FACEPLATE

The Official Newsletter for the Divers and Salvors of the United States Navy
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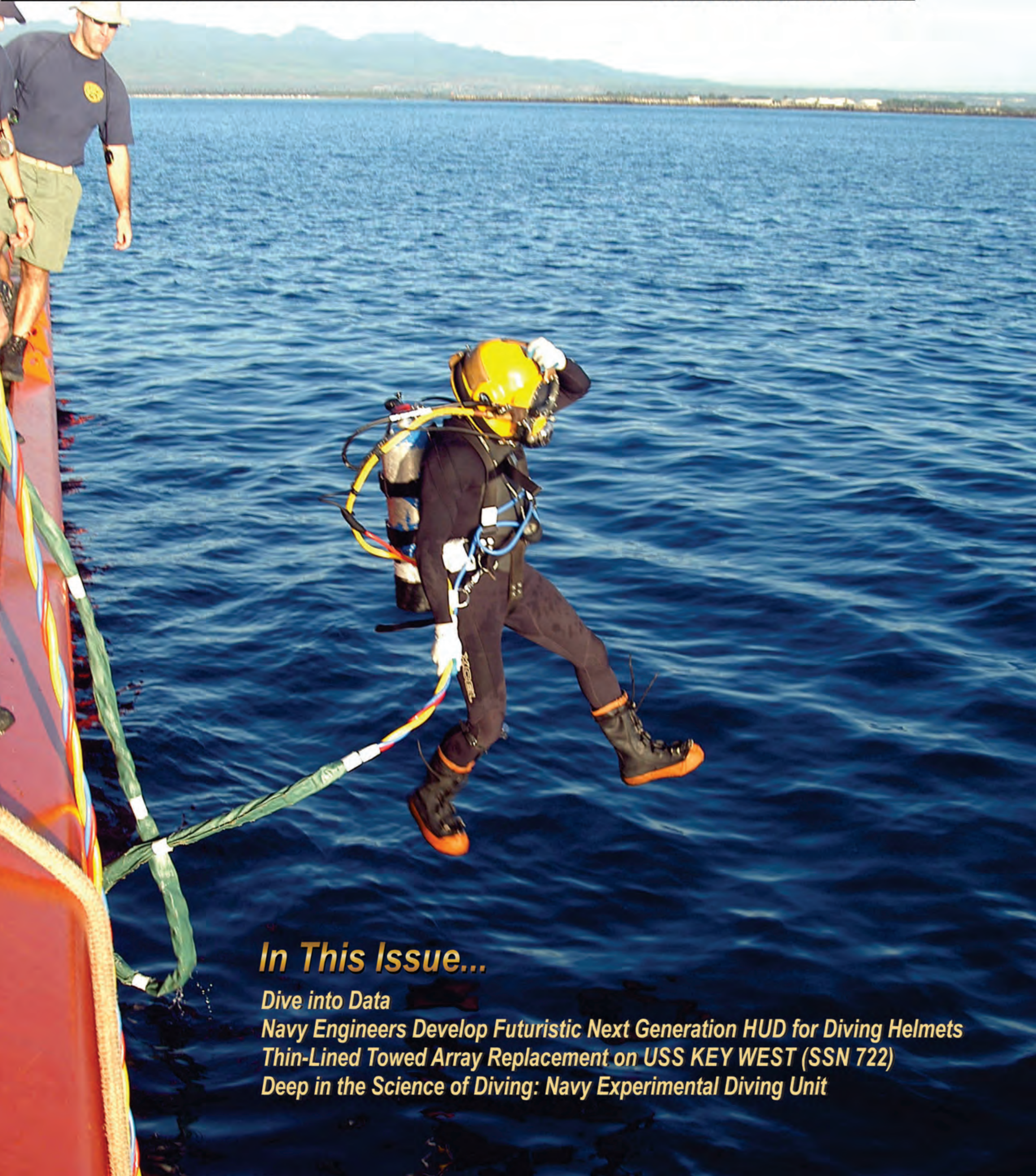

In This Issue...

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FACEPLATE is published by the Supervisor of Salvage and Diving to make the latest and most informative news available to the Navy diving and salvage community. Discussions or illustrations of commercial products do not imply endorsement by the Supervisor of Salvage and Diving or the U.S. Navy.

Articles, letters, queries and comments should be directed to the Commander, Naval Sea Systems Command, NAVSEA 00C, 1333 Isaac Hull Ave. SE Stop 1070, Washington Navy Yard, DC 20376-1070. (Attn: FACEPLATE). Visit our website at **http://www.supsalv.org** to view/print Faceplate.

Editorial Staff

In This Issue

Cover

NDCM (MDV) Dave Gove oversees surface supplied diving operations off the coast of Oahu in 2005, while stationed at Mobile Diving Salvage Unit ONE.

SUPSALV SENDS...CAPT Keith Lehnhardt

Greetings Navy Divers! For those who haven't heard, I took over the reins as SUPSALV from CAPT Gregg Baumann back in May. For Gregg, his SUPSALV tour capped off a near 30 year Navy career. While he served in many different roles ranging from maintenance to ship salvage to acquisition to foreign military sales, he mentioned during the turnover process that he considered SUPSALV to be the pinnacle tour of his career. Always save the best for last, right! Thanks, Gregg, for your dedicated service, commitment to excellence, and many contributions to the Navy Divers and fleet in general. Fair winds and following seas, brother!

As I step into the big shoes left behind by Gregg, and those who preceded him, I am humbled and honored to have the opportunity to lead the SUPSALV organization. While my background primarily lies with the operations, maintenance and acquisition of submarines, diving systems, submersibles and high speed surface craft, I managed to weave as much operational diving and salvage work into my tours as humanly possible. Diving is my passion and I'm excited to get back into it full time.

I am a firm believer that the vast diversity within the many facets of the Navy Diving community is our greatest strength. While we are all Navy Divers, we spread ourselves across the many disciplines of UWSH, salvage, ordinance disposal, training, construction, combat diving, experimentation and more, and, in doing so, provide huge contributions to enable and move the **four lines of effort identified in the CNO's "Design for Maritime Superiority"** forward, from strategy to reality.

Our regional maintenance center, shipyard and contracted divers work miracles to keep our ships in the water and operational, while our MDSU, EOD and SEAL Divers work to clear the path and **strengthen Naval power at and from the sea**. To date this year, your UWSH efforts kept a minimum of 54 ships and submarine OUT of dry dock and in the hands of the operational Commanders. That's strengthening Naval power in my book!

With diversity of mission, geographic location and chain of command come challenges as well. We need to ensure that we continue to reach out and communicate lessons learned, mishaps, and better ways of doing business across boundaries, allowing us to **achieve high velocity learning at every level**. Remember, "Failures are part of life. If you don't fail, you don't learn. If you don't learn, you'll never change." Let's learn and change as a Diving Community. Spread the word quickly about things that we can do better, safer and more efficient. As SUPDIVE mentions later, we are working on collaborative tools to harness technology that is already out there, to help move us further in this direction.

The diverse perspective that divers at all levels of the various organizations bring to the table to solve problems, meet operational commitments, and overcome challenges is amazing. I have always been impressed with the superior leadership, mentorship, and followership that exists in the diving community, and this will continue to **strengthen our Navy team for the future**.

Finally, through the various international exercises, partnering agreements, cross training, humanitarian assistance, and foreign military sales projects, you all work diligently year round to move the benefits of diversity past our borders to **expand and strengthen our network of partners**. What a force multiplier this is to be able to bring to bear the equipment, techniques, and staffing of our foreign partners. The policy put in place by the new release of the OPNAVINST 3150.27 and the upcoming release of the Navy Diving Manual (Rev. 7) includes provisions and authorities to streamline international partnering, and put more control in the hands of the operational Commanders. Take advantage of these opportunities and use your ORM wisely!

For those of you who haven't read the CNO's "Design for Maritime Superiority", I encourage you to do so. What I've discussed here is just the wave tops. It really puts a greater perspective on the jobs that you do day in and day out. Your diligent effort along each of these four lines (bold/underlined) is critical to our Navy's success and its ability to protect our nation's interests in the face of our adversaries, and the challenges that the maritime environment, technology proliferation, and budgetary pressures present.

In closing, we welcome CDR John Porter as SUPDIVE, CDR Ford Ewaldsen as our OPNAV N97 Resource Sponsor, and Mr. Mark Helmkamp as SEA00C2. Fair Winds and Following Seas to CAPT Scott Kraft, who is on his way to NSWC Indian Head EOD Technology Division, CAPT Dan Schultz, who has move on to the Naval War College, and Mr. Mike Herb, who is enjoying retirement. Thanks for your exceptional effort in moving the Diving and Salvage community forward.

See you on the side.

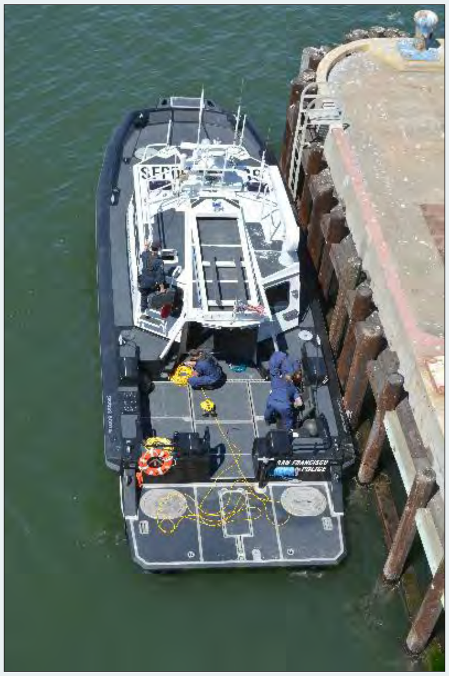
Dive Safe. Hooyah Deep Sea!

Keyport Divers Partcipate in History Making Underwater, Two-Way, Highspeed Data Transfer Demonstration

By: NDC(DSW/SW) Jose Castilla III

While we routinely text and share media above the waterline with ease; these capabilities are now within reach of Working Divers. Divers from Naval Undersea Warfare Center Division, Keyport recently supported Dr. Alex Bordetsky, Director of Naval Post Graduate School's (NPS) Center for Network Innovation and Experimentation (CENETIX) during a Tactical Network Topology (TNT) - Maritime Interdiction Operation (MIO) field exercise. With teams operating in San Francisco Bay and the Puget Sound, Keyport, divers participated during the in-water portion of the exercise conducted in late October 2015.

As a first time TNT-MIO participant, it took me a couple of days to wrap my head around the scope of the project we were participating in. Imagine the MIO program as a human body in which subject matter experts, data bases, fusion, commanders, and stake holders function as the brains; an integrated MIO network is the nervous system; operators (visit, board, search, and seizure (VBSS) teams, special forces, law enforcement, and NUWC Keyport Divers) are the hands; and a myriad of sensors and robots serve as the eyes. These experiments/field exercises seek to explore and expand the capabilities of those body parts, while revealing, testing, and mitigating the vulnerabilities of each.



