

Analysis of a Diving Accident: Death of a Diver

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Nothing is more tragic than the death or serious injury of a diver, especially when the accident could have been easily prevented. In most diving accident cases where I have consulted, there are usually multiple mistakes made by both the diver and the dive team.

In the following case, we'll see where the death of a diver was caused by a combination of ignorance, arrogance, and a failure by the diver to recognize unsafe conditions. Like all articles of this type, the facts of the case have been changed to protect the identities of those involved in the incident.

Replacing Pilings on a Wooden Pier on the West Coast

A diver was employed by an inshore commercial diving firm to work on a job where pilings were being replaced on a long wooden pier at a popular west coast port town. The job was proceeding smoothly and the work in 30 feet of water was nearly finished.

On the day of the accident, the weather was unusually cold, even for the Pacific Northwest, with a blast of cold air from Canada dropping daytime temperatures into the low 30s. The diver had several years of diving experience, and the diving supervisor was a former diver from the Gulf of Mexico. The tender had a background in recreational scuba diving, but had never received formal training in commercial diving, or served as a military diver.

The diving company was using a small low-pressure compressor connected to a volume tank. However, instead of using a diver's air control manifold, they were using a stand-alone diver's air filtration manifold. The filtration manifold had been modified to include a ball-valve to allow the connection of a scuba cylinder as a back-up air supply. When the filtration manifold was altered, the ball valves used to connect the diver's umbilical supply were extended outside of the manifold frame, potentially exposing them to damage or accidental closure.

The diver was wearing a dry suit with an attached diving helmet, a weight harness, and no bail-out bottle.



It is the tenders responsibility to continuously tend the diver.

Although OSHA does not require a bail-out bottle for dives at depths less than 100 FSW, the ADCI Consensus Standards wisely mandate the use of a diver-carried reserve for all dives, regardless of depth.

Due to the cold weather, the diving supervisor was sitting in the cab of the company's pick-up truck in an effort to stay warm and escape from the biting wind. From his position in the truck, he could not see the gauge on the volume tank. Meanwhile, the tender had tied the diver's umbilical off to the railing at the edge of the pier, while he was engaged in gathering up the equipment to shut the job down for the weekend. Neither the supervisor nor the tender were wearing any diving gear, and were unprepared to go to the aid of the diver in the event of an emergency.

When it came time for the diver to surface, the

supervisor exited the truck cab and walked over to the edge of the pier to come up on the diver's hose. Dragging a coil of the hose over to the diver's ladder, he began to coil the hose up in a figure-eight on the deck. For the entire two minutes it took to bring the diver to the surface, the supervisor had no communications with the diver.

Without a wireless headset, and with the communications box back on the front seat of the truck, the supervisor could not hear the diver. As the diver broke the surface, it was immediately obvious he was in distress, waving his arms and thrashing about. By the time the supervisor pulled the diver to the ladder, the diver had passed out. Although the distance from the pier to the water was only about eight feet, the supervisor and the tender were unable to pull the diver up to the pier. Since neither the supervisor nor the tender were wearing any dive gear, they were unprepared to enter the water to assist the diver. There was also no hoisting mechanism for lifting an unconscious or disabled diver, which is required by OSHA regulations.

Another contractor was working at the base of the pier using a forklift to unload materials from a flatbed truck. After running back to the base of the pier, the supervisor was able to secure the assistance of the forklift driver and his equipment.

Once the forklift reached the end of the pier, the supervisor wrapped the diver's hose around the forks and instructed the heavy equipment operator to raise the forks in an effort to lift the diver onto the pier. Unfortunately, the diver became entangled in the ladder which further delayed the rescue until the tender could climb down the ladder and disengage him from the rung where one of his tools had snagged.

By the time the diver was lifted onto the pier and his helmet was removed, he was no longer breathing and had no pulse. Although the company had an oxygen resuscitation system on hand, they were unable to revive the diver. Despite a short trip to the hospital by ambulance, the young man was pronounced dead by the emergency room doctor.

The Lawsuit

The widow of the diver immediately filed a wrongful death lawsuit against the diving company and the owner of the pier on behalf of herself and her three children. She easily won a settlement of over \$10,000,000.00 before the case ever went to trial. The diving company filed for bankruptcy and is no longer in business.

