IS THE UNITED STATES NAVY STILL USING DIVE TABLES?

FEATURE **PATRICK VAN HOESERLANDE** PHOTOGRAPHY **U.S. NAVY**

U.S. Navy photo by Mass Communication Specialist 1st Class Blake Midnight

The impact of the U.S. Navy dive program on the diving world is monumental. The major contributing source to scientific research in diving was undertaken by the United States government, and indeed the U.S. Navy in particular.

In 1898 the U.S. Navy led the way in the development of decompression theory through their involvement with the investigation of the USS Maine which had been mysteriously sunk off the coast of Havana, Cuba. Shortly after, the rest of the world saw the possibilities of having military divers and began developing their own diving programs.

In 1915, the U.S. Navy published a report featuring the Haldane tables that included schedules for dives to depths of up to 204fsw (62 meters). The introduction of an additional tank that allowed a diver to break free from the surface supplied air and venture to deeper depths, led the U.S. Navy to the publication of the Diving Manual of 1916 which included schedules for diving to depths of 250fsw (76 meters) on compressed air.

In 1924, experiments at the Bureau of Mines Experimental Station in Pittsburgh, Philadelphia clearly showed that there were immense advantages using helium-oxygen (Heliox) mixtures for diving to deeper depths. Three years later, the U.S. Navy opened the Deep Sea Diving School (DSDS) and the Experimental Diving Unit (EDU) at the Washington Naval Yard to find a resolution to oxygen toxicity limits. Oxygen toxicity occurs as a result of aspirating higher pressures of oxygen. Deep sea mixed gas tables that incorporated helium into the breathing mixture began to form.

The contributions of Cousteau, another colossus in the diving world, were immediately transferred to the war effort in 1943 and put into practical application by the U.S. Navy through the elite Navy frogmen, equivalent to today's SEALs. A mere six months later, Navy divers made dives to depths of 304fsw (93 meters) for salvage operations of the USS F-4 submarine, which had been sunk off the coast of Honolulu, Hawaii. Due to the depth and necessary decompression, the divers were only able to remain on the bottom for short 10 minute durations, during which they were highly affected by what we now know as nitrogen narcosis.

Dr. Wienke, in 1992, broke away from the Haldane theory which focused strictly on dissolved gas and formed the Reduced Gradient Bubble Matrix (RGBM) which included the mechanics for dissolved gas and bubble dynamics. RGBM was partly constituted for the habits of recreational divers, however, the U.S. Navy also was in need of such tables to combat the stress of repetitive shallow working dives. Civilian institutions started to drive the enhancement of decompression theory, but credit remains with the Navy for providing much of the initial research and testing.

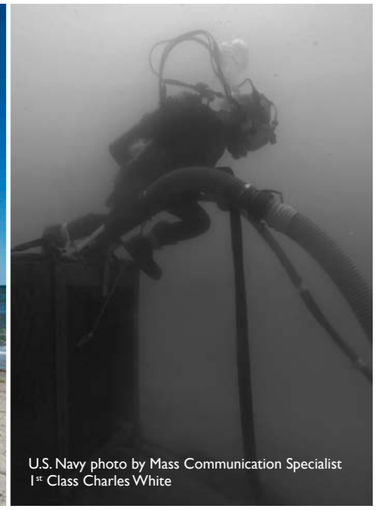
My admiration for the efforts done by the U.S. Navy started with my first manipulation of dive tables. Although they were a simplified version for SCUBA diving, the knowledge and experience captured in the original tables were still present. As I advanced along my diving career, the hunger for more in-depth knowledge led me to the U.S. Navy Dive Manual. Discovering this basic document felt like finding the Holy Grail. My temporary move to the USA created an opportunity to meet a U.S. Navy diver that I could not miss. The interview would give the possibility to get a vivid glimpse at grand history. And to get the answer to a burning question: Do the U.S. Navy still use their dive tables?