San Francisco Police Department officers & dive boat support MIO-JFIX-2014 in San Francisco Bay. August 10-14, 2014. Photo by: Eugene Bourakov

Left to right: Senior Researcher Eugene Bourakov, ND3 Andrew Hulsey, NDC Jose Castilla III, and ND1 Benjamin Gyger pose for a picture at Alameda Point following a history making, bone crushing, 15ft -26 minute SCUBA dive. Photo by: NDCM(DSW/SW) David Glidewell

ND3(DSW) Andrew Hulsey, the hands for this portion of the exercise, had a relatively simple task at least from a diver's perspective - enter the water, place a diver worn handheld device in close proximity to the 'data port', receive tasking, accomplish the assigned task, and return to the data port to transmit results. Behind the scenes things were a bit more complicated and high-tech.

At depth, ND3 Hulsey utilized the data port end of the nervous system, an ad-hoc, mobile, self-forming network, coupled with Bluetooth technology, to receive tasking in the form of text messages and photos. The texts were sent from the brain, an operations center on Yerba Buena Island, but could have been sent from anywhere in the world - photos and real time video were collected by the eyes, NDC(DSW/SCW/EXW) Jared Butler and ND2(DSW) Joshua Amberson operating a VideoRay UROV over 800 miles away in Keyport, WA. Following his instructions, ND3 Hulsey used Near Field Communication to operate his handheld device, took a picture of the suspect package, and transmitted it back to the operations center via the data port. He then stood by at depth for further instruction. According to Dr. Bordetsky, this feat was a first for the world of diving.

The significance of CENETIX effort's goes well beyond analyzing and bolstering the connection between the Brains and Hands. The technology CENETIX is leveraging to bring two-way high speed data access to divers at depth also helps mitigate one of diving's greatest hazards – ambient pressure change due to vertical movement in the water column.

By eliminating the need to surface for the diver to receive and transmit real time high speed data and instructions from the Brains, the data port mitigates an aspect of risk for divers in much the same way a robot mitigates risk for VBSS teams by exploring around corners before the team is exposed to a hostile field of fire. The net effect in both cases is a fortification of the Hands, and thus a more robust MIO program.

For more information on NPS' CENETIX please visit: http://cenetix.nps.edu/cenetix/cenetix.asp

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NDC Castilla is the Leading Chief Petty Officer at NUWC Detatchment Keyport and the Dive Locker's errant editor at large.

NEDU Exhibit on Display at the U.S. Naval Undersea Museum

By: Mary Ryan

One of the most rewarding things about working at a Navy museum is the opportunity to introduce the public to hardworking Commands they may not be familiar with - yet. Last fall we had the chance to do just that by opening a new exhibit about the Navy Experimental Diving Unit (NEDU).

The Navy Experimental Diving Unit has safeguarded divers and expanded their diving capabilities since 1927. NEDU's ongoing mission is to research, develop, test, and evaluate diving equipment and procedures. Put more simply, NEDU's job is problem-solving: NEDU scientists, engineers, and divers use their expertise and experience to find solutions for the many challenges of working underwater. Over the last nine decades, NEDU's work has significantly extended the depth, duration, and safety of Navy diving.

Since September 2015, the U.S. Naval Undersea Museum has been sharing this message with our visitors in our exhibit "NEDU: Rising to the Challenge." The exhibit delves into NEDU's many accomplishments by explaining each as the solution to a pressing problem that faced the diving community. Because NEDU has solved so many diving challenges in its 89 years, the exhibit focuses on its most significant achievements.

Most famously, NEDU personnel developed the decompression tables that remain the worldwide standard today. Decompression tables tell divers how to safely decompress after a dive. Divers use different types of decompression tables depending on how long and deep they dive, the type of breathing mixture they use, and the type of gear used, among other factors. Over the years, NEDU personnel have developed or improved more than 20 different types of decompression tables.

At depths deeper than 165 feet, divers can begin experiencing the disorienting, drunk-like condition known as nitrogen narcosis. NEDU fixed this problem in the 1930s by developing a new breathing mixture using helium. Replacing the nitrogen in air with helium removed the threat of nitrogen narcosis and allowed divers to go deeper, safely. Helium was used in a real-world operation for the first time in May 1939, when divers breathed helium to salvage the sunken submarine USS Squalus (SS 192) from 243 feet. Today helium remains the standard Navy breathing mixture for surface-supplied dives to 190 feet or greater.

NEDU has also played an instrumental role in saturation diving since Navy doctor Captain George Bond proved its viability with the Sealab projects in the 1960s. NEDU developed the saturation

NEDU was stationed at the Washington Navy Yard, where this 1974 photo was taken, for almost 50 years before moving to its current home in Panama City, Florida, in 1975.

Hospital Corpsman 1st Class David Keener (left) and Chief Hull Technician Brad Flemming decompress after making a dive during the 2002 USS Monitor salvage operation off Cape Hatteras, NC. The decompression tables NEDU developed are the standard worldwide. (Photo by: Photographers Mate 1st Class Chadwick Vann)

diving decompression tables that let Sealab aquanauts decompress safely after weeks of living underwater - a task made doubly difficult because the tables had to address the effects of saturation diving and the use of helium as a breathing mixture. More recently, as the Navy regained in-house saturation diving capability, NEDU tested and certified the Navy's new saturation diving system.

In modern times, NEDU's focus shifted to testing new diving equipment and establishing diving procedures. Its exhaustive testing may not be the most glamorous of Navy projects but it is monumentally important. The Navy Diving community is known for its uncompromising safety and unparalleled expertise, a reputation earned in part by the many hundreds of pieces of diving gear NEDU has tested and procedures it has developed.

"NEDU: Rising to the Challenge" will be on display through the summer of 2019. Highlights of the exhibit include a Momsen lung; MK V mixed gas, MK 12, and MK 21 helmets; and MK 11 and MK 15 UBAs (underwater breathing apparatuses). Visitors are also challenged to use what they learn about diving gear NEDU has tested in an interactive education experience.

The U.S. Naval Undersea Museum is located in Keyport, Washington, and is open daily from 10:00 AM to 4:00 PM (closed Tuesdays from October to April). Admission and parking are free. Can't visit in person? Enjoy an online version of "NEDU: Rising to the Challenge" on the museum's website at http://www.navalunderseamuseum.org/nedu/.

Article cover photo: A view of the new exhibit "NEDU: Rising to the Challenge" on display at the U.S. Naval Undersea Museum. (Photo by Jarrod Gahr)

Mary Ryan is the curator at the U.S. Naval Undersea Museum, the Navy's official museum for undersea history, technology, and operations.

Naval Station Guantanamo Bay Dive Locker Enables Dive Training Capabilities

By: Expeditionary Combat Cameras' Underwater Photo Team

Members from the Underwater Photo Teams sharpen their skills during underwater photo training off the coast of Guantanamo Bay, Cuba, Nov. 20, 2015.

It's called the pearl of the Antilles. Guantanamo Bay's crystal clear waters offer a wide range of possibilities for commands seeking cost-effective training grounds for diving.

Chief Navy Diver Julius McManus, Command Diving Officer for Naval Station Guantanamo Bay (GTMO) says the GTMO facility is fully equipped to support dive training operations.

The dive locker is outfitted with a MK-16 charging station, a MK-III Lightweight Dive System, and a Recompression Chamber Facility 5000 that can provide 100% O2 and 50/50 N2/O2. Additionally, the locker is capable of supporting SCUBA, ships husbandry, and light salvage operations.

"GTMO's geographic location allows divers to take advantage of 300 days of ideal weather conditions, diving in waters that range from 45 to 1000 feet in depth, less than a 15-minute commute from the dock," says McManus.

U.S. Navy manned Port Operations has 100% control of recreational boat traffic, allowing military divers open access to secured waterways and providing an added sense of safety to the dive side.

In addition to ideal diving conditions, the base goes on to offer several facilities that appeal to commands in the planning phase of a training evolution, such as hundreds of rooms through Navy Gateway Inn and Suites, a fully outfitted dining facility, and a level four treatment center at Naval Hospital Guantanamo Bay.

In comparison to traditional, more commonly used dive training locations, it is significantly more cost effective to send divers to train in GTMO, says McManus. On average, diving commands could save roughly $20,000.00 per week in training expenses because of lower per diem and lodging costs, as well as lower airline expenses by utilizing Navy Air Logistics Office (NALO) flights, vice commercial airlines or convoys.

In addition to NALO flights, base air operations include helicopter capabilities with a maximum ceiling of 4,000 ft. for water jumps and fast roping, as well as an airfield capable of handling wide body jet airliners and strategic airlift aircraft.

Naval Station Guantanamo Bay is host to several weapons ranges, a demolition range, and offers the possibility of supporting underwater demolition operations.

The GTMO Dive Locker stands as a willing and able participant to commands of all branches seeking to develop their divers, especially in times where divers of all branches must seek to streamline their forces while maintaining the same standard of proficiency. McManus says, “Our schedules are completely open”.

For more information about the Naval Station Guantanamo Bay Dive Locker contact NDC David Diller at david.diller@gtmo.navy.mil.

The mission of Expeditionary Combat Camera is to provide direct imagery capability to the Office of the Secretary of Defense (OSD), Chairman of the Joint Chiefs of Staff, Military Departments,combatant commands and joint task forces during wartime operations, worldwide crisis, contingencies and joint exercises.

Members of the U.S. Navy Underwater Photo Team (UPT), assigned to Expeditionary Combat Camera and Fleet Combat Camera Pacific enter the water during a training evolution off the coast of Guantanamo Bay, Cuba.

Chief Mass Communication Specialist Shane Tuck poses during underwater photography training off the coast of Guantanamo Bay, Cuba.

Navy Diver 2nd Class Kevin Marchi, assigned to Mobile Diving and Salvage Unit (MDSU 1) ONE, aboard the fleet-ocean tug USNS Catawba (T-ATF 168) prepares to dive. The divers are working to salvage an aircraft lost at sea.

Thin-Lined Towed Array Replacement on USS KEY WEST (SSN 722)

By: CWO3 Joe Theodorou

In October of 2015, Pearl Harbor Naval Shipyard (PHNSY) requested assistance from Supervisor of Salvage and Diving, Underwater Ship Husbandry Division (SEA 00C5) to replace the Thin-Lined Towed Array (TLTA) Capstan Motor on USS KEY WEST (SSN 722) in Guam. This was based on subject matter experts from both PHNSY and Naval Underwater Warfare Center (NUWC) determining after replacing internal electrical controllers and hydraulic valves, the capstan was still operating erratically requiring replacement. SEA 00C5 assigned CWO3 Joe Theodorou (author) as Project Manager. After review, I concluded due to the underwater welding (UWW) requirement that a diving and diving related services contract was needed. Therefore, Phoenix International Holding, Inc (Phoenix) was directed to plan and execute the TLTA capstan motor replacement under my guidance.

