Washington State Department of Labor & Industries

Underwater Confined Spaces Pose Serious Hazards for SCUBA Diver

November 1998

In March 1997, a tragic fatality incident occurred involving inadequately trained SCUBA divers entering an inverted, underground irrigation siphon used to convey water under roadways and other terrain. The underground siphon is a permit-required confined space. Four divers were killed; two of them were rescue divers. Additionally, two backup rescue divers nearly perished. These diving fatalities emphasize the need to ensure that dive personnel entering a confined space are commercial divers, specifically trained for confined space diving. Moreover, employers must ensure a comprehensive dive plan is in place as well as appropriate supervision for these types of extremely dangerous diving scenarios.

What is an underwater confined space?

Any underwater confined space is any underwater situation in which there is an "overhead environment" obstructing direct vertical access to the open water surface. Underwater confined spaces also may exhibit the characteristics of other confined spaces such as limited number or size of openings for entry and exit.

The following examples are typical underwater confined space diving situations:

- Sewer line installation, repair and maintenance
- Irrigation siphon repair, maintenance, and debris removal
- Underwater dredging and construction activities which involve an overhead environment with limited direct access to the water's surface
- Ice diving
- Recovery and rescue operations (which can be necessary in the above situations)

Washington Administrative Code (WAC) further defines confined space through its Permit-required Confined Space Entry Standard (WAC 296-62-145). This standard protects workers from the hazards associated with confined space entry operations.

Some hazards associated with underwater confined space diving:

Because underwater confined spaces contain many unique dive hazards, confined space diving (also known as "cave diving" or "penetration diving") requires highly specialized training. A primary hazard is the existence of a "ceiling" which restricts direct access to the surface, requiring the diver to be completely dependent upon properly functioning equipment. Should an emergency occur, the diver cannot make a free ascent to the surface. Many divers, unaware of the consequence of having a ceiling, fail to plan for such an emergency.

Other hazards associated with the confined space "ceiling" include the fact that normal openwater rules for air reserves are inadequate. It often takes more air to exit a confined space than it takes to enter. Additionally, any kind of labor intensive diving requires much more air. It is also imperative that divers be aware of elevation changes in confined space dives. Deeper dives result in increased air volume requirements due to increases in pressure. Yet another frequently unrecognized confined space diving hazard is disorientation. Divers in confined spaces can easily lose sight of landmarks and thereby lose direction. This can cause confusion and ultimately lead to panic.

These are only a few of the many hazards associated with confined space dives. Before entering a confined space, divers must always acquire the necessary training and certification. In addition, employers who contract divers to perform work of this nature must be aware that this is considered a special category of commercial diving, requiring substantial experience and skill. Employers must also comply with the rules regulating commercial diving and confined space (Washington Administrative Codes (WAC) 296-37 and 296-62-145, respectively).

Some safety recommendations:

- Ensure that the dive is absolutely necessary and that all alternatives have been considered
- Prepare a dive plan
- Accurately calculate air supply with special attention to elevation changes, i.e. pressure changes during the dive which can increase air requirements
- Tether and tend all divers in the water
- Utilize open circuit SCUBA only after all other alternatives (such as surface supplied air) have been exhausted
- Utilize communication and retrieval systems that can be operated from the surface

- Implement a permit-required confined space entry program with formal training and practice

Need more information?

More information about confined space diving is available from:

- Professional Association of Diving Instructors (PADI): (800) SAYPADI
- National Association of Underwater Instructors (NAUI): (813) 628-6284
- Association of Diving Contractors (ADC) (281) 893-8388
- Scuba Schools International (SSI): (800) 892-2702
- National Association of Cave Divers (NACD): (352) 495-3348