THE INTERVIEW

The day of the meeting, I drove to the Joint Expeditionary Base Little Creek, Virginia Beach, Va. The directions in the e-mail lead me to a building with a giant "crab" as its guard. The front gives away that this is the home of an Explosive Ordinance Disposal (EOD) group – home to specialists that utilize dive techniques

U.S. Navy photo by Mass Communication Specialist 1st Class Charles White


U.S. Navy photo by Mass Communication Specialist 2nd Class John Callahan


U.S. Navy photo by Mass Communication Specialist 1st Class Charles White

to approach explosives underwater in order to neutralize them. Although diving is only a means of transportation, it is a means that you have to master to near perfection in the vicinity of a device designed for destruction.

As I stepped through the door, I felt like I was entering the front office of the Walhalla for divers. This is a once in a lifetime opportunity, and I have all intentions to make the most of it. My point of contact, Lieutenant Dougherty, picked me up and I followed her to a small room. There, I met the dive officer of EOD Group 2 (EODGRU2): Chief Warrant Officer 3 Coy Everage. Hearing the title 'Dive Officer', I expected to interview a person with the rank of an officer, but officers who dive are rare in the Navy and none of them are in an EOD position. This surprised me because the number of divers certainly warrants enough officer level positions. These officers could be influential in promoting the diving community.

After the introductions, we were ready to start the interview.

SELECTION AND TRAINING

Divers are not specially recruited, meaning they all start in boot camp as every other recruit. Many do however, enter boot camp on contract to become Navy Divers. Additional recruits that have interest in becoming a diver may join special work-outs and pool training after the boot camp sessions to prepare them for the selection and training as a diver. This voluntary training, in addition to the hardship of boot camp, is considered as a kind of natural selection based on the will and motivation of the candidate to endure extra physical loads. Training is not the only thing done in boot camp; at the end of this period, the start of the selection process begins. After boot camp requirements and tests – which must be passed by all recruits – those interested in diving must wrestle through extra swimming, push-ups, sit-ups, pull ups and other tests.

A few years ago, the internal recruitment of divers – whereby active military in the Navy could become divers – was stopped. There is a possibility that this kind of recruitment will be reintroduced to supplement the recruitment during boot camp, should additional divers be needed.

After successfully passing boot camp and passing the medical section, the 'pool week' starts. This is a very intense in and under water training in the safe (all is relative of course) environment of the swimming pool. All dives are apnea dives with basic snorkeling equipment. The week serves to test the coolness and 'aquacity' of trainees underwater, even in stressful and difficult moments.

Pool week is the official start of diver training. The focus on education and training is one of the main differences between military and commercial diving. The possibility of encountering unforeseen, life-threatening situations during military action is much bigger, and a good way to increase the likelihood of surviving such a situation, is to train intensively.

To harness the expertise and experience into in-depth training, the U.S. Armed Forces have all divers trained at a sole diving school in Panama City, Florida.

From week 13 to 18 after the start of boot camp, the trainees are introduced to the art of surface supplied air diving. This is followed by 6 weeks of SCUBA diving courses wherein all theoretical and practical aspects are taught and trained. These two periods are known as the second class dive school.

After at least 6 years of being in the job, a diver can attend further training in the first class dive school. This is 9 weeks enrichment in surface supplied and SCUBA diving. Successfully ending this school gives a diver the credentials to take up the role of a supervisor.

The title of Dive Master can be reached after another 14 years of dive experience. Having achieved this level, the diver can become a dive officer, running a unit and leading the training of divers. This does not equal the qualification of an instructor, however, only providing the training necessary to sustain the level of performance of the divers in a unit.

All divers are trained in the use of air and Heliox. Nitrox is a possibility as a dive gas, but almost never used. The same is true for Trimix as warm water in a diving suit limits the positive effects of this mixture. Saturation diving is not common and limited to the 30 divers of the Experimental Diving Unit.

SAFETY FIRST IN THE DAILY JOB

The work of a U.S. Navy diver can be divided into four categories. The first is submarine and ship's husbandry, and consists of commercial type maintenance work on all parts underwater. The second is Special Warfare in which the diver supports dive training of special operations personnel like Navy SEALs. The Navy divers working is this category do not go in operations themselves, but support the operators. Salvage divers, the third category, specialize in salvage operations and other tasks. The last category consists of EOD divers, who, as previously noted, deal with underwater ordnance disposal.