Phoenix began planning by sending supervisors and engineers to Norfolk Naval Shipyard (NNSY) to visit USS ALBANY (SSN 753) in dry-dock in order to take dry measurements of capstan motor to ascertain if removal of the motor through Main Ballast Tank (MBT) 5A grate was feasible. This would save significatant time and cost versus having to cut an access through the MBT bulkhead for removal of the motor through the SPM cavity. In addition, two Phoenix divers traveled to Rhode Island to met with NUWC Engineers who provided an overview of the system and replacement motor. Valuable information was gathered from system drawings and computer aided design (CAD) 3D drawings that supported lowering the motor through the grate with minimal interference removal. The planning and preparation phase took just under two months to complete; the phase included information gathering, welder-diver welding procedure qualification, engineering designs and procedures, fabrication of an open bottom cofferdam to support dry habitat welding, and personnel certification.

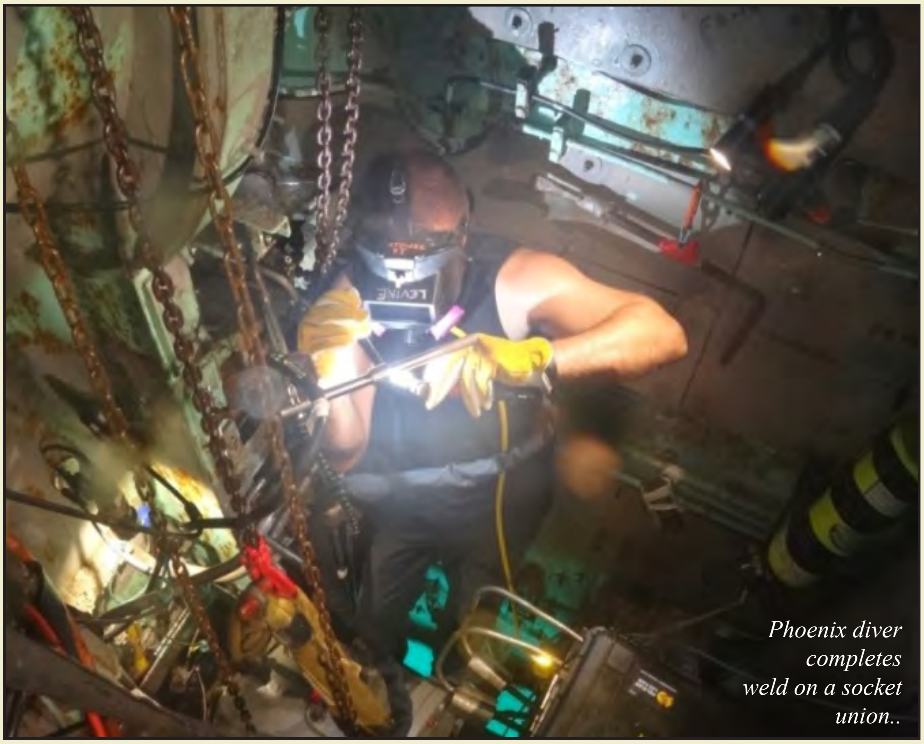
Dry chamber is deployed to MBT-5A.

Prior to Phoenix executing its portion of the job scope, coordination was made with USS Frank Cable (AS 40) divers (FCB DVRS), PHNSY and NUWC to remove the array, flex-coupling and pump out the hydraulic fluid from the system in support of removal; this saved two days. Phoenix equipment manager arrived to set up the Air Transportable Underwater Welding System II (ATUWS II) prior to Phoenix divers and myself arriving.

Execution of capstan motor removal started on 01 December, with Phoenix divers verifying the measurements that would support rigging through MBT 5A (#33S) grating. The cofferdam was deployed, rigged and dewatered over MBT-5A in support of dry chamber welding. Per Naval Standard Technical Manual 074, a minimum of three feet of dry surface should be maintained from the lower boundary of the weld area to the water line.

Phoenix excavated six socket welds, a ballast tank chock and a pipe hanger to support removal of capstan motor. Prior to commencing removal rigging, Phoenix plugged all piping on the capstan motor, to reduce any hazardous waste and to support NUWC in troubleshooting motor inoperability. The capstan motor was recovered to the surface on 08 December. Preparations began to install the new motor, which required verification of depth measurements of unions to ensure they were still in compliance with MIL-STD-22D. All unions were verified in compliance and prepped for reinstallation. The capstan motor was reinstalled and fit-up measurements were verified to ensure proper alignment of both the angular and parallel shaft positions between the drum shaft and capstan motor shaft. Based on specific guidance contained in NAVSEA SE325-CF-MMI-A10, Tech Manual for I Level Operation and Maintenance Deployable Array Working Group Type OA-9070A_BQQ, a deviation was required because the drum motor pawl lock was engaged, not allowing 360 degree movement for measurements as required. NUWC In-Service Engineering Agent manager approved the deviation allowing the reinstallation to continue. The capstan motor was reinstalled and all pipe unions welded with a visual and dye penetrant test SAT on 17 December.


Phoenix diver lower old capstan motor through grate.


Phoenix diver completes weld on a socket union..

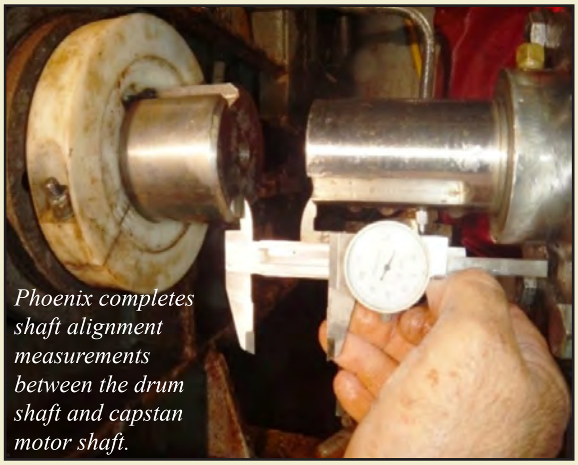
PHNSY then conducted a joint tightness test of all pipes removed with no leaks reported. Phoenix then completed installation of the grate chock, pipe hanger and removal of the cofferdam. Phoenix completed all requirements on 19 December. Twenty-one operational days were planned to support the replacement effort, even with three days of delays, the team was able to complete two days ahead of schedule.

FCB DVRs completed capstan motor operational testing requirements and reinstallation of array and flex coupling with NUWC divers. Overall, this team effort saved the Navy $1.9M in dry-dock avoidance and approximately 20 days of ship movement to and from the closest dry-dock.

As the project manager for many jobs, this was by far the most technical and rewarding job to manage and plan with all the different entities. HOO-YAH DEEPSEA!

CWO3 Joe Theodorou is currently serving as project manager under SEA 00C5.


New capstan motor is prepped and ready to reinstall.


Phoenix completes shaft alignment measurements between the drum shaft and capstan motor shaft.

Mark V Monument Scholarship Project

By: Dave Sullivan Mark V Monument Scholarship VP, T, & S

"The Mark V Monument Project" originally undertook a mission to obtain the necessary Navy approval and private funding to fabricate and erect a ten foot tall bronze/granite JAKE monument at the entrance to the Naval Diving and Salvage Training Center in Panama City, Florida. The monument was completed in October 2012, and dedicated to all U.S. Military Diver graduates, past, present and future that go down in the sea to work.

Military Divers are among the hardest working people that willingly labor at one of the highest risk and toughest jobs in country. They generally do not earn enough to bear the high cost of college education for their family without some kind of financial assistance. Therefore, the Mark V Monument Project is in its third year of a new mission to generate funds that will provide scholarship assistance to the children, grandchildren, and spouses of U.S. Military Divers. We are excited to now focus on this new and worthy mission and are grateful for the donations and volunteer efforts that enable us to operate toward success. We recently distributed the annual scholarship awards for 2016

The recipients of the 2016 Mark V Monument Scholarships are:

Letah Campbell
daughter of
MM3 (SS/DV) Chad Campbell

I will be attending the University of Hawaii at Hilo, earning a degree in Biology focused on Ecology and Conservation, with a minor in Anthropology. This degree will help me pursue teaching abroad and doing field research around the world. Due to this scholarship, I haven't had to accept any unsubsidized loans which makes paying for college much easier. I also wont have to work as many hours throughout the year and can spend my extra time diving all around Hawaii. This award has given me a better base for my future and has brought my father and I closer together. Thank you Mark V Monument Scholarship program.

Mallory Daniels
daughter of
LCDR (SS/DV) Robert Daniels

This fall, I will attend the University of Texas at Austin to begin my undergraduate studies in nursing. I hope to someday become a Commissioned Corps Officer of the United States Public Health Service. I believe dedicating my career to public service will be fulfilling and rewarding. This scholarship is helping me achieve my goals be alleviating the financial burden of attending a university. Thank you so much for selecting me as a recipient of this scholarship. I am very grateful for your support.

Dive into Data.

A Statistical Look At Military Diving Since The Establishment Of DJRS.

By: LCDR Jim Colgary, USN, ED Diver, MIT Graduate Student

In 2008 the US military transitioned to a central, electronic dive logging system called the Dive Jump Reporting System, DJRS. Meant to increase visibility on diving trends and maintain an accessible system to view dive currency, the system has been a great asset to the dive community and its leadership. In the summer of 2015, I requested the largest data draw in DJRS history: every electronic dive log and dive related mishap since DJRS implementation. Following a Freedom of Information Act request, the Naval Safety Center, owner and maintainer of the system, provided 768,851 dive log entries and 39 mishap reports (since 2008). In addition to the DJRS data, Atmospheric Dive Suit (ADS) dive logs were collected from the Portsmouth Naval Shipyard to further strengthen the dataset. Saturation Dive logs, however, were not obtained. With six years' worth of military dive history, we can quantitatively learn a lot about our community.

All charts are available online at www.militarydivingdata.com for an interactive data experience. Please visit the web to fully customize, download, and further explore six years' worth of dive logs.

Figure 1 is a traditional histogram showing all military dives since 2008. All services, types of diving rigs, and tasks are represented. Some technical notes: (1) dives are broken into incremented 10 foot "bins," starting from the left limit; (2) The blue columns represent the total number of dives on a logarithmic scale; and (3) The orange line represents the cumulative percentage (Empirical Cumulative Distribution Function, ECDF) of dives achieved to a given depth.