Analysis of the Case

It appears that the primary cause of the accident was the modification of the diver's air filtration manifold, which was employed in a manner in which it was never intended to be used. By modifying the manifold, the diving company became responsible for the changes they made to the equipment. In addition, during his deposition the diving supervisor admitted that he believed that when he started bringing up the dive's hose he accidentally dragged the umbilical across the exposed valve, which cut off the diver's air supply.

With the communications box in the cab of the truck, at least twenty feet away from where the diving supervisor was coiling the hose, the supervisor could not have heard the diver if he ever had called for assistance. Either the supervisor or the tender should have been positioned at the edge of the pier, tending the diver's hose and listening to the com box at all times.

As with most diving accidents, there were any number of factors which had they been different, would have prevented this accident from taking place. Undoubtedly, the single most cost effective preventative measure that could have been taken would have been to have the diver wear a bail-out bottle. This one simple step would have allowed the diver to return to the surface and climb the ladder, even if the topside air supply was cut off.

While there is no way to know for certain, since the diving company could not produce the helmet the diver was wearing at the time of the accident, we can only assume that the diver panicked when he broke the surface, and was unable to remove the helmet. It's also possible that the helmet was not properly maintained, making it impossible for the diver to remove the helmet. Without the original piece of gear to examine, one can only surmise that this might have been a possibility.

Without a lifting device, and with no stand-by diver, valuable minutes were lost trying to get the diver out of the water. Whether they had used a stage, a hoist, a davit, had additional crew members, or some other method of lifting the diver, any of these mechanisms would have undoubtedly shortened the time it took to get the diver out of the water and possibly have saved his life.

Lessons to Be Learned for Divers

There are two important lessons to be learned by divers from this incident. First, and foremost, if the company you are working for does not adhere to all aspects of the ADCI Consensus Standards, you need to tactfully point out any deficiencies in their work

practices and strive to get them corrected. If the company blatantly disregards the ADCI Consensus Standards and refuses to revise their practices, then you need to look for another place to work. With the shortage of divers today, nobody should have to put up with a company that does not follow safe practices.

Hand-in hand with the previous recommendation is to always wear a bail-out bottle. There is no good reason for every diver not to be equipped with a bail-out bottle. The expense is minimal, and a bottle will rarely if ever impede your work. Yes, there is a possibility that a bail-out bottle could cause you to become entangled with lines or net in certain environments, but the benefits far outweigh the risks.



Divers should always wear a bail-out bottle, no matter what the water depth.

Lessons to Be Learned for Diving Companies

During his deposition, the head of the diving company admitted that although his company was a member of the ADCI, he had only joined the association to obtain the insurance and believed that Consensus

Standards were not something that applied to his operations. Unfortunately, he learned that these are the standards your company will be held to as a commercial diving contractor.

Never modify diving equipment that you have purchased from a manufacturer. Once a piece of gear is modified, the liability for that equipment becomes your responsibility. If you think there is a problem with a piece of gear and it needs modification, consult the manufacturer and get their response in writing before making any changes.

Always be sure that the people you employ are qualified graduates of a recognized commercial diver training program. The days of hiring people out of bars or with only sport diving experience are far behind us.

Make sure that the diver is tended continuously, and that you can hear and communicate with the diver at all times. Use a wired or wireless headset if you must be out of range of the communications box, or the noise levels from the machinery on the job interferes with good communications.

In the event of an accident, make sure that all of the equipment is photographed in place and then stored in a safe location once the appropriate authorities have had a chance to examine it. If you lose, damage, or sell the equipment, it will appear as though you are attempting to conceal evidence.

The ADCI membership has done an outstanding job of reducing the number of diving accidents during the past ten years. However, if we don't spend the time to learn from the diving accidents that do occur, incidents like this will continue to plague us. The ADCI's Consensus Standards are excellent, but it's the responsibility of every diving company and diver to help ensure we use these standards to avoid compromising our safety. 🚫



OSHA standards require some method of hoisting an unconscious or injured diver out of the water, no matter where you are working. Trying to haul an unconscious diver even a short distance from the water may be impossible without the right equipment or enough manpower.