A diver starting in a category does not always have to stay in that category. On the contrary, during a career, the diver has to switch categories, a necessary condition to become a dive master. This broadens the diver's knowledge about diving in general, at the detriment of specialization.

Another difference with commercial diving is the credo 'Safety First'. From a military community you could expect a 'Mission First' approach, but not in the U.S. Navy. This kind of diving does not call for a combat approach, although I suspect that in time of crisis that could change.

'Safety in numbers' must be the basic idea of the four person strong standard dive team. Planning and leading the team is in the hands of an experienced diver: the supervisor. Of course, there is the diver that has to do the job at hand. Supporting and aiding the diver is the tender. The fourth member of the team is the rescue diver, always ready to render assistance to the diver in case of dire straits.

Though the team may be the cornerstone of safe diving, procedures are certainly not neglected. Solo dives are never allowed. In case of potential danger like an EOD task, there is no use in risking the lives of two divers. Therefore an EOD diver will be tendered and is not considered a solo diver because the diver is able to communicate and the tender is able to keep a watchful eye on the events. When diving in pairs, the divers always use a floating buddy line. Work in enclosed spaces is not allowed. There must always be free access to the work spot. No dive starts without a decompression chamber nearby. There is also a limitation on the working depths: these conservative maximum depths are for air set at 190 feet (58 meters) and for Heliox at 300 feet (91 meters).

THE FUTURE OF DIVE TABLES

In the early days, military diving led the market and certainly the development of new products. With only 1% of the market share, this is no longer the case. Most of the time, military diving has to follow the innovations of the commercial and leisure diving industry. This does not mean that the Navy allows the use of everything that can be found in a store. No, it keeps a close eye on what's out there and follows a rigorous testing scheme before releasing equipment to the Navy dive community (this list can be found online by searching 'dive equipment authorization military use' or www.supsalv.org/00c3_AMU.asp).

The widespread use of Remotely Operated Vehicles (ROVs) did not go unnoticed. Some of the tasks are now done by these underwater robots, but their use is not limited to that. They are introduced as an integral part of some dive teams. The ROV can join the diver for extra assistance and in a supporting role as a transporter. The robot gives the supervisor a better view of the situation and is the physical contact with the rest of the team at the surface. Having a better and closer follow-up of the diver is what the military is looking for on the market.

Another promising development is that of sensors. As sport divers, we saw the introduction of the heart monitor sensor to adapt our decompression scheme, but there are more possibilities out there. All kinds of sensors to monitor the diver's vital parameters could lead to timely warning of potential dangerous situations and better action in preventing negative outcomes.


U.S. Navy photos by Mass Communication Specialist 2nd Class Wyatt Huggett


U.S. Navy photo by Chief Mass Communication Specialist Brett Cote

As ROVs and other high tech equipment are adopted, one could expect that a more common and less technological element as the dive computer is standard equipment within the Navy. Although some types are allowed, they are not part of the basic equipment and there is no intention to change that. The dive community considers a dive computer as an extra check, but certainly not as the primary tool to plan and execute a dive. A dive is still planned as a no-deco dive based on the current U.S. Navy tables. The rare deco stops are preferably executed in a hyperbaric chamber. So a diver skips his deco stop to go straight into the safety of a chamber. This may sound very strange for a recreational diver as we see hyperbaric chambers as tools for treating the possible consequences of a dive that went wrong. The U.S. Navy considers the risks related to a diver at a wet deco stop much higher than a normal ascent combined with the comfort and level of control offered by a decompression in a caisson.

EPILOGUE

After a few hours, the interview comes to the unfortunate and inevitable end. As I walk out of the building, I turn to have one last look at the "crab," the EOD warfare device so named for its resemblance to the small crustacean. I wonder if I've got all the important elements and if I will be able to integrate them into an article. The history and the influence of U.S. Navy diving in our world is too big to summarize in a few pages based on an interview. My hope is that I can transfer at least a bit of their heritage to you, my reader.