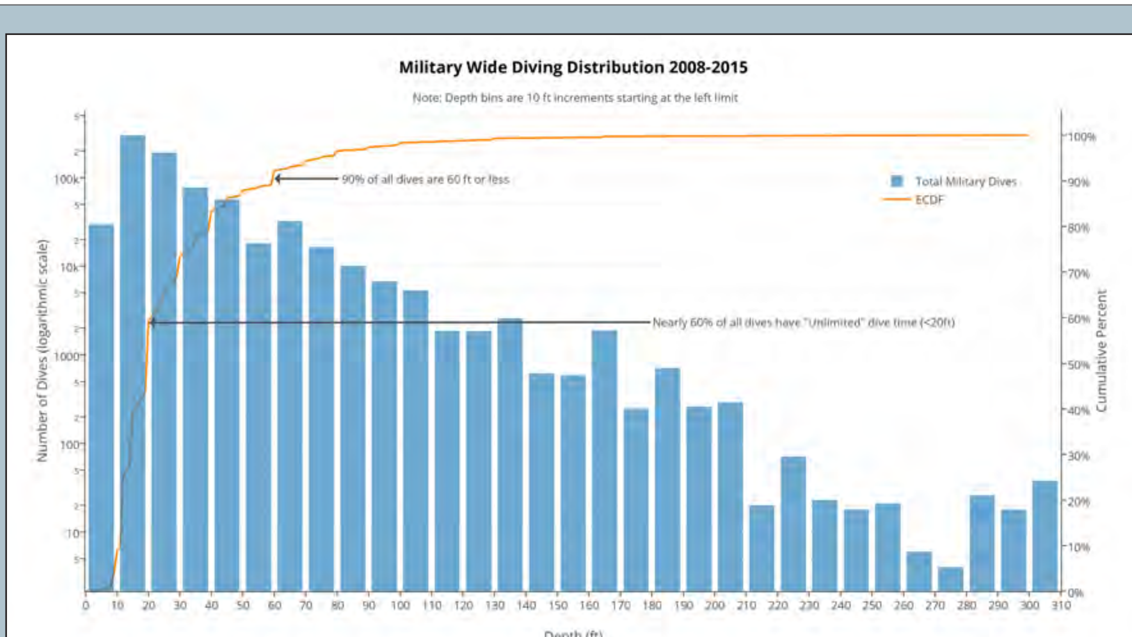


Figure 1

One of the first numbers from the dataset that may come as a surprise is the average dive depth: 27.8 feet. This number is driven by high instances of 10-29 foot dives (20 foot dives representing the dataset median). Additionally, nearly 60% of all dives have "unlimited" dive time and 90% of all completed dives have been less than 60 feet. Consider yourself in an exclusive club the next time you dive greater than 60 feet.

Figures 2 and 3 illustrate "how" the military dives. DJRS broke down each documented dive by job type, tagging each entry with a general "Dive Description." Each bin is normalized to the total number of dives within the given depth bin. Figure 2 illustrates a group normalized percentage for each given dive type. For example, between 260 and 269 feet, 50% of time was spent on Experimental Testing, and the other 50% was spent on Search. Most depth bins are dominated by training. Training (Diver), Supervisor Training, and Student Training represent 57% of all diving depths less than 190 feet. Interesting things to see: (1) The community spends a considerable amount of time on Experimentation, specifically at deeper depths; (2) Pressure Testing for dive candidates and Recompression treatments make an appreciable appearance in the 60 foot depth bin; and (3) Requalification dives are generally very shallow (10-19 feet).

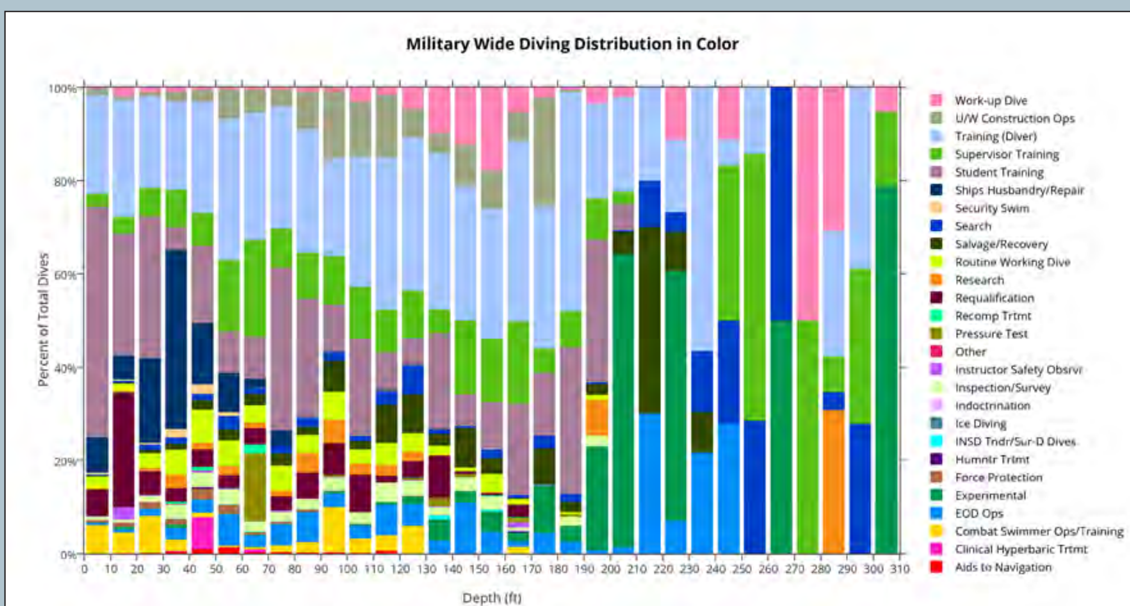


Figure 2

When all training and non-operational diving types are removed, Figure 3 shows a clear visual of all diving work. The shallower depths are dominated by harbor work: U/W Construction, Ship's Husbandry, Security Swim, Routine Working Dives, Inspection/Survey, and Force Protection. As depth increases, the dive profile is dominated by Salvage, Search, and EOD work. If you visit the web (www.militarydivingdata.com), you can customize the chart by toggling legend descriptions on and off.

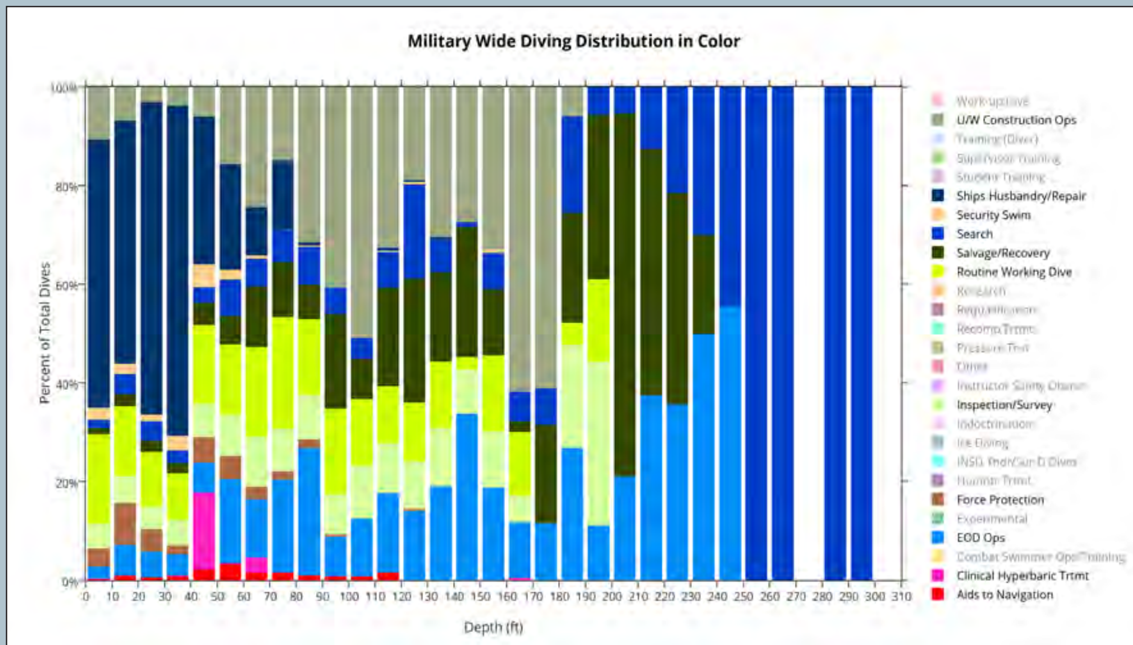


Figure 3

Figure 4 breaks out the data by Service affiliation. As expected, the Navy dominates the number of dives completed at each depth. Army Divers make up the next highest percentage of dives at almost all depths. This chart represents all types of diving.

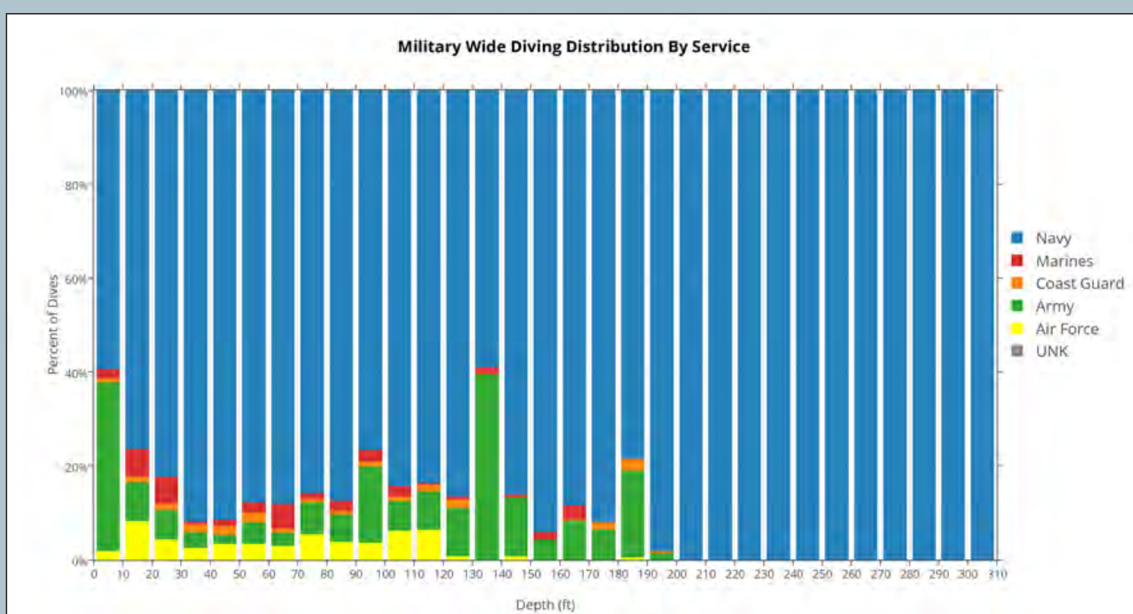


Figure 4

In Figures 5 and 6, the diving data is segmented by apparatus type. This is the first time ADS dive history is included, although at a very small fraction. The pie chart in Figure 5 represents the average apparatus use per year. The group normalized chart in Figure 6 shows how apparatus use relates to depth. Note the depth axis stops at 310 feet, above which, the ADS is the only rig used, absent of saturation diving (data not included). "Oxygen Rebreathers" represents MK-25 variants, "Mixed Gas Rebreather" represents MK-16 (Air and Helium diluents) or similar variants, "Other" includes experimental or similar rigs, "Surface Supplied" represents MK-21 and KM-37 similar variants (mixed gas and air), and SCUBA and Chamber dives represent their namesake.

