

Rescue Skipper On Emergency Nitrox - A New Lifesaving Aid...



If you were to analyze scuba diving safety rules and regulations, you would immediately notice that they are designed to eliminate almost every chance for an accident to occur. Yet, emergency scenarios do happen all too often. Thankfully, there are a number of very good safety products on the market that certainly reduce the inherent dangers of this profession & leisure activity. Very occasionally, dedicated scuba divers come up with new ideas that can not only be termed as being important advances in underwater safety but clearly increase the survival chances of any divers unfortunate enough to find themselves referred to as 'the casualty'. This article is about one such advance...

Accident or Incident?

As the captain of a rescue vessel, I've responded to a number of Mayday calls that have involved divers. I do not dive myself. Over 45 years at sea with an emphasis on 'getting out of the water and into the lifeboat', I suppose I've channelled my interests on trying to stay afloat – rather than willingly descending into the depths to explore that world beneath the waves.

Photo: June 2008 - Scuba diver dies: others injured in Maldives tragedy.

In this case, it would seem that inadequate training and disregard to safety procedures by a dive operator led to tanks being filled with contaminated air.

However, in researching the military, commercial, sport & leisure world of dive & scuba with special reference to safety & rescue, I was somewhat surprised to notice a depressing and ongoing list of global fatalities and injuries; most listed as 'accidents'.

In reality, this list should be termed under the heading of 'incidents', not 'accidents' –

for in most cases, these tragic events could have been avoided. A carefully trained diver should rarely have an accident. Sub-sea deaths & injury are, in most cases, the direct result of divers failing to adhere to proven safety criteria. Some of the most common bad diving practices include diving alone, diving in a medically unfit condition (including being overweight), failing to maintain certification or proper training and unfortunately but quite frequently diving beyond the limits of any training and skills they have attained. Finally, common sense precautions such as informing someone on shore that they are conducting a dive, an inability to ensure their dive location is safe, checking tides & currents or keeping a close eye on weather reports soon adds additional names on casualty lists.



*A professional commercial diver signals OK as he carries out an oil rig inspection.
[Photo: Aqua-Terra Maritime Inc. USA.]*

Now to be fair to both the professional military and commercial diver, most of the ones that I have met are highly trained and operate under the strictest safety parameters. Both sectors in this area of life underwater are understandably termed 'high risk'. Certainly, in the United States, despite the obvious dangers of their profession, the commercial dive industry has a good track record. In the last 18 months, four commercial divers have died: a ratio of 1 death for every 55,000 dives.

Sport & leisure divers however continue to record higher 'emergency scenario' statistics.

If you dive onto the Web, you'll find no end of sad reports concerning scuba. Take CDNN top news stories:

- CALIFORNIA - Kelp makes diving deadlier
- HAWAII - Diving accidents kill two Maui tourists
- NEW CALEDONIA - PADI 'Discover Scuba Diving' accident kills tourist
- FIJI - Diving accident kills tourist off Coral Coast
- GERMANY - Baltic Sea scuba diver missing, presumed dead
- CALIFORNIA - Another diver dies off North Coast
- HAWAII - Diving accident kills popular DJ on holiday in Oahu
- NEW ZEALAND - Severely injured scuba diver airlifted to hospital
- FLORIDA - Scuba diving accident kills another Blue Springs cave diver
- NEW JERSEY - Spiegel Grove scuba accident victim leaves \$60k to hometown
- MORE CDNN HEADLINE NEWS...



Intent on Self Harm?

Last year, the bodies of two divers were found within the wreck of HMS Scylla off Cornwall, U.K. The massive search launched involved local Coastguard units and RNLI lifeboats, a Royal Navy warship and the Britain's Ministry of Defence Police. An inquest into a prior scuba diving death at the same wreck two years earlier, found that the HMS Scylla site was "extremely hazardous" for divers and was "a tragedy waiting to happen".

HMS Scylla was an Exocet Leander class frigate, the last frigate to be built in Devonport Royal Dockyard in 1968.

Scylla is 113m long with a displacement of 2500 tonnes. Scylla made the local news headlines in 1973 when she collided with the Torpoint ferry. She undertook 'Cod War' patrols in 1975 and in August 1980 was dispatched to deliver emergency relief teams to the hurricane stricken island Cayman Brac. In December 1987 she was deployed to the Persian Gulf

In 1993 she was decommissioned and in 2003 was bought by the National Marine Aquarium to be placed on the seabed as a reef.



