, before allowing entry.
- Prevent further entry and cancel permits when entry operations are completed or if a new condition exists.
- Verify that rescue services are available.
- Ensure that entry operations remain consistent with the entry permit and that acceptable entry conditions are maintained.

Authorized entrants are required to:

- Know the space hazards.
- Use appropriate personal protective equipment.
- Maintain communication with attendants.

Attendants are located outside of confined-space work areas and must remain on duty at all times during entry operations. They are required to:

- Perform nonentry rescues when specified by the employer’s rescue procedure.
- Know existing and potential hazards, including modes of exposure and exposure signs or symptoms, consequences and physiological effects.

- Maintain communication with, and keep an accurate account of, confined-space entrants.

- Order evacuation of the space when a prohibited condition exists, a worker shows signs of hazard exposure or there is an emergency outside the confined space.

- Coordinate rescue and other services in an emergency.

- Ensure that unauthorized people stay away from confined spaces.

Attendants may monitor more than one space at a time, said Becker.

“The same rules apply,” he explained. “You have to be able to communicate with all entrants and, more importantly, be able to communicate with emergency personnel if a situation arises in one of the spaces.”

Confined-Space Rescues

Attendants may perform nonentry rescues using retrieval systems specified by the company’s rescue procedure, but under no circumstances should attendants ever enter confined spaces unless another attendant has arrived at the scene, Becker said.

“More than 60 percent of all confined-space fatalities occur because attendants or unauthorized persons rush into hazardous environments without protective equipment,” he observed.

Outfitting attendants with proper personal protective equipment and instruments necessary for rescue is an option.

“Annual-rescue training is required, as well as actual simulated rescue using dummies,” said Becker. Classroom training is not sufficient, he added.

Help may come from in-house rescue, local emergency services or contracted emergency-response teams.

The OSHA standard provides guidance on evaluating rescue teams or services, which includes an initial evaluation, in which employers decide whether a potential rescue service or team is adequately trained and equipped to perform the type of confined-space rescues the facility needs and whether such rescuers can respond in a timely manner, and a performance evaluation, in which employers measure the performance of the team or service during an actual or practice rescue.

“Rescue services need to be on the planning end, before confined-space work begins,” said Becker. “More importantly, after the rescue, employers need to know where the injured worker is going to be treated and how far away the critical-care facility is.”