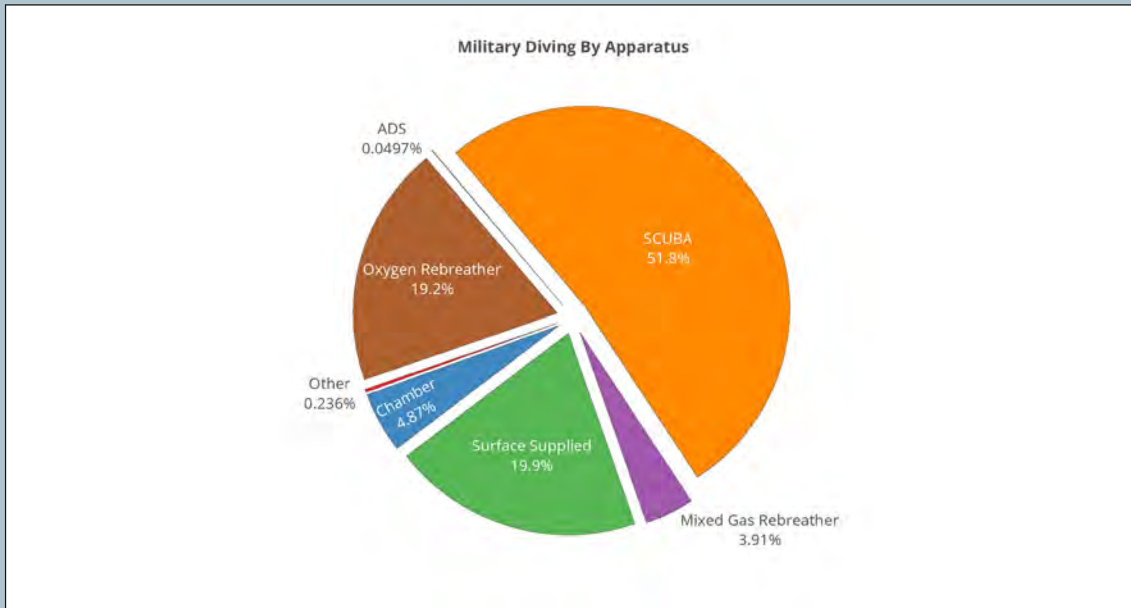


Figure 5

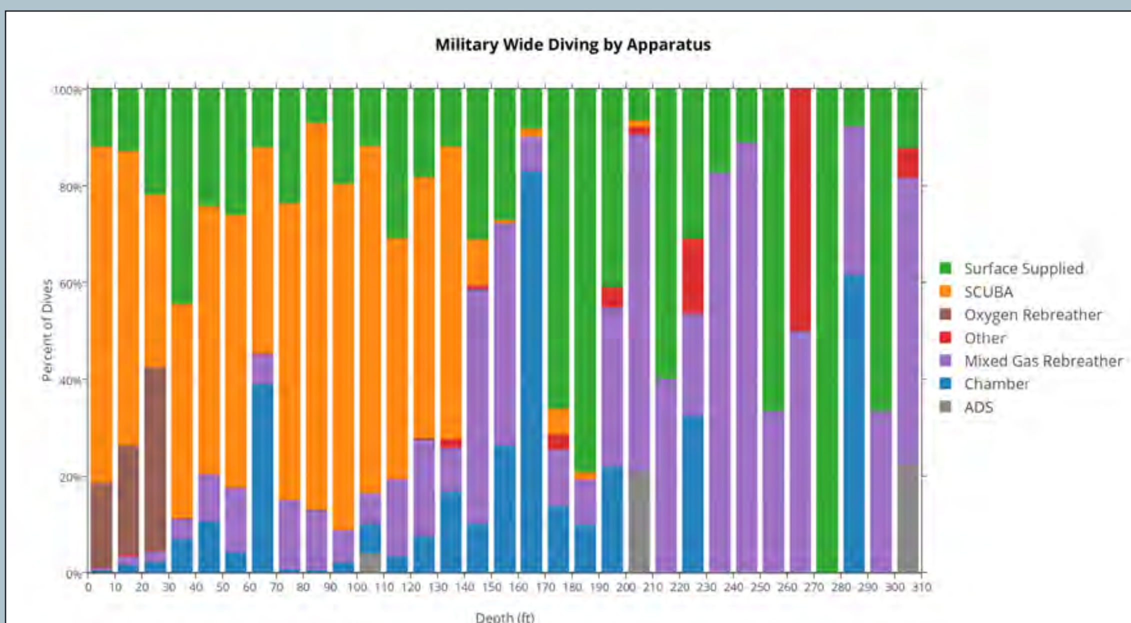


Figure 6

SCUBA dominates shallower depths and trails off until its upper authorized-use limit (190 feet). The 5 SCUBA dives seen at 200 feet were recorded by NEDU. Mixed Gas Rebreathers and Surface Supplied diving takes over when the depth becomes deeper. Few dives (536 total, less than 100 per year) were completed to depths greater than 200 feet, so the apparatus use percentages are more variable and sensitive.

Figure 7 buckets the dives by year. Given 2008 represented the start of DJRS and only partial data was received for 2015, the following chart represents the dive breakdown from 2009 through 2014. Although the number of dives increased steadily over the years, all previous analyses were annually consistent. On average, as a combined military diving community, more than 115,000 dives are logged per year. Over 45 dives occur every working hour (assuming 250 day work year and 10 hour work day). Rest easy knowing somewhere one of your fellow divers is breathing compressed gas.

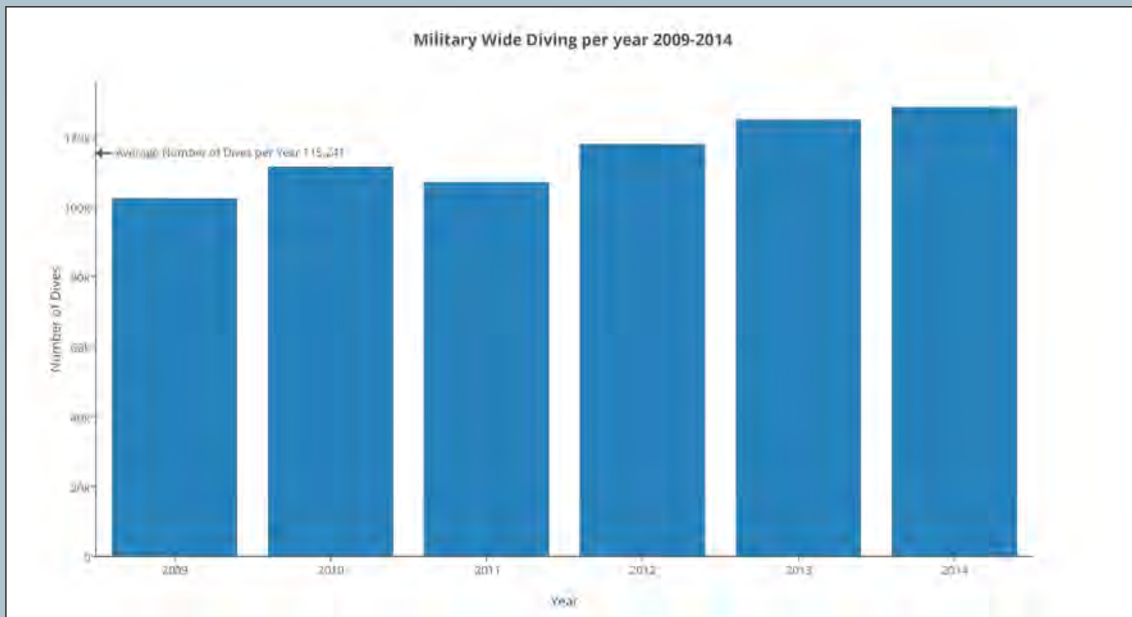


Figure 7

When originally analyzing this dataset, I noticed inconsistencies with a small portion of dive logs. Specifically, SCUBA dives were frequently displayed above 200 feet. Upon further inspection, I identified nearly 13,000 misreported dive records (~1.5% of all logs). Those misreported dive records either reported a Max Depth greater than Schedule Depth or did not record a Schedule Depth. In some instances, it was easy to identify a mistype error (Schedule Depth of 30 feet, Max Depth of 300 feet) and others where the Schedule Depth was zero, indicated an untrustworthy dive log. I excluded all questionable dive log data from this analysis.

The following Navy and Marine Corps diving mishap data is presented for dive community situational awareness. Most years contain dive mishaps in the single digits and the annual mishap rate (mishaps per number of dives) represents less than a hundredth of a percent. While the community has experienced a limited number of diving related mishaps, this absence of data makes forming solid statistical analysis less impactful, but speaks highly of training, supervision, equipment, and technical prowess within the community.

Mishaps collected from the Naval Safety Center represent an "injury, recompression therapy, or death resulting from an incident occurring while breathing compressed gases … before, during, or after entering or leaving the water" (OPNAVINST 5102.1). 39 mishap reports since 2008 were provided by the Naval Safety Center. Two known mishaps from February 2013 (not provided by the Safety Center) were added to the dataset to ensure its completeness. One additional report was corrected based on an erroneously reported max depth. Overall, 41 mishaps were analyzed.

Figure 8 shows the mishap histogram (2008-mid 2015) with associated diving mishap type illustrated below. A strong statistical correlation (+0.85) was observed between number of dives and number of mishaps. Meaning, there exists a positive and predictive linear relationship between the number of dives and the number of mishaps. Related, there is a moderate negative correlation (-0.65) between mishaps and depth, meaning more mishaps at shallower depths.

