

## Confined Space— In the Shotcrete World

By Mike Munyon and Frank E. Townsend III

In life, learning from practical experiences often requires learning from our misunderstandings and mistakes. In many cases, this can be an effective way of developing greater levels of competence and understanding in the workplace. Unfortunately, when mistakes or misunderstandings are made in a confined space, the cost of this education is often measured in the number of lives lost due to tragedy.

The deadly nature of confined spaces leaves little to no room for error, and even less opportunity to “learn as you go” or accept the “this is how we have always done it” thought process. Understanding the requirements, hazards, and common mistakes will go a long way toward establishing a confined space safety program based on industry

best practices, as well as the requirements of the Occupational Safety and Health Administration (OSHA) rules.

We must make every effort to ensure the safety of our employees through training and monitoring of our jobsites in the shotcrete industry. It is no different regardless of project or industry; the employer must provide training to each employee whose work is regulated by this standard. It should come at no cost to the employee, and ensure that the employee possesses the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this standard.

What questions must we ask? Understanding if any employee is claustrophobic prior to training is important and if so, do not place the worker in this position. Understand your ventilation plan and backup plan. Are respirators required? What kind? What is the lighting plan? Are there backup lights? A communication plan is essential: hard line and backup radios? Do the radios work in that environment, and have they been tested in that environment previously? What are the ways in and out of that section of work and other adjacent ways? In case of an accident, what is the response plan? Has the fire department toured the job? Who is the attendant? Who is the supervisor in charge of the operation? Know who will be in the space. Everyone on the team should know all this information prior to entering the project site. Training is then reinforced by checking to ensure that it has sunk in and is being followed.

Some important rules the training must include are:

- The hazards in the permit space;
- The methods used to isolate, control, or in other ways protect employees from these hazards; and
- The dangers of attempting such rescues for employees not authorized to perform entry rescues.



*Working in confined spaces merits its own considerations and safety precautions*

## OSHA's Confined Space Standard 29CFR1910.146

This OSHA document, published in 1999, establishes requirements for confined and permit-required spaces in general industry. It specifically discusses general and program requirements for permit-required confined spaces, as well as training requirements and the duties of entrants, attendants, and the entry supervisor. Underground construction activities must also comply with the requirements of tunnel and shaft construction. Many tunnels are classified as “confined spaces” and others are “permit-required confined spaces.” Before entry into a tunnel, employees must be informed of the requirements of the confined space program, and address the specific hazards associated with distance, communication, physical demands, and emergency rescue.

The determination of whether a space is a permit-required confined space is contingent upon two factors. The first factor is solely based on physical characteristics of the space itself. A confined space must be large enough and so configured that an employee can physically enter and perform assigned work, have limited or restricted means for entry or exit, and not be designed for continuous employee occupancy. If the space is so configured, then the second factor is whether the space contains or the activities introduce any hazard capable of causing death or serious physical harm. A space would be classified as a “permit-required confined space” if it either contained or has a potential to contain a hazardous atmosphere—a material which has the potential to engulf an entrant, an internal configuration such that an entrant could be trapped or asphyxiated, or contain any other recognized serious safety or health hazard.

## OSHA Issues Final Rule for Confined Spaces—Change

OSHA issued the final rule, designated 29CFR1926, to specifically increase protections for construction workers in confined spaces. The final rule was released on May 1, 2015, and took effect on August 3, 2015. The change does a good job of assigning roles and responsibilities on jobsites with a general contractor and multiple subcontractors. Compliance assistance material and additional information is available on OSHA's Confined Spaces in Construction web page: [www.osha.gov/confinedspaces/index.html](http://www.osha.gov/confinedspaces/index.html). Employers must be in compliance with the

training requirements of either the new or previous standard. Employers who fail to train their employees with either of these two standards consistently will be cited. **Failure to recognize the triggering conditions or implement required safeguards can result in stiff civil or even criminal penalties, including fines up to \$70,000 for each violation.**

Factors that indicate employers are making good-faith efforts to comply include:

- Training for employees as required by the new standard;
- Ordering the equipment necessary to comply with the new standard; and
- Taking alternative measures to educate and protect employees from confined space hazards.

