Sixty Feet Per Minute. Why?

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Was ascent at 60 feet per minute handed down along with the Ten Commandments? Or does it reflect a basic fact of human physiology: Well, no. Actually, it's another example of human beings at work, trying their best to stay out of trouble without a lot of information to go on.

Ancient History

The story goes back to Professor J.S. Haldane and his colleagues, Boycott and Damant. Early in the 1900s, the Royal Navy (Great Britain) asked them to figure out a way of bringing divers up from depth with as little risk of decompression sickness as practical. Their pioneering experiments and conclusions were published in a long scientific paper in 1908.[1]

Instead of doing risky experiments with divers, Prof. Haldane and his colleagues initially used goats in a high-pressure chamber. One of the things they learned was that a goat or a man could be brought up to an ambient pressure roughly half of the calculated nitrogen pressure in his most-saturated tissue. Getting rather promptly to the first decompression stop (or surface, in a short dive) was the main consideration. Within limits, the rate of ascent did not seem to make a lot of difference.

The Royal Navy put a Haldane-type decompression table into use. The rule for ascent rate was not to exceed 60 ft./min., and the main reason for this limit seemed to be the possibility of going past the first stop if the diver were hauled up too rapidly.

The U.S. Navy adopted the Royal Navy tables without a lot of change, and the first USN Diving Manual (1916) made not faster than a foot per second the rule. However, sometime between 1916 and 1943, this rule was changed. The 1943 USN Diving Manual says, the diver's *ascent should not be greater than 25 feet per minute.* Nobody now seems to know when or why that change was made.

New Air Tables -1958

I came on the scene at the old Experimental Diving Unit in Washington, DC, in 1951. Soon, and for some time thereafter, our "Bible" was a slender volume known as the Bureau of Ships *Diving Manual, NAVSHIPS 250-880,* issued in 1952.[2] Ascent at "not over 25 ft./min." was firmly implanted there, and it never occurred to us to question it. It was quite a practical rate for hauling a hard-hat diver up, and that was what most diving involved at the time.

One morning, probably in 1957, EDU personnel and a selected group from elsewhere met to talk about the proposed new *USN Diving Manual.* I'd been designated as editor. The main reason for having a new diving manual at that point was to put forth the new air decompression tables that were in the works. Anyhow, the rate of ascent in the new tables became a hot topic at the meeting.

Comdr. Doug Fane, representing his West Coast Underwater Demolition Team, insisted that his frogmen couldn't possibly ascend as slowly as 25 ft./min.. What they wanted was more like 100 ft./min., or even faster. The hard-hat types present insisted that nothing of the sort would be practical for hauling up divers in suit and helmet.

The men involved in calculating the tables insisted that ascent was an important element in decompression and that complete sets of schedules would have to be produced and tested for different rates of ascent - and that doing so would be totally impractical.

Facing reality, the two sides decided to compromise on 60 ft./min.. That had the merit of being equal to one foot per second, and it seemed possible for a hard-hat diver to be hauled up that rapidly and for a scuba diver to come up that slowly. Anyhow, the group decided on 60 ft./min., and the calculations proceeded on that basis. I don't recall that anyone present realized that 60 ft./min.. had once been the U.S. Navy rule and that it had been changed for reasons unknown.

Neither Fane nor anybody else probably realized quite how slow 60 ft./min.. would seem with scuba, but he probably figured that coming up a little faster wouldn't really hurt - and the hard-hat contingent probably thought that coming up slower than 60 wouldn't matter much, either.

As the tables took shape, it looked as if variations from 60 ft./min.. could sometimes make enough difference to require some rules for compensation. The basic ideas were that if a diver tarried close to the bottom, he could take up enough extra gas to require more time in decompression. If he came up too fast, he would miss some of the decompression time that ascent at 60 ft./min.. would have provided. Adjustments were to be made accordingly. The rules remain basically the same in the current USN Diving Manual as when I put them in the manual that came out in 1959.

Before we seriously question the safety of coming up at 60 ft./min.., perhaps we should be sure that we're not actually coming up much faster and failing to apply the rules. Or maybe we can find a better way.

References

1. Boycott, A.E., Damant G.C.C., Haldane, J.S. "The prevention of compressed air illness. *J. Hyg. Camb,* 1908; 8:342-443.

2. U.S. Navy Department (Bureau of Ships). *Diving Manual, NAVSHIPS* 250-880 Washington: Superintendent of Documents, 1952.