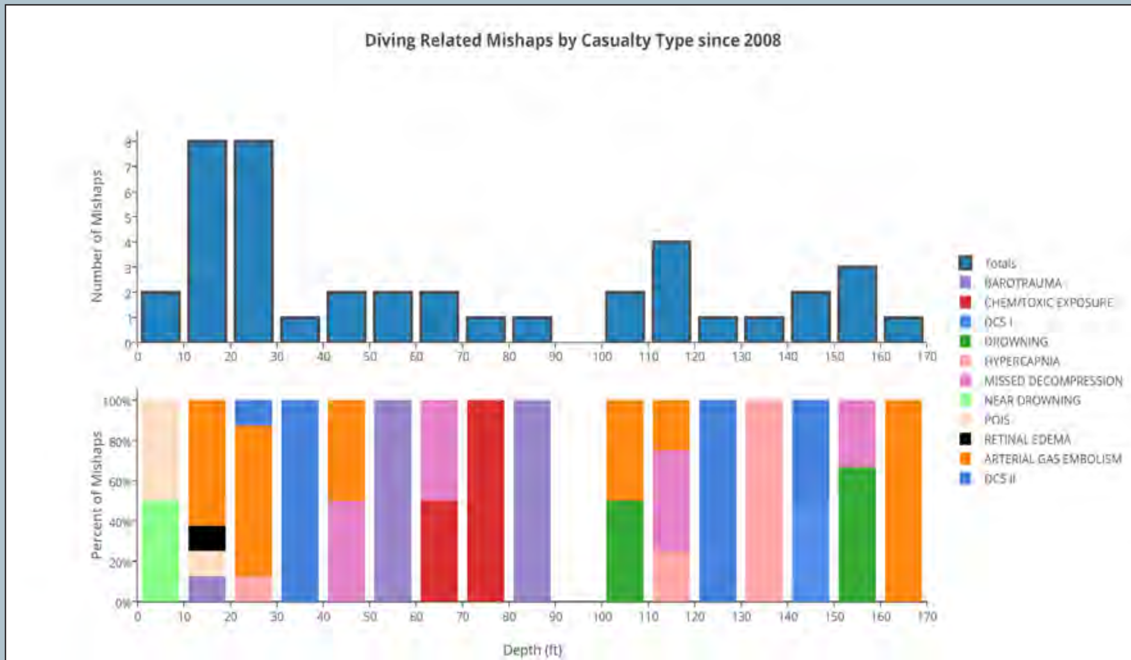


Figure 8

As the bottom chart of Figure 8 shows, diving related illnesses are real casualties experienced in the fleet. For example, Pulmonary Over Inflation Syndrome (POIS), specifically Arterial Gas Embolism (AGE), is found experientially throughout our diving range – divers are always at risk, no matter the depth.

Figure 9 represents the Navy and Marine Corps diving histogram (logarithmic scale) overlaid with the Mishap Rate during the last six years. Note the Mishap Rate can be identified by the right y-axis and only reaches a maximum of 0.53% in the 150-159 foot depth bin.

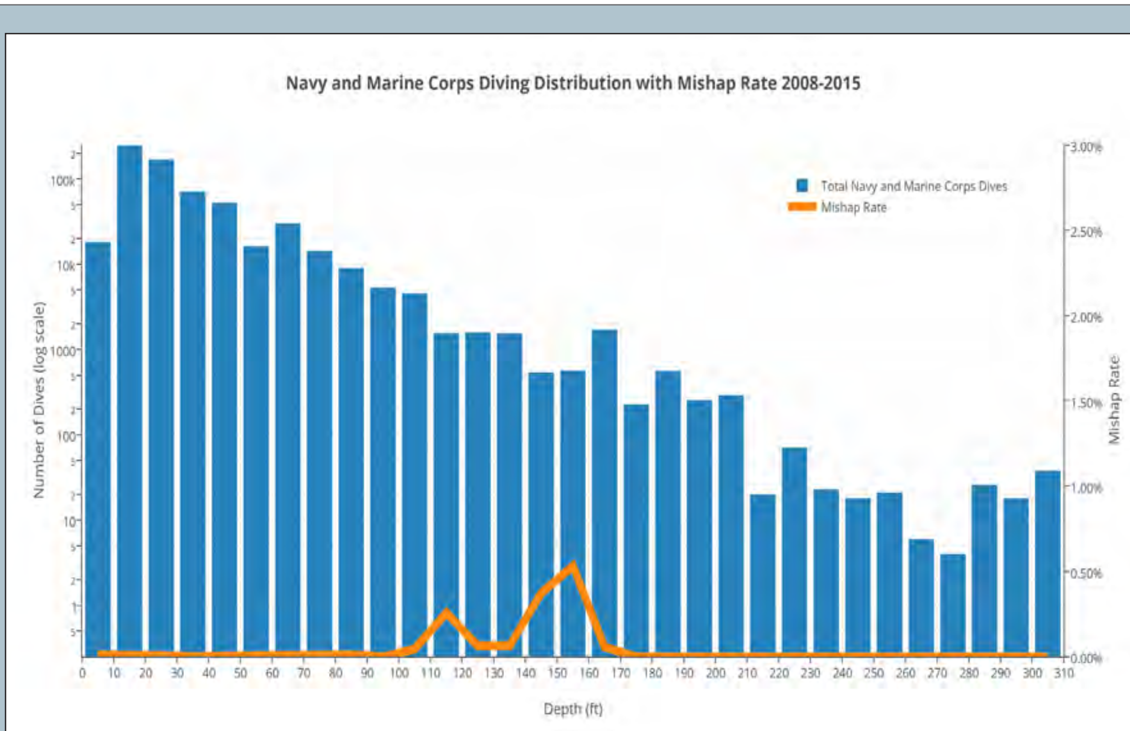


Figure 9

Although the Mishap Rate value is very small, there does exist a statistically significant change in Mishap Rates from the 0-99 to 100-170 foot depth. This statistical significance prompted further inspection. The majority of the mishaps in the 100-170 foot depth band (9 of 14) are air diluent MK-16 dives, including one fatality. 3 of 14 dives are HeO2 diluent MK-16 dives. The last mishaps in this depth band are two fatal SCUBA dives in February of 2013. Overall, nearly 80% of mishaps in this depth band occurred while breathing air.

Further analysis of the association between apparatus and mishaps is shown in Figure 10. A cumulative 22 Mixed Gas Rebreather mishaps across the depth band, 14 O2 Rebreather mishaps between 10 and 30 feet, 4 SCUBA mishaps, and 1 Surface Supplied mishap were reported. The supplemental notes on the chart indicate the maximum individual Apparatus Mishap Rate. Generally very low, the Apparatus Mishap Rate helps put in perspective the "spikes" seen in Figure 10. In the case of the 50% SCUBA Mishap Rate in the 150-159 foot depth bin, this statistic is an outlier but highlights the rarity in which SCUBA is used for deep diving. Only 60 logged SCUBA dives since 2008 were completed at 150 feet or greater, with 2 reported mishaps (overall 3.3% Mishap Rate for "deep" SCUBA dives).

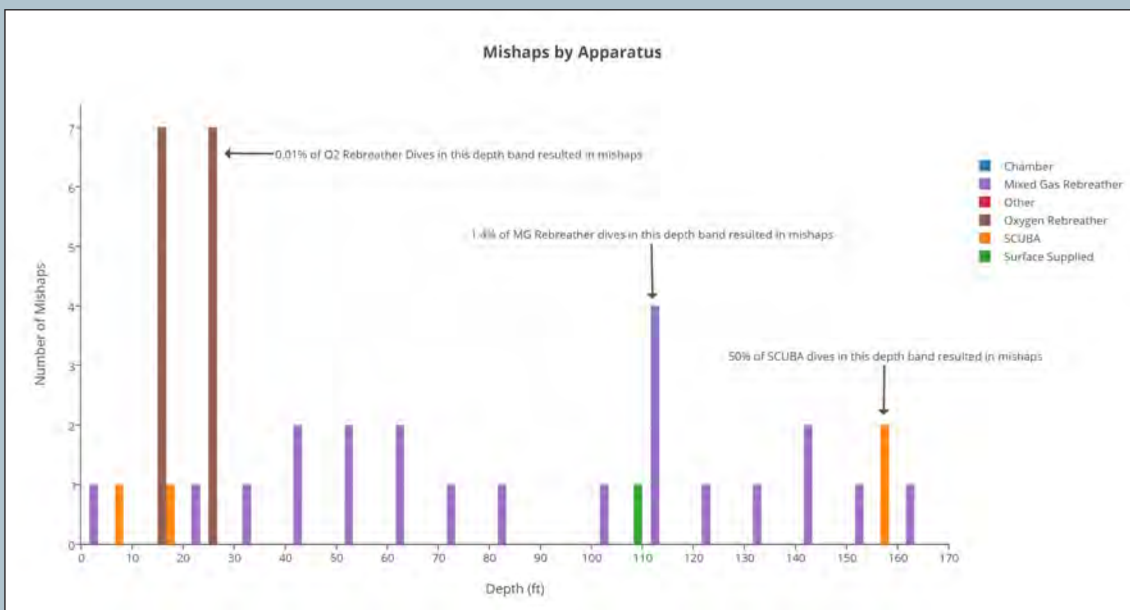


Figure 10

I hope you all enjoyed the quantitative look at the military diving community since the launch of DJRS. I urge you to take to the web and interact with the data to draw specific numbers and download the charts for your own use. Thanks for reading and dive safe!

A special thank you to the Naval Safety Center for honoring this data request and allowing military divers to better understand the state of the community.

LCDR Jim Colgary is an ED Diver and graduate student at MIT. Jim collected this data in conjunction with thesis research on the next generation Atmospheric Dive Suit.

DEEP IN THE SCIENCE OF DIVING

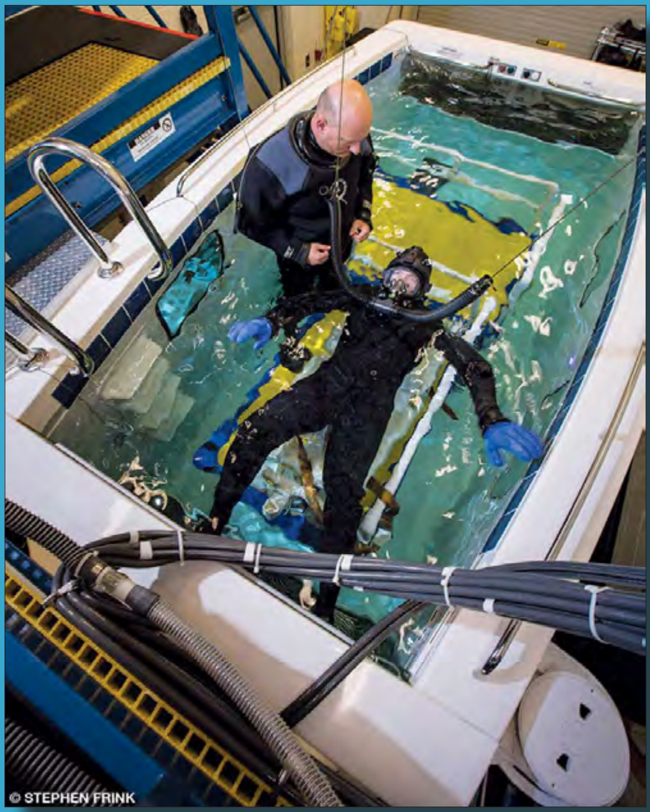
THE NAVY EXPERIMENTAL DIVING UNIT

By: Michael Menduno   Photos by: Stephen Frink

Four muscular Navy Divers, all volunteers, file carefully through the first two interlocking pressure chambers on their way to "Charlie" chamber. From there they will climb down into a cylindrical, water-filled chamber - large enough to house a school bus - that constitutes the base of the U.S. Navy Experimental Diving Unit's (NEDU) Ocean Simulation Facility.

The divers, each designated by a number for the purpose of the experiment, wear Navy Mark 16 (MK-16) closed-circuit rebreathers equipped with full-face masks. The rebreathers are charged with either trimix 12/44 (12 percent oxygen, 44 percent helium, 44 percent nitrogen) or heliox 12/88 (12 percent oxygen, 88 percent helium) - the divers haven't been told which mixture they have.

