

# **Dive and Decompression Planning**

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## **Trimix operations**

Trimix dives are formal operations. Treat them as such, and plan them meticulously, or don't do them. The exposures you place yourself in are dangerous and extreme, and the room for error is virtually non-existent. You may die at any time on any technical dive. And YOU don't have to weep at your grave.

## **Teams**

Select the appropriate team size (this may even be a team of one if redundancy levels are appropriate and the environment so dictates). Don't make the team too big, or too small. Make the team experienced, well-equipped, well-prepared and psychologically and physically stable. If boat diving, the skipper is part of the team. Brief him/her thoroughly. He or she may well not be familiar with some of the practices concerned, and may not therefore respond appropriately to incidents.

## **Before the dive**

Review all plans. Check all equipment. Set all lines and decompression materials. Spend some time in mental preparation. Don't dive till everyone and everything is ready. It really isn't worth adding more stress than is necessary to a deep mixed gas dive. Do make sure that more than enough time is allowed before the dive for preparation.

## **Entering the water**

Carry all your gases in a logical order, with the richest mixture on the right. Know where they are, and which regulator goes with which gauge. Once having entered the water, make sure your equipment is still in the same place it was before. Never simply assume it will be where it was before you jumped in and rearranged it! Check you can read all gauges and reach all valves and regulators and their essential equipment. Check you can reach your cylinder valves in an emergency.

Acclimatize at the surface or at 6 meters if the surface is choppy. Take time to orientate yourself to boat or shore, currents and bottom. Thorough buddy check - leaks and gear. Take a definite time check before starting your actual descent, and note your start time on your slate.

## **Descent**

Stick as closely as possible to planned descent times - extra minutes on descent can mean extra hours on decompression, or lost minutes on the bottom. Control your buoyancy AT ALL TIMES. If you lose control of your buoyancy it can affect both your descent rate and your breathing rate, and add a source of stress to the dive. Be prepared for gas switches before you need to make them. Make them on the move if possible, and practice to ensure a smooth and effective switch. Stow used regulators properly, and remember to turn off travel gases at depth to avoid toxicity problems. Slow your descent with your BC or drysuit just before you reach the bottom, and hover just above it, to maintain visibility.

## **On the bottom**

Plan your dive to the Rule of Thirds. Be precise. Take everything slowly - don't rush. Maintain proper buoyancy. Keep stress to a minimum. Always be aware of your location. Don't exceed planned depths or times for any reason.

## **Ascent**

Stick to the set ascent times for your dive. The ascent period is actually your first phase of decompression, and these times are planned into your schedule. Travel at 20 meters/minute (60'/minute) to the first stop or the nitrox switch, whichever comes first. This reverses the gas gradient more effectively. From that point, travel at 10 meters/minute (30'/minute) between stops - this controls the ascent and reduces bubble formation during offgassing. If a gas switch and a decompression stop coincide, take a moment to adjust your buoyancy before making the switch. A loss of buoyancy supervision can result in an unplanned ascent or descent of several meters if you are not careful.

## **Decompression strategies**

Avoid free-floating decompressions unless currents or tides dictate it. If the currents are weak, use decompression stations hung below the support vessel, with enough room at each station for the number of divers it is designed to support. Use standby divers to monitor the progress of the decompressing divers at a regular interval, and establish some method of emergency communication (e.g., slate and line) that allows rapid communication with the surface at all times. Emergency decompression cylinders should be in the water close to the divers, and these should have been placed, along with the decompression station, before the start of the dive. Wherever you can, stay as a group. If you must free-float, then a group of divers linked together is a manageable unit at all times. Several pairs of individuals floating off in subtly different directions over a one or two hour period is a recipe for disaster. Do ensure a support craft (small inflatable) travels above the group, containing back-up cylinders and a standby diver. Make the whole decompression as trauma free as possible.

## **Oral rehydration**

It is possible to supply decompressing divers with fluids, and rehydration should be a priority on long decompressions, especially in tropical countries. Any form of collapsible container is suitable, and if proprietary brands are not available, then the lining of cardboard wine containers will do nicely. Isotonic sport drinks such as Sport Lucozade or Gatorade can be obtained in collapsible card containers, and straws can be used effectively underwater. Remember that it takes about 6 hours to properly orally rehydrate a dehydrated diver, and a fairly continuous supply of fluid, even water, is better than vast amounts before and after a dive.

## **Decompression hints**

Full face masks may be used to maintain warmth and may reduce the potential for CNS oxygen toxicity, though proper oxygen management is more effective. It is quite possible, with prior practice, to change to a FFM underwater, and the real value of doing so is that of oral communication and warmth. Be prepared for a FFM to use much more gas than predicted by open-circuit RMV calculations and practice beforehand to establish required gas volumes. On long decompressions, it may be more appropriate to run either pure oxygen or EAN 60-80 from the surface on a long umbilical hose, either to a second stage regulator or a FFM. The length of hose required will not materially affect the delivery of gas to a depth of 6 meters from a modern regulator. This allows an uninterrupted supply of gas without too many unwieldy cylinders taking

up space in the water. If this is done, however, a bailout cylinder should be kept on standby in the water to cover any interruption in the supply.

## **Pure oxygen**

Undertaking the shallowest stops on pure oxygen offers the most effective offgassing gradient. However, on a long decompression the 6 meter stop may deliver over 50% of the maximum recommended CNS percentage limits, and it is recommended that pure oxygen not be used at depths exceeding 3 meters. Even a medium swell may provide pulses of increased partial pressure, and the whole toxicity tracking process becomes less predictable. Even in an emergency, it is unsafe to switch to pure oxygen below 10 meters, even if this requires breathing the bottom mix to an extremely shallow depth. As long as the  $ppO_2$  of the inspired gas is above 19%, symptoms of hypoxia are unlikely to occur. The use of slightly weaker nitrox decompression mixtures (e.g. 50-80% oxygen) offers some extra breathing depth in such an emergency, and is to be recommended. This does not preclude the use of pure oxygen for the 3 meter stop as a safety measure. Pure oxygen should obviously be available on the surface for emergency use, and an adapter which allows an oxygen clean scuba regulator to be fitted directly to a large oxygen cylinder, medical and non-medical, is a distinct advantage.

## **Surfacing**

The last few meters actually cover the greatest pressure change, and are perhaps one of the most crucial point of the ascent. It is no coincidence that most cases of decompression illness occur just after the diver surfaces. Anything that can be done at this time to reduce the potential for bubble formation should be done. Some things you can do to help this process are :

1. Take two minutes to ascend the last 6 meters
2. Rest on the surface for 5 minutes
3. De-kit in the water - with assistance!
4. Rest on the boat / shore for at least 10 minutes before any action. Then rest some more
5. Try and avoid undue effort at all stages of the surfacing, getting out of the water, and de-kitting process. Remember that helium bubbles are present, and more will offgas very readily if you give them the slightest provocation!