Uh Oh … I'm in Deco

By Bob Bailey

One of the things we learned in our Open Water training is that sport diving is supposed to be within no-decompression limits (NDL). Back in the "old days" divers used tables to keep track of nitrogen buildup during their dives, and to determine how much no-decompression time they could plan for on their next dive. These days almost everyone uses a dive computer that monitors your dive profile and tells you on a continual basis how much no-decompression time you have remaining at a given depth. Keeping track of your NDL is a simple matter of watching the display on your dive computer.

But what if you neglect to watch your computer as carefully as you should … and suddenly notice it's blinking and giving you numbers that you're not used to seeing. Depending on the computer model (and whether or not you actually read the manual that came with it) you might be able to determine what to do as a result. But that's not always the case.

So I'd like to talk about what "deco" actually means to a sport diver, and what you can do if you should find yourself with a deco obligation. I'll begin by emphasizing that decompression is far from an exact science, and that divers who plan to do decompression diving should not do so without first getting proper training from a qualified dive instructor. This discussion is for the sport diver who inadvertently finds himself or herself with a deco obligation that was not intended.

To understand what deco means, let's first look at what causes it. We all know from our basic Open Water training that the root cause is nitrogen in the air that we breathe. Because it's an inert gas, nitrogen doesn't get used by our body processes (metabolized) … it just "sits" there. When we dive, our tissues gradually absorb and finally maintain higher than normal levels of nitrogen. The rate at which nitrogen gets absorbed and the level at which it is maintained depend on how quickly we descend and how deep we go.

The process is reversed when we ascend. As the pressure of the water on our bodies decreases, the nitrogen absorbed into our tissues will come out. We call this process "offgassing" … and the rate at which we offgas nitrogen depends on our ascent rate. Decompression is the term we use to describe what happens to nitrogen that is offgassed from our body tissues into our bloodstream.

Two things factor into decompression. First, as we ascend the pressure exerted on our bodies becomes less than the pressure of the nitrogen gas absorbed within our tissues, and the accumulated nitrogen in our tissues begins to come out in the form of tiny, microscopic bubbles. These bubbles get dissolved into our bloodstream and eventually make their way to our lungs, where the excess nitrogen is expelled when we breathe.

The second thing that happens is that as we ascend, the nitrogen bubbles in our bloodstream get larger. Remember the example of the balloon in your Open Water class? As the balloon got pulled down deeper, it got smaller … and as it came back up closer to the surface it got larger. Well, think of the nitrogen bubbles in our blood as millions of tiny balloons. We want to expel them through our lungs before they get too big. We achieve this by coming up slowly.

Now that we've looked at the basics of decompression … let's talk about how we can deal with an unintended deco obligation. First off, it's important to understand what your computer is telling you. Typically the NDL number you're used to seeing on your screen

will be replaced by the number of minutes of deco obligation you've incurred … and the number "10" appears where you're used to seeing your maximum depth. That "10" isn't telling you to go to 10 feet … it's telling you **do not go shallower than 10 feet until you've completed your decompression obligation**. Think of this 10-foot depth as a "ceiling", above which you cannot go. Note that some dive computers will also give you "intermediate" ceiling depths as you ascend. Be careful not to go above the ceiling depth until your dive computer indicates that it is safe to do so.

Ascend to your ceiling depth slowly … to give the nitrogen bubbles a chance to be expelled from your body before they're allowed to grow too numerous or too large. It is usually a good idea to stop 2 to 5 feet below the ceiling so that any slight variations in your buoyancy control will not cause you to exceed it.

Since decompression is affected by a lot of different variables … most of which are unique to our individual bodies and the circumstances of our dive profile … it's impossible to provide a "formula" that works best for all cases. Therefore some rules of thumb can be adopted to help you make a safe ascent:

1. Ascend to half your deepest depth at the normal rate of 30 feet per minute.
2. Remain at that depth for one minute.
3. Proceed with your ascent at a slower than normal rate … I prefer an ascent rate of no more than 10 feet per minute.
4. Make a short (1 to 2 minute) stop at 30 feet.
5. Proceed at 10 feet per minute to just below your ceiling depth.
6. Remain at that depth until you've "cleared" the deco obligation from your dive computer.
7. Take a full minute to go from there to the surface.

In many cases of inadvertent deco obligation, making a slow ascent and short stops at the halfway and 30-foot depths will clear your computer before you even reach your safety stop … in which case you can end the dive by simply following your normal safety stop routine.

Obviously, other factors need to be taken into account … such as how much breathing gas you have remaining. It is important to realize that following a deco obligation into an out-of-air situation is simply not the right choice. Although clearing the deco obligation is important, making sure you have adequate gas to do so is always the top priority. Monitor your air supply carefully and make sure you and your dive buddy know how much each of you has remaining.

There may be other circumstances that would require you to surface with a deco obligation, such as a flooded drysuit or simply being too cold to remain in the water. Make sure to evaluate all risk factors when deciding what to do. However, if all other factors are within safe limits, following the rules of thumb listed above will reduce the risks associated with exceeding deco limits and help you end the dive safely.

If you must get out of the water before clearing your deco obligation, monitor yourself for signs of decompression sickness (DCS). If any signs of DCS become evident, begin O2 treatment and seek medical help immediately.

Remember that the best solution is to monitor your depth and time so as to avoid exceeding your no decompression limits. But mistakes happen … especially on days when you are doing multiple dives. If you should find yourself in a deco situation, begin your ascent immediately, monitor both your ascent rate and air supply, and remember that as you get closer to the surface, slower is better.