Once they're submerged in the wet pot, the dive watch supervisor in the control room will press the divers to 200 feet, where they'll complete a 40-minute dive while pedaling cycle ergometers (stationary bikes). They will then decompress for nearly two hours according to the MK-16 trimix table, which is 15 minutes shorter than the corresponding decompression schedule for heliox and allows initial ascent to the first decompression stop at 70 feet (the first deco stop in the heliox schedule is at 90 feet). After surfacing, the divers will be monitored for signs and symptoms of decompression sickness (DCS).

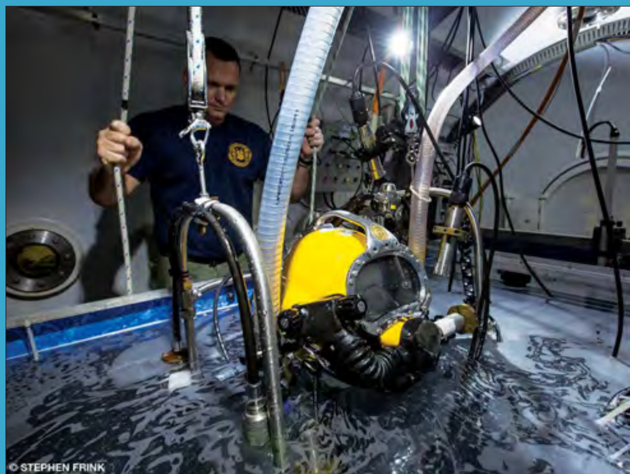


A diver wearing a tubesuit calorimeter undergoes cold-water testing to determine where the body gains or loses heat in different water temperatures. The project will show how much heat is required and where it is required to safely and effectively maintain diver thermal balance.

Because helium, which is nonnarcotic (unlike nitrogen), is believed to have faster tissue uptake and elimination than nitrogen, existing decompression models (including Albert Bühlmann's algorithm, popular with technical divers) assign deeper stops and correspondingly longer decompressions the greater the fraction of helium in the breathing mix. This is sometimes referred to as the helium penalty.

If the models are correct (that is, if decompression with trimix is more efficient than heliox for bounce dives), NEDU scientists would expect to see a higher incidence of DCS in the heliox dives in the study than in the trimix dives. But lead researcher David Doolette, Ph.D., who is also an underwater cave explorer, is not convinced that's what they will find.

NEDU researchers developed heliox diving in the 1930s as part of the command's initial mission. Their goal was to find a way to limit the debilitating effects of nitrogen narcosis to make it possible to rescue crews



Navy Diver 1st Class Greg Early hoists a KM-37 helmet after an unmanned freezing-water performance evaluation dive inside the Experimental Diving Facility Bravo Chamber.

Gerth (foreground) and Doolette evaluate an experimental decompression schedule.

A Navy Diver in the NEDU test pool performs an exercise during a physiology study.

from downed Navy Submarines. They hypothesized that helium would require less decompression than nitrogen, but their early tests concluded otherwise. With the successful rescue of USS Squalus survivors in 1939, heliox became the Navy's standard breathing mix for deep diving.

In recent years the Royal Canadian Navy and others began trimix research programs, in part due to high helium costs, and invited the U.S. to participate. Doolette and colleagues Wayne Gerth, Ph.D., the head of NEDU's decompression team, and Keith Gault, however, convinced their sponsor that the program would make sense only if trimix offered significantly reduced decompression times over heliox, a claim that had never been tested. They designed the experiment accordingly.

The results? The four Navy test divers successfully completed their dives. Over the next nine weeks a total of 32 volunteers conducted 50 heliox dives without incident and 46 trimix dives with two diagnosed cases of DCS. Statistically that means that the researchers must retain their null hypothesis: Trimix decompression is not more efficient than heliox; existing models require revision. It's not the first time that an NEDU experiment has refuted legacy diving practices or beliefs.

Brain Trust Meets Geek Squad

Experimentation is at the heart of the enterprise that is NEDU (pronounced N-E-D-U), which traces its scientific heritage back to the Navy's first experimental dives, conducted by Chief Gunner George D. Stillson in 1912, to test John Scott Haldane's decompression theory. Located at the Naval Support Activity Panama City military base in Panama City Beach, FL., the NEDU's mission is to develop solutions to support and improve the fleet's diving and other manned undersea operations through research, development, and independent testing and evaluation of equipment and procedures. Think of it as the brain trust meets geek squad of U.S. Navy Diving.

Since its inception in 1927, NEDU, along with the Diving Biomedical Research and Development Division of the now defunct Naval Medical Research Institute (which NEDU absorbed in the late 1990s), has been responsible for a disproportionate share of advances in decompression procedures, mixed-

Divers in Alpha and Bravo chambers of the Ocean Simulation Facility prepare to leave the surface.

Researchers conduct human performance testing following repeated long-duration dives.

gas diving, Underwater Breathing Apparatus (UBA) engineering, Saturation (SAT) Diving and our knowledge of diving physiology.

In terms of quantity and significance, no other institution can claim a more distinguished record of contributions. NEDU's collected works, which include more than 1,000 technical reports and innumerable scientific papers, most unclassified, embody the intellectual and technology infrastructure used by practically every diving community today.

For much of its history NEDU's research focused on issues facing tethered divers conducting surface-supplied and SAT diving, which was of critical importance during the Cold War. Over the past decade and a half, however, the growth of special operations has caused the diver-driven command to turn its attention to the problems encountered by free-swimming divers, which represent half of the fleet's 5,000 divers.

"We're pushing the envelope on gases, depth and gas switches, mostly with closed-circuit rebreathers," explained Lt. Cmdr. Steve Duba, an Explosive Ordnance Disposal (EOD) diver, who serves as NEDU's Executive Officer (XO). "It's special mission support. One of our priorities is keeping divers warm in free-swimming situations. There's also a push to go deeper, and we're looking at developing the tables and gear to support that." Surface-based dives on the MK-16 are currently limited to 300 feet (open-circuit dives are limited to 190 feet).

If you're wondering what the future holds for U.S. Navy Diving and, by extension, diving as a whole, consider this: It's being invented right now at NEDU.

For Divers by Divers

Walking down the long beige cinder-block hallway with brown-flecked linoleum flooring and black-and-white pictures of famed alumni, passing clean-cut young men in khaki short shorts and blue NEDU t-shirts, it's easy to imagine you've entered a 1950s parochial school rather than dive geek heaven. Diving is, in fact, regarded with near religious fervor here.

You could say NEDU was created by divers, for divers. Its 120 employees, including nearly 35 civilians, comprise a unique team of Military Divers, Diving Medical Officers (DMOs), scientists, and engineers. In addition to the leadership drawn from officers in the fleet's 20-some diving communities - including Sea-Air-Land (SEAL) Teams, Fleet Divers and EOD - there are six DMOs, nearly 25 scientists and engineers, and 50 First Class Navy Divers, who serve as test subjects and maintain the facility and equipment under the supervision of a Navy Master Diver.

The depth of knowledge is palpable. "I've been in the Navy for 29 years, and this is the best command I've served in," said Project Officer Capt. Edward "Andy" Woods, M.D., a former SEAL Team medical officer. "There are so many exceptional individuals - the best of the best. People come here because they're passionate about diving; they couldn't do this anywhere else."

NEDU focuses on improving diving safety and performance. About 30-40 percent of its $10 million annual budget is reimbursable for the work conducted on behalf of its sponsors, which include the Office of Naval Research, Naval Special Warfare Command, and Submarine Escape and Rescue (part of the Naval Submarine Medical Research Laboratory), as well as other branches of service such as the Air Force. Its investigations range from basic and applied biomedical research to addressing the specific operational needs of warfighters. Sometimes that involves Einstein-meets-MacGyver solutions.

NEDU also tests and certifies all of the equipment used or being consid-

NEDU's Executive Officer LCDR Steve Duba stands in the open wet pot of the Ocean Simulation Facility.

ered for use by the Navy diving community; its unique unmanned test facility is capable of subjecting gear to depths of 730 feet in cold, hot, fresh, or salt water. In addition, it conducts all diving accident investigations involving federal employees, which have numbered close to 100 in the past decade.

NEDU's work relies heavily on the Ocean Simulation Facility (OSF), which is the largest and most sophisticated hyperbaric facility in the world. Built in 1971, the chamber complex consists of a wet chamber and five interconnected dry living/working chambers that can simulate ocean conditions to depths equivalent to 2,250 feet of seawater and altitudes up to 150,000 feet. The complex also accommodates complex man-machine testing. NEDU conducts two to three SAT dives a year in the OSF as part of its mission to maintain the Navy's SAT diving capability. The dives can last up to 30 days and cost as much as $750,000.

Scientists such as Doolette say NEDU's diving culture enables them to do research that other institutions can't. "We're one of the few facilities in the world that can take an experiment all the way to DCS," Doolette said. "Almost everyone else looks at VGE [venous gas emboli] as an outcome measure."

Although most research organizations find it increasingly unacceptable to bend people, the hard endpoint makes decompression studies more valuable. "Divers here say, 'Yes, I'll do it,' because their buddies are out there at the tip of the spear," Doolette said.

NEDU divers must give their informed consent to participate in a given experiment, each of which is carefully reviewed by a federally mandated institutional review board to ensure it meets ethical standards for human subject research. There is no coercion. The unit's 50 enlisted divers aren't the only ones to man up; every diver participates.

"I volunteer, and so does the CO [Commanding Officer] and the XO," said Command Master Chief Louis Deflice, a Master Diver who is third in command and completing his second tour of duty at NEDU. He originally came in 1997 as an enlisted SAT diver. "We believe in our divers and wouldn't ask them to do dives that we wouldn't do. It's an opportunity to give something back."

No doubt this democratization of science contributes to NEDU's compelling sense of team. Many individuals say that they consider it a family.

Back to the Future

"Suppose you were performing a SAT dive and locked out of a warm subsea platform on a rebreather at 1,000 feet in near-freezing water," said Vince Ferris, a department head who oversees NEDU's unmanned test facility. He is testing the variability of temperature compensation circuits in oxygen sensors, which determine how much oxygen ($O2$) is added to a rebreather's breathing loop. A 1 percent overshoot at 200 feet is no big deal, but at 1,000 feet it would be deadly. His team is also investigating a promising new carbon dioxide ($CO2$) sensor that uses a polymer sensing film to detect $CO2$, which unlike existing infrared sensors is impervious to water vapor. The device could greatly im

prove the safety of rebreather diving.

Their latest project is to determine the efficacy of using Micropore Inc.'s CO_2 absorbent cartridges for the MK-16 as well as the fleet's Dräger LAR V oxygen rebreather. Though cartridges haven't caught on with tech divers due to their expense, Ferris, who is a veteran cave and rebreather diver, thinks they offer potential advantages over manually packed scrubbers to military divers. The lab is also in the process of retesting all Navy regulators and helmets to see how they perform in near-freezing fresh water. As a result of two diving fatalities, they recently discovered that a regulator that performs in 29°F salt water can freeze up in 34°F fresh water. Ferris' list goes on.

