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Dear Sir:

1. Recently, the 304th ARRSq sent me to a high altitude diving work shop, sponsored by the National Association of Underwater Instructors (NAUI). All the speakers were extremely knowledgeable on the subjects of decompression sickness and altitude diving, and some of the knowledge I gained from the conference should be passed on.

2. The use of oxygen in the prevention and treatment of decompression sickness was stressed by Dr. Behnke. Prebreathing oxygen prior to diving deep, then abiding by the no-decompression tables lessens the chance of decompression sickness considerably by eliminating the nitrogen normally saturated at one atmosphere in our bloodstream. Breathing oxygen after a dive also decreases the chance of decompression sickness by enlarging the "oxygen window" and allowing more nitrogen to be eliminated by the body in a given time. Both prebreathing oxygen and breathing oxygen after the dive could be used as preventative measures in marginal situations on pararescue missions where dives must be made right on the "knife edge" of the no-decompression limits to complete the mission requirements.

3. In reguard to diving at altitude, Dr. Bell, a researcher from the University of California at Davis, reported that the Cross tables are valid. However, the ascent rate must be adjusted from the normal rate of sixty feet per minute by slowing the ascent two feet per minute per 1000 feet of altitude above sea level. The Cross table says that when a diver dives at altitude to a certain actual depth, he must use a deeper depth (the theoretical depth at altitude) when computing no-decompression limits from the US Navy Diving Tables. If he were to use the actual depth attained for these computations, there would be a great risk of being "hit" with decompression sickness due to critical pressure differentials during ascent while diving at altitude. Use of the theoretical depth of decompression stops at altitude, Cross Table B, shouldn't affect pararescue as we're restricted to no-decompression diving.

4. Another factor which must be taken into account is the fact that depth guages read differently at altitude than at sea level. Oil-filled and closed bourden tube depth guages read shallow, while capillary guages read deep at altitude and corrections should be made by either using the correction tables or by adding a drop of oil to the oil-filled guages. Some divers get around this problem completely by using a marked descent line.

5. Because of the problems associated with diving at altitude, and the fact that ARRS pararescuemen do dive at altitude in many areas, it would be of advantage to change ARRSR 55-11, page 18-2 to read:

> 33 to 130 Ft Dive (5 min minimum; <u>use the theoretical depth when diving at altitude</u>).*

If a dive were planned at Hill AFB, Utah (altitude 5000 ft above sea level) for an actual depth of 130 feet, a depth of 160 feet must be used in computing no-decompression limits (or decompression stops, in this case) from the Navy dive tables. However, if the dive were planned to a theoretical depth of 132 feet from the Cross table, the actual descent must be to no deeper than 110 feet, or the no-decompression limit would be exceeded.

6. Flying after diving should also be discussed, even though it is prohibited by Air Force regulations, as it remains a distinct possibility for mission requirements. There are two ways of approaching the problem: 1) by using the altitude at which the cabin is pressurized, or at which the aircraft will fly if unpressurized, for computing the theoretical depth and applying this to the US Navy dive tables, or 2) by computing pressure ratios for conversion to surface interval letter designator** the dives can be safely made prior to flying. In either case, pre-breathing O_2 and the use of oxygen after the dive and/or on the airplane would add a significant safety factor.

7. One other recommendation seems appropriate. There are now available several tables which present the US Navy Repeditive Dive Tables in a simplified form. These tables make the calculation of repeditive dives much easier than the format presented by the Navy, and could greatly increase the safety of repeditive diving amoung USAF pararescuemen.

8. It is my hope that this information will be of benifit.

Sincerely,

John C. Ratliff, SSgt
Pararescue Section, 304<u>th</u> ARRSq

*Underlined material is the added material.

**Reference "Altitude After Diving" by C. L. Smith, NAUI NEWS, Jan 74 pg 16, enclosed.