Scylla lies just 8m from the surface with a maximum depth of 26m at high tide.

Some people just don't think. They seem intent on becoming proficient in self-harm. Yachtsmen & women with a misguided 'power gives way to sail' attitude continue to cut across the bows of large merchant vessels that are underway: no thought given to the fact that it often takes a few miles to turn such tonnage or bring the ship to a standstill. High-powered water bikes continue to be driven at breakneck speeds: a danger to divers, swimmers and marine life. I once watched two daredevils cut under the catamaran hull of the Weymouth ferry as it entered port: much to the disgust of the irate skipper. Inexperienced divers still panic and shoot to the surface in a frenzy of uncoordinated limb movements and bubbles. I even know one ex-professional diver that came up so quickly, he knocked himself out on the hull of the ship he had dived from: he suffered injury as he had not carried out the basic training rule of extending his arm before reaching the surface.

Over recent years, port security has been tightened in many harbour areas. High tech diver detection equipment is constantly in use and warships and commercial vessels are inspected regularly by security services. In the photo above, Master Sgt. Dave Armstrong takes a plunge into the Willametter River to practice underwater hazardous device searches at the hull of a ship docked at Swan Island, Ore. (U.S. Air Force Photo/Ruby Zarzyczny)



On a number of occasions over the years, when my ship has been in port, I've had to act fast to ensure that an unannounced tourist diving under my hull would not be subjected to the sobering effects of a 3-meter, four bladed propeller. In small ports, that scenario still happens. Thankfully, these days, in larger ports – with an emphasis on homeland security – alert security personnel usually detect such uninvited guests as soon as they enter the water. You would still be surprised however how many would-be Jacques Cousteau's are

unceremoniously dragged out of the deep by military, security agencies, coastguard or customs: the divers' embarrassed faces – a clear indication that they had not even considered the dangers of being knocked unconscious, crushed between ship and harbour wall or even shot as a suspected terrorist.

Accidents, of course can occur and when they do, regardless of your training or expertise, sometimes there is little you can do about it. Two experienced German divers died a few years ago in Yugoslavia when a local fisherman used dynamite to improve his catch. Both divers were knocked unconscious and drowned.

Potential Tragedies

Down in Devon (United Kingdom), I sit in the bridge of my ship and watch a variety of craft set out on diving expeditions. From small ex-fishing boats with top speeds of 6 or 7 knots to fast inflatables with high powered outboards, you see them leaving harbour with smiling faces suitably geared up in the latest dive suit technology. The weather is fine but the absence of anyone wearing life jackets is often noticeable. One presumes that they consider that on the dive, should they have to make an emergency ascent; the air from their BCD will keep them afloat. Of course, should the craft overturn or sink en route to the dive site or as they return home, rolled down wet suits are rather useless at keeping you afloat.

Just over one year ago, the Kingfisher dive boat sank off Koh Phi Phi, Phuket, Thailand - killing one tourist and severely injuring another.



Too many times, novice divers having had their couple of initial swimming pool tests, followed by two or three additional dives entering the water from a beach, end up on 10 and 20 meter dives where they find to their surprise that visibility is down to one or two meters, the unpredictable wind along the Devon coast has suddenly increased way beyond forecasts and their 'buddy' can't be seen. Panic becomes the order of the day. Coming up too fast from just 10 meters can still leave you with aches & pains and your now rolling and heaving dive boat is certainly going to worsen your mild decompression symptoms – rather than help the situation.

Once you are in trouble for whatever reason, it doesn't matter if you are a military diver, commercial, experienced enthusiasts or novice. There are certain factors out of your control that are going to make all the difference to the completion of a successful rescue, adequate treatment and eventual recovery. .

Time – The Enemy of Successful Rescues

A few weeks ago, off Point Loma in San Diego, USA, a man & woman were diving about two miles off the point when the male diver ran out of air. His dive partner aided him in breathing as they made their way back to the surface, but they had to make their ascent so fast that it put them both in danger. Luckily, a nearby high-speed lifeguard boat transferred both victims to lifeguard headquarters at Quivira Basin, where ambulances were waiting to take them to a hyper baric chamber at the hospital.



Finding a life raft in a vast expanse of water can be difficult. Pinpointing the tiny dot of a diver's head just above water - even more so. If weather is bad or visibility poor, the chance of a successful rescue is greatly reduced. Photo: Royal Navy Search & Rescue (MOD UK).

So what is this new lifesaving aid? It is the RescuEAN Pod...

Take one non-responsive diver who, having been safely pulled back on board a dive boat is now being administered oxygen. After 15 minutes, the oxygen is depleted, however there is still another half an hour until rescue services arrive or even longer for the skipper to get his casualty back to port for on-shore assistance. On the dive boat, they have several half-used nitrox cylinders, but these are connected to conventional diving regulators. What if you

could use this oxygen enriched air to give to the patient?

This is one of the scenarios that RescuEAN's inventors Martin Kerley and Chris Wood hypothesised when they attended a rescue course. They were informed by their instructor that there was no way that nitrox could be given to an unconscious diver because the cylinders only had demand valves attached to them.

The RescuEAN Pod is a life-saving aid for the diver or rib/boat owner with access to Nitrox. It is for use with dive accident patients in the event of the emergency O2 kit being already in use, exhausted or simply not available - whether they are conscious, semi-conscious or unconscious.

The pod's concept developed after a long and intensive period of PADI dive training by the two diving Directors. Using Nitrox, when O2 is unavailable, is strongly recommended by all 'diver certifying associations' around the world - "If you run out of oxygen, but have enriched air Nitrox available, use a scuba regulator to provide it to a responsive injured diver"

With the pod's introduction, it's now possible to offer Nitrox to an unresponsive patient too. This increases the possibility of their recovery over the use of basic mouth to mouth.



The pod allows a constant Nitrox flow of 15 or 25 LPM to the patient via a facemask (with O2 inlet) mask immediately on reaching the shore or a boat (it can be used with Non-Rebreather masks too). It is highly recognisable, light weight, easy to carry and use - benefiting from the rapid use of the 'quick release' low pressure hose connection from a diver's Nitrox cylinder first stage normally used with their BCD or dry suit.

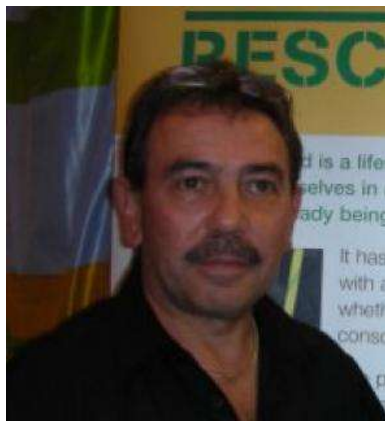
The robust, corrosion resistant construction allows the option of the pod being carried underwater whilst diving or to be openly displayed on boats and ribs - ready for immediate use when needed. The pod rapidly becomes negatively buoyant when submerged and quickly drains on exit.

The Pod was launched in October 2007 and is rapidly becoming an accepted lifesaving aid by sport and professional divers as well as rib and boat owners, worldwide.



Who is the driving force behind RescuEAN Pod?

MARTIN KERLEY, Director – Sales and Administration



The 'inventor' of the pod, Martin is a keen diver. Together with his dive buddy, Chris, he has worked on all aspects of the RescuEAN's design and development as well as maintaining his other diverse businesses of Management Consultancy and Financial Services.

Martin started diving with BSAC many years ago but stopped through pressures of work and family life. It was only in 2006, when both his daughters decided they would like to dive with him, he decided to join them during their PADI training - so he would also be equally certified... Since then, he has completed all his training within the UK - from Open Water through to Master Scuba Diver. All his training was with In2Scuba Dive School (www.in2scuba.co.uk) based in Kent where he now becoming a Divemaster. Since restarting, Martin now has well over 200 dives logged and was definitely 'bitten by the dive bug'. He enjoys doing the speciality subjects and has completed his Rescue, Enriched Air, Dry Suit, Deep and Wreck certifications. Martin has dived in the Caribbean, Indian Ocean, Malta, Cyprus, Turkey,

English Channel and the Farne Islands. In addition, he has 'enjoyed' many of the UK's inland waters!!! More relative to RescuEAN, both he and Chris have also completed their Emergency First Response training as well as DAN Oxygen Provider/Oxygen First Aid specialities. It was during their EFR and Rescue training that Martin came up with the concept of the new pod.

Away from the water - Martin is married with two daughters and enjoys spending time with the family as well as driving, shooting, rugby, cinema, cycling and travel.

CHRIS WOOD, Director – Sales and Marketing



Chris is married with two children, a son and daughter, and lives in Surrey, UK. He has known Martin since their youngest children attended nursery school together - over 12 years ago.