Respiratory physiologists Dan Warkander, Ph.D., and Barbara Shykoff, Ph.D., both sport divers, have spent the past five to six years examining how humans interact with underwater breathing apparatuses, measuring what combinations of breathing resistance and CO_2 can be tolerated. "Our goal has been to get insight into the physiology: what's safe, what's not, what you can do and why," Shykoff said. "The Navy is interested in safety."

Warkander has performed critical work designing and testing CO_2 scrubber gauge systems, while Shykoff is regarded as the resident expert on whole-body or pulmonary oxygen toxicity. Late last year Shykoff published a new descriptive risk model for rebreather diving meant to replace the familiar but outdated oxygen tolerance unit (OTU) model taught in nitrox and tech classes. The problem? "We've been trying to describe oxygen toxicity as a single phenomenon, but it represents different phenomena depending on the PO_2 [partial pressure of oxygen]," she explained. "The OTU model also includes no provision for recovery" (resuming diving after metabolizing the excess oxygen).

John Florian, Ph.D., another researcher who specializes in warfighter performance, discovered a new form of whole-body oxygen toxicity shortly after his arrival at NEDU in 2008. Special Operations Forces (SOF) were anecdotally reporting excessive fatigue following six-hour hyperoxic swims on oxygen rebreathers. Florian conducted experiments and found that divers were suffering from a severe decrement in performance in their muscular and cardiovascular systems.

Florian's team is now working to understand the underlying physiological mechanisms and come up with prescriptive solutions. "Warfighters can be sick and cold and will gut it out. That's the SOF culture, but they don't have to do that," he said. "We want to give them an advantage so they can arrive with a 0 percent decrement and focus on their task instead of gutting it out."

They are also investigating the body's thermal protection system in hopes of better understanding underwater thermal physiology. He is looking at the basic mechanism of heat exchange, where the body gains or loses heat in different water temperatures, how much heat is required and where it is required. For example, Florian said that applying heat in the wrong places can actually lower a diver's core temperature. Their goal is to keep free-swimming divers warm with minimum bulk and/or power consumption. NEDU has tested several active thermal protective systems that are in development.

Gerth and his team continue to refine our understanding of decompression management. In addition to the recent trimix experiment, in a 2011 study involving hundreds of dives they debunked the notion that deep stops, generated by bubble models, are effective. They also discovered that a diver's thermal status (e.g., being warm on the bottom and/or cold during decompression) is a risk factor in DCS. Their clue: North Sea data linked the use of hot-water suits with a slight increase in DCS. "We thought it wouldn't make any difference but found that it did," said Gerth, who's considered one of the world's foremost decompression modelers.

They are currently examining the efficacy of air breaks - the practice of breathing air for five minutes after every 30 minutes of breathing pure O_2 during decompression and in hyperbaric treatment. The practice has never been tested, and it's not known if the pattern of air breaks is optimal or even necessary.

The team's main priority, however, is to enable Navy divers to tailor their dive profiles with risk levels appropriate to the operation - i.e., to dial in a specific risk of DCS using probabilistic algorithms. A training dive could be conducted with low risk, while the risk could be increased in a combat situation, enabling divers to get out of the water faster. Eventually they hope to incorporate this capability into dive computers. The MK-16 tables, which are "iso-risk" tables - i.e., every dive has the same 2.3 percent probability of DCS - are the only probabilistic tables currently in use. While a 2.3 percent probability of DCS might seem high, this measurement assumes that the dive profile is pushed to the limit (a square-profile dive) and represents the average risk on a typical Navy table profile.

Is what we now know about diving greater, the same, or less than what we don't know? John Clarke, Ph.D., NEDU's Scientific Director since 1991, science-fiction author and authority on the human-UBA interface, smiled and answered: "There's a never-ending depth of questions about diving. We're constantly learning and finding out that many of the things we believe are simply not correct."

Michael Menduno is an avid diver, reporter and technologist who has written about diving and diving technology for more than 25 years. He coined the term "technical diving." Menduno was the founder and publisher of "aquaCORPS: The Journal for Technical Diving" (1990-1996), which helped usher technical diving into the mainstream of sports diving. He also organized the first Tek, EUROTek and AsiaTek diving conferences, and Rebreather Forums 1 & 2.

Reprinted courtesy of Alert Diver, the magazine of Divers Alert Network www.alertdiver.com.

Visit AlertDiver.com/NEDU_milestones for a timeline of important NEDU milestones. See a video about the NEDU at AlertDiver.com/NEDU.

Navy Engineers Develop Futuristic Next Generation HUD for Diving Helmets

By: Katherine Mapp, NSWC PCD Office of Congressional and Public Affairs

Summer 2016 is heating up with new and upcoming advances in Navy diving technologies at the Naval Surface Warfare Center Panama City Division (NSWC PCD).

Underwater Systems Development Project Engineer Dennis Gallagher and his team are developing what can be described as a "next generation" and "futuristic" system for the Navy diving community.

The Divers Augmented Vision Display (DAVD) is a high-resolution, see-through head-up display (HUD) embedded directly inside of a diving helmet.

Naval Surface Warfare Center Panama City Division (NSWC PCD) lead engineer/senior electrical engineer William Hughes III demonstrates the Divers Augmented Vision Display (DAVD) during a lab simulation. U.S. Navy Photo by Richard Manley (RELEASED)

This unique system enables divers to have real-time visual display of everything from sector sonar (real-time topside view of the diver's location and dive site), text messages, diagrams, photographs and even augmented reality videos. Having real-time operational data enables them to be more effective and safe in their missions; providing expanded situational awareness and increased accuracy in navigating to a target; such as a downed aircraft, ship, or other 'objects of interest'.

Instead of having to rely on pre-dive briefings alone on what they are looking for, how specific items should appear and where they may be located; the DAVD system places the information right before their eyes with a look and feel comparable to a point-of-view video game display.

The diver has the ability to turn the HUD on and off and direct topside to re-position display data to different locations on the HUD.

"By building this HUD directly inside the dive helmet, instead of attaching a display on the outside, it can provide a capability similar to something from an Ironman movie. You have everything you visually need right there within the helmet," Gallagher commented.

The DAVD HUD system can be used for various diving missions; including ship husbandry, underwater construction and salvage operations. The same system could eventually be used by first responders and the commercial diving community.

As part of its Strategic Plan for 2011-2025 to "… identify, exploit, and develop technology to advance the state-of-the-art in diving equipment," Naval

Naval Surface Warfare Center Panama City Division (NSWC PCD) lead engineer/senior electrical engineer William Hughes III demonstrates the Divers Augmented Vision Display (DAVD) during a lab simulation. U.S. Navy Photo by Richard Manley (RELEASED)

Prototype of the Divers Augmented Vision Display (DAVD) positioned within a dive helmet. U.S. Navy Photo by Richard Manley (RELEASED)

Lab simulation view of an augmented reality image of an airplane through the Divers Augmented Vision Display (DAVD). Divers Augmented Vision Display (DAVD). U.S. Navy Photo by Richard Manley (RELEASED)

Sea Systems Command (00C3) is in the process of developing enhanced sensors - such as miniaturized high resolution sonar and enhanced underwater video systems - to enable divers to 'see' in higher resolution up close, even when water visibility is near zero. These enhanced underwater vision systems would be fed directly into the DAVD HUD.

"We constantly engage with the operators. If there is a vision they have, we can make it happen," Gallagher said. "By having this type of positive on-the-spot feedback, you know you're going down the right road."

Gallagher and his team have collaborated with, and demonstrated the system to, more than twenty divers from various commands, who shared his vision of this futuristic capability for Navy divers.

The team is now working on phase two, where components are being designed to include both helmet systems and full face masks. Divers will conduct in-water simulation testing in October of this year. Phase three will begin in fiscal year 2017 to harden the system for expanded field testing with various dive commands.

Katherine Mapp is a Public Affairs Specialist at Naval Surface Warfare Center Panama City Division. She joined the Public Affairs team in 2016 after graduating from Florida State University with a bachelor of science degree in professional communication.

Lab simulation view of a sector sonar image with navigation aids through the Divers Augmented Vision Display (DAVD). U.S. Navy Photo by Richard Manley (RELEASED)

The Old Master

MCPO Steve Mulholland

The "OLD MASTER"??? How did this happen? Where has the time gone? I feel like it was just a couple years ago that I was graduating dive school and still wearing size 29 UDTs. First off, I am honored and humble to be given this chance to address everyone.

As I approach my 29th year of service this week, and as big alterations were just announced in the Navy, I can't help but think of all of the changes that have taken place during my career. In my opinion, some were good and some were bad, but as we all did, I took an oath to follow the orders of those appointed above me. This doesn't mean we have to follow all directions that do not make sense. We all have the opportunity to speak our mind and make changes in our community and the Navy. It's in the way we deliver our feedback that decides on how our voice will be heard. When we provide feedback we need to ensure we do our research, and help to provide a solution or at least the facts as to why our current directions will not work.

Since I was young diver, I have been faced with plenty of orders or policies that I did not agree with, and many times I promised myself I would never submit my junior personnel to those conditions when I became the leader. What I have learned over time is that we do not always see the full picture of the decision making process. As I climbed in my responsibilities, I very soon realized that I was one of the leaders involved in decisions that I knew would be unpopular and would be thought of as a bad decision. When I had the opportunity, I tried to ensure that I would explain the decisions to the best of my abilities. Many times that opportunity did not present itself or even with an explanation, the news was still looked upon as bad. Regardless of the opinions of the decisions, in my experience they were all made with the best intentions in mind with regards to all the facts involved, to include: safety, money, or just the best outcome for the majority of personnel.

There have been so many changes in the past 29 years: Uniforms have changed, dive equipment has changed, the length of diver training has changed multiple times, and I can't even tell you how many times the dive manual has changed (including all the interim changes.) The ND and EOD rate titles have lasted a little over 10 years. I can remember when a majority of the community believed combining all of us in to one single rate was a terrible idea. It was said, this idea would never work, we would lose money, it would lock up advancement, and we would lose our experience with other ratings. As a junior MDV, I can tell you I hated the idea. Watching the growth of our community, my opinion now is that it was a great success and has steered us in the right direction. Also making E9 my first time up helped me to quickly change my mind! (LOL)

All of us at one time or another has provided feedback to our leaders. Maybe it was a feedback report on a PMS card, a comment on a CMEO survey, suggestions to a command instruction, changes to the dive manual, or recommendations to the operational procedures for a dive operation. We all have a voice to be heard. With having the right to provide feedback, we must be willing to receive feedback as well. You may find that you do not like the return feedback, especially when you provide a suggestion on policy and it doesn't change anything. What if it's a policy that you and your junior sailors dislike? What if the country elects a politician that you do not like? Is that the time to give up? How many times have you heard someone say, "I'm done" just off of one policy or decision that came out? Sure everyone can't stay in for 30 years, