

Maintenance Matters

Do Unto Dive Gear Before It Does Unto You

Equipment maintenance should matter greatly to all divers. After all, maintenance matters left unattended have a nasty way of sneaking up on us at the most inopportune times and tossing that proverbial monkey wrench into our plans.

While equipment malfunction due to poor maintenance is by no means a major cause of diving incidents or injuries, it does represent a category of problems over which we have nearly complete control.

As the following incidents and accidents will show us, we should treat our gear with the care we give ourselves.

Sealed fate

Consider the accident that occurred when a 53-year-old female had the misfortune of diving with what appears to have been an improperly serviced regulator.* She entered the water with three other divers; one had paraplegia. The three descended to a depth of 36 metres. Only two minutes into this dive, she began having difficulty with her regulator, and she subsequently drowned.

The DAN report noted this: "An examination of the regulator revealed that it was missing a diaphragm seal. The regulator was owned by the diver,

but it is not clear if she had used it for diving since the last time routine maintenance was performed."

As this accident sadly illustrates, a problem with dive gear can come from the depths in a heartbeat, and if it robs us of breath, there may be very little time to resolve the situation. For that reason, we should all redouble our efforts to ensure that our equipment is properly maintained and proceed with caution even when - or especially when - recent maintenance has been performed.

The tie that doesn't bind

Another incident that involved recently serviced dive gear illustrates that a diver can omit even the most basic steps during servicing. It was May 2003 when an instructor conducted a "discover diving" session with a prospective student in a pool at a depth of 3 metres.

According to the British Sub Aqua Club incident report, "The instructor was kneeling on the bottom of the pool when the mouthpiece became detached from his regulator. He reached for his octopus regulator and put this in his mouth; however, the mouthpiece from this regulator also became detached. He indicated to the trainee to ascend, and the instructor made a free ascent to the surface, breathing out as he did so. Both left the pool safely."

The report doesn't even suggest what the instructor said to the "service agent," only that the case was referred to the agent. Had it been me, I'm sure I would have had a few choice words and disparaging comments about the

quality of the service. The tie that doesn't bind is the one that was never installed. Despite an exhaustive search, neither missing tie was found. Fortunately, it was the instructor, and not the prospective student, who had the misfortune of using that particular piece of gear. Otherwise, the outcome may have been much more serious.

Crystallized danger

Another example of poor maintenance comes from a BSAC incident report from March 2005. Two divers had made a dive to a depth of 35 metres, and nine minutes into the dive, one diver experienced a "mild free flow." The diver switched to another regulator, but that one, too, began to free flow. He then took his buddy's octopus regulator, but in the process of doing so, bumped his buddy's mask, causing it to flood. Taking a breath from the buddy's octopus regulator, the diver received a mouthful of water, and so he switched back to his own gear.

During this episode of "musical regulators," the divers had stirred up considerable silt and had lost visual contact with one another as a result of the reduced visibility. Both divers made an ascent to the surface, during which time the buddy's regulator also began to free flow. The two made faster-than-normal ascents. Once they had surfaced, they were placed on oxygen. As the report notes, subsequent examination showed that one regulator had a build-up of salt crystals.

* Report on Decompression Illness, Diving Fatalities and Project Dive Exploration, 2004 edn. Durham, NC, Divers Alert Network, 2004.

BY RICK LAYTON

Alert Diver Asia Pacific



At least some anecdotal evidence suggests that inadequate regulator maintenance is a common symptom in reports of poorly performing equipment. One DAN reader, Lt. Col. Mark L. Kimmey, writes in response to a previous Alert Diver article: "I have been an equipment technician for over three years, and you wouldn't believe the stuff that comes in for service with the typical complaints of 'second stage free-flows' or 'hard/wet breathing.'

"Invariably I find the same thing time after time when I disassemble a rig on my bench: Second stages have sand and salt deposits inside, mouthpieces are worn and cracked, and it's obvious when something just hasn't had routine service parts replaced for a while. Divers need to understand that next to their lives, regulator service parts are cheap."

Not all the required regulator maintenance needs to be performed by paid dive equipment technicians.

Routine maintenance for regulators should include a thorough soaking in warm, fresh water after each day's diving to remove salt water and prevent the formation of salt crystals that can cause damage or lead to malfunction.

In addition, the writer suggests that divers "flush each second stage with flowing water from a hose or tub faucet, but taking care not to depress the purge button. The flowing water will flush out lots of sand and salt that is building up in the regulator. This is especially important for the octopus that may have been dragging in the sand when the diver wasn't paying attention."

Failed hose

Another incident report tells about a group of three divers who made a drift dive to 18 metres, when it suddenly became apparent that a low-pressure hose feeding a regulator had

failed. The failure occurred at the connecting point to the second stage regulator. The affected diver swam to one of his buddies, who surrendered his own regulator and switched to his pony bottle.

Meanwhile, visibility was reduced in the cloud of bubbles, and the failed hose was whipping and thrashing through the water, striking one of the divers. The buddy finally managed to shut off the affected diver's air valve, and the two made a hasty ascent to a depth of 7 metres. At that point, they were able to slow their ascent and proceed to the surface only slightly faster than normal. The third diver completed the ascent with them. Fortunately, nobody suffered any ill effects from the ordeal.

This incident offers two important lessons. First, with proper care and maintenance, air hoses can easily last 20 years, but they should still be inspected regularly for any signs of

corrosion, physical damage or excessive wear. Compressed air hoses have tiny perforations in the outer sheath, through which air bubbles will penetrate when the crimped fitting in the end of the hose begins to leak.

A hose will often slowly leak before it fails. This incident reminds us that a sudden catastrophic failure may come with no warning at all. As part of the routine maintenance of scuba equipment, bubble detection liquid should be applied to the ends of the hose near the crimp to detect any leakage that may signal an impending failure. Excessive leakage or physical damage to the crimped fittings are signs that the hose should be replaced.

Second, many divers may not be aware of the serious thrashing that will occur when a pressurized air hose is suddenly detached at one end. Quickly shutting off the air is the only way to secure the danger.

Oh, no O-rings!

A more likely cause of failure for the compressed air portion of a scuba unit is the O-ring seals where the regulator mounts to the cylinder.

In May 2005, a pair of lucky divers should have been playing Powerball rather than diving. The chances of experiencing two identical failures on a single dive seem almost unbelievable, but they beat the odds and avoided disaster.

According to the account published by the BSAC, the two divers had descended to a maximum depth of 29 metres and neared the end of their dive at a depth of around 6 metres when things - O-rings - started popping. According to the report, "Her buddy turned off the cylinder, and the diver used her pony regulator. The O-ring on the pony cylinder then blew, and this was also turned off. Another diver offered her octopus regulator."

Fortunately, the divers all exited the water none worse for the wear. This incident highlights the importance of thoroughly checking the cylinder valve O-rings before connecting the regulator on each dive. Nicks, cracks or other signs of damage signal the need to replace an O-ring.

Overlooking the dangers

Perhaps all too often divers will endure minor problems to continue diving. I've done this myself, and I suspect that at one time or another many others have, too.

This case involved a 44-year-old female with 12 years experience and more than 60 dives in the previous year. Undoubtedly, she was comfortable in the water and with her diving skills, and, perhaps for that reason, she did not end the dive when her gear acted up. On the final day of a six-day dive trip, she made three dives: the first to 29m, the second to 27m, and the last to 24m. According to the 2004 DAN report, "The last day of diving was complicated by the fact she was cold on all three dives, and her buoyancy compensator device (BCD) periodically inflated. This took her up and down in the water column several times but not all the way to the surface." While she didn't report any trouble on the dive itself, the diver later experienced pain-only symptoms that worsened after flying.

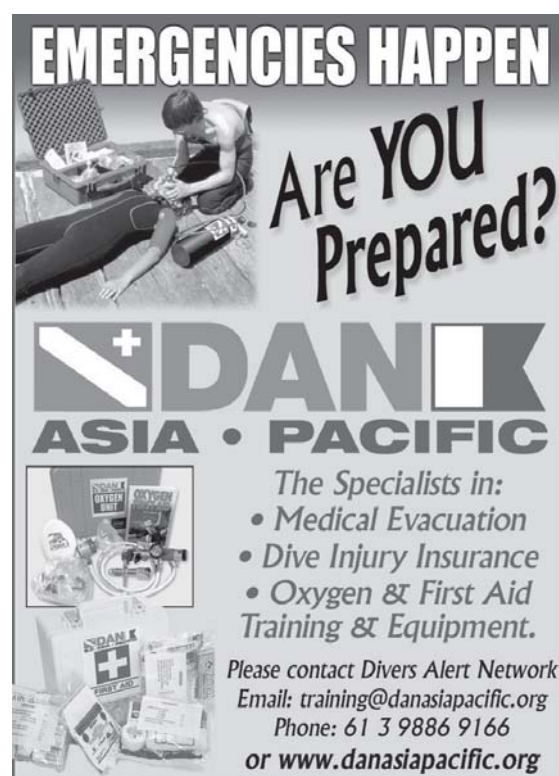
While the BCD problems may have had little or nothing to do with the fact that the diver experienced symptoms of decompression illness, one can't help but wonder if the unplanned depth excursions may have worsened the situation. Had the diver not been as capable, such a BCD problem could have caused more serious injuries.

Safe diving requires that we give due diligence to maintenance matters. We must take stock of our equipment when something is not right, and we should either replace or repair it before continuing our diving.

Maintenance matters much more than we might suspect. Never overlook periodic preventative and routine maintenance. For your own safety and the safety of those diving with you, do unto your gear before it does unto you.

By learning from the mistakes of others, we can reduce the likelihood of similar accidents occurring in the future. Please help DAN AP to collect information of dive accidents and incidents by contacting us whenever you hear of one. Please don't assume that we already know about it. We may not have and your information could be valuable.

*Email us at:
research@danasiapacific.org*



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