Chris is also a self-employed landscape gardener, though since discovering diving last year, also with In2Scuba in Kent, he has definitely decided his preference is for water over land!

In the short time he has been diving he has logged over 200 dives and currently holds five specialities, including Enriched Air, Dry Suit, O2 provider, Wreck and Deep Diver and is also a Rescue Diver. Chris has completed his EFR certification as well as being a DAN oxygen provider and has qualified as a Master Scuba Diver and like Martin is becoming a Divemaster.

He has dived all around the UK, from inland dive sites to the English Channel and the Farne Islands. Chris has also enjoyed the wonders of the Mediterranean, with its clear warm waters and fantastic marine life during visits to Malta, Crete and Turkey.

It was following their Rescue Diver certification that both Chris and Martin realised the value of the introduction of a personal item of equipment that can enhance any injured diver's chance of survival; particularly for any diver that:

- Dives in areas of the world where O2 is not readily available
- Dives away from recognised schools/clubs that do have O2 on hand
- Dives from charter boats and ribs at home and abroad that may not have a working O2 kit on board
- Being in a rescue situation where the only higher concentration of O2 available is enriched air nitrox.

Pod Maintenance

The pod and its components have been designed to withstand the effects associated with scuba diving.

The metal components are 316 Marine Grade Stainless Steel and therefore, should not suffer even if used regularly in salt water as the metal is corrosion resistant and providing the pod is rinsed in fresh water and 'blown through' before storage.

The only 'maintainable parts' are the three internal Medical O2 grade 'O' rings within the control valve. During testing with a professional diving organisation using the pod in rescue scenarios and keeping on a rib six days a week between February and November, there have been no reported maintenance issues. Likewise, following use by several dive clubs and schools since August 2007, there have been no reported problems. However, if it is found that the 'O' rings do need replacement, RescuEAN will produce a 'kit' that will include a 'O' ring replacement tool, 'O' rings and instructions.



Bearing in mind the pod has now been tested/used for over 300 + days in training and scenarios as well as on Rib's in salt water, it is estimated this would equate to a minimum expected lifetime of 5 years for the sport diver without

any major maintenance issues (subject to the regular rinsing and blowing through - after dives). RescuEAN Limited will continue to monitor maintenance and will keep its customers advised.
Military Operations, Search & Rescue, Port Security, River Police, Research and much more...

The RescuEAN Pod could be as useful to military units, security agencies, search & rescue, river police or port security divers as it might be to those carrying out dives involving environmental research in the Arctic or construction projects in the Middle East. It is compact, efficient and costs very little. It is easy to use and simple to maintain.



NCIS...Special Agents & Divers

The Naval Criminal Investigative Service (NCIS) is an elite, worldwide federal law enforcement organization staffed by civilian special agents, intelligence specialists, and numerous other professional/administrative personnel whose primary mission is to "protect and serve" the United States Navy and Marine Corps, their families, and Department of the Navy (DoN) civilian employees by providing a variety of law enforcement, counterintelligence and security functions.

NCIS is committed to ensuring the operational readiness of the Navy and Marine Corps with proactive measures designed to prevent, protect and reduce the major criminal, intelligence, and terrorist threats that confront U.S. & allied naval forces and of course, the U.S.A..

For more information please visit the NCIS website: www.ncis.navy.mil.

NCIS divers, special agents, prepare to carry out a training exercise. On any given day, they may be called upon to respond to a terrorist threat (an underwater attack on warships for instance) or be called upon to search a vessel

for drugs. Their unique abilities allow them to operate from U.S. NCIS HQ at Washington Navy Yard, from field offices, on U.S. warships and from their overseas offices if required. These guys & girls are very professional, highly trained and can be considered as being part of one of the world's best security agencies.



Photo left: A British Army diver operational in Basra Iraq.

Dealing with unexploded mines and other devices is certainly dangerous work. The RescuEAN Pod might be a useful addition to life-saving equipment in scenarios such as those dealt with by security agencies or armed forces...

All around the world, armed forces and security agencies are sending down divers on a regular basis in their efforts to combat terrorism and other criminal activities such as drug trafficking. Research ships have divers installing tsunamis warning systems. United States Army Corps of Engineers have divers checking flood defences, dams and reservoirs on a daily basis.

Accidents can happen: incidents will frequently happen.

Use of the RescuEAN Pod might just make the difference between life and death. Between US\$150 and US\$200 seems a small price to pay for the benefits of this unique little product. As for my crew, they all seem to believe their old skipper could benefit from emergency nitrox as well!

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Possible Scenario:

Glancing at the distant horizon, you and your dive buddy relive the two fantastic shore dives you have just completed. As you begin to remove your dive equipment, you notice another diver running along the beach towards you. As he nears, you hear him call for "Help". He had been in a foursome and two of his dive buddies had a problem underwater and need some assistance. As you rush along the beach, still wearing some of your kit not having time to fully remove it, all you see one diver struggling out of the water dragging another beside him. As you arrive, they are both now lying at the waters edge. One is unconscious and the other, very stressed and highly over exerted.

From your rescue and EFR training, you immediately assess the situation and consider the options. Having questioned the diver that ran up to you, you give him the task of phoning the emergency services and to inform the operator of the likely need for treatment of the two injured divers in a hyperbaric chamber as you and your buddy get to work on the two patients. The conscious one has already mentioned to your buddy that he felt dizzy and had severe pain in his elbow and shoulder area. You immediately recognised his signs and symptoms as probable decompression illness - so you put your training into action. Your buddy begins by asking the fourth diver to assist by removing the patients dive equipment while you deal with the non-responsive patient. Dragging him fully out of the water you hear the conscious diver tell your buddy they both came up too quickly after the diver you are treating had a serious panic attack. Decompression illness was now highly likely.

Whilst you don't have an oxygen emergency kit with you, fortunately, you and your dive buddy are owners of RescuEAN pods and both were diving that day on a 38% Nitrox mix - you immediately have the facility to offer instant and beneficial assistance to the injured divers.

Your buddy has already set his patient in the recovery position, connected his pod to his Nitrox filled cylinder and has the facemask in place. His patient is now calming down. You have checked your patient's vital signs. Between rescue breaths through the facemask and administering CPR, you instruct the diver that has just returned confirming the paramedics were on their way, to set up your pod for use. On arrival at the scene, you had quickly removed your BCD and cylinder and laid it close to your patient. In a second or two, the diver had undone the low pressure hose connection from your BCD and connected it to your pod. Slipping the tubing onto the exit nozzle and briefly purging the pod, he connects the tubing to your facemask. The pod is now ready to use with the increased O2 mix from your Nitrox cylinder to benefit the unresponsive patient.

While continuing rescue breaths you hear from your buddy that the other patient is relatively stable for now, breathing well and calmly. You are still positioned next to your injured diver as you twist the pod's centre control and hear the airflow begin. You quickly ask for permission to administer emergency oxygen. Even though unconscious, you accept the patient will want you to help as you restart mouth to mouth and CPR – now with the benefit of 38% oxygen mix entering their lungs. Still assessing them for other less obvious injuries and finding none other than the possible decompression illness, you continue with CPR and rescue breaths.

Soon the EMS paramedics arrive on the scene, just as your patient begins to become conscious. As you allow the paramedics 100 percent oxygen to replace your pod, you are confident you did everything you could by delivering the highest concentration of emergency oxygen available to your non-responsive patient - in the shortest time.

You report to the paramedics the details of their dive, as you understand them, hand them both injured divers dive computers and advise that they have been they have been on 38% Nitrox for the past 14 minutes...
It's a great idea!

Email received:

From: Scot [mailto:Email on request]
Sent: 11 February 2008 23:30
To: 'Martin Kerley'
Subject: RE: Scot From Louisiana

Martin,

It was very nice meeting you while I was in Croydon, UK.

I got home on Fri night and left to go diving on Saturday morning. After "a 350 mile drive" on Saturday night I pulled out the RescuEAN and asked if anyone knew what it was. The pod drew a lot of interest and everyone was very impressed with it. I got a lot of good feed back.

Sunday, on the dive boat, we got the chance to see it in action. This was not an emergency, but we had a diver that was feeling very ill and the discussion of giving him O2 to help him feel better started. Before I could say anything, the owner of the dive shop I dive with suggested trying out the RescuEAN and see how it worked. In no time I had it out and hooked up to my 32% Nitrox tank and the diver was breathing enriched air thro' the facemask. After a short time he commented that he was feeling much better.

The crew on the dive boat thought it was a great idea. The owner of the dive shop is now very interested in it and would like to stock them in his shop here in Louisiana; I have given him all your contact info.

I am only sorry that I did not get a photo of it in action.

I hope to be in contact with you again soon.

Scot

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