OSHA estimates the new confined spaces rule could protect nearly 800 construction workers a year from serious injuries and reduce life-threatening hazards. A few key notes from the new standard follow.

**There are five key differences from the original rule and several areas where OSHA has clarified existing requirements. The five new requirements include:**

1. More detailed provisions requiring coordinated activities when there are multiple employers at the worksite. This will ensure hazards are not introduced into a confined space by workers performing tasks outside the space. An example would be a generator running near the entrance of a confined space, causing a buildup of carbon monoxide within the space;
2. Requiring a competent person to evaluate the worksite and identify confined spaces, including permit-required spaces;
3. Requiring continuous atmospheric monitoring whenever possible;
4. Requiring continuous monitoring of engulfment hazards. For example, when workers are performing work in a storm sewer, a storm upstream from the workers could cause flash flooding. An electronic sensor or observer posted upstream from the worksite could alert workers in the space at the first sign of the hazard, giving the workers time to evacuate the space safely; and
5. Allowing for the suspension of a permit, instead of cancellation, in the event of changes from the entry conditions list on the permit or an unexpected event requiring evacuation of the space. The space must be returned to the entry conditions listed on the permit before re-entry.

**In addition, OSHA has added provisions to the new rule that clarify existing requirements in the general industry standard. These include:**

1. Requiring that employers who direct workers to enter a space without using a complete permit system prevent workers' exposure to physical hazards through elimination of the hazard or isolation methods, such as lockout/tag-out; and
2. Requiring that employers who are relying on local emergency services for emergency services arrange for responders to give the employer advance notice if they will be unable to respond for a period of time (because they are responding to another emergency, attending department-wide training, and so on).

## Exclusion Criteria

Enclosed spaces that are not confined spaces for the purposes of the application of the new standard must satisfy specific exclusion criteria.

To determine that a space is not a confined space, it must be identified as a space described in Column A and must meet all the criteria in Column B (refer to Table 1).

The Exclusion Criteria table does a nice job of defining what constitutes permit-requiring confined spaces. It highlights the risks involved in working in confined spaces that should not be ignored.



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**Table 1: Confined Spaces Exclusion Criteria**

Column A	Column B
Spaces that may be excluded from Part 9, provided that <b>all</b> the criteria in Column B are met	Exclusion criteria
Swimming pools	<ol style="list-style-type: none"> <li>1. The design, construction, location, and intended use of these spaces will ensure these spaces are characterized by clean respirable air at all times.</li> <li>2. The space must have an interior volume of not less than 64 ft<sup>3</sup> (1.8 m<sup>3</sup>) per occupant.</li> <li>3. The space must have openings to the atmosphere that are known to provide natural ventilation.</li> <li>4. There must be no potential for a high or moderate hazard atmosphere, as defined in Section 9.1 of the <i>Regulation</i>, to exist or develop immediately prior to any worker entering the space or during any work within the space.</li> <li>5. There must not be a need to mechanically ventilate, clean, purge, or inert the space prior to entry for any reason.</li> <li>6. There must be no potential for a hazardous substance to migrate through any media (for example, air, soil, conveyance, piping, or structure) to infiltrate the space.</li> <li>7. The space must be free of residual material (for example, waste, sludge, debris) that, if disturbed, could generate air contaminants that could immediately and acutely affect a worker's health.</li> <li>8. There must not be any risk of entrapment or engulfment to workers entering the space.</li> <li>9. The space must not contain, have introduced, or be adjacent to tools, equipment, or involve processes that could generate air contaminants that could immediately and acutely affect a worker's health.</li> </ol>
Crawl spaces under school portables or other non-industrial buildings	
Excavations	
Attic space	
Open, unconnected wet wells, or dry wells for storm or sewer hookups at new construction sites	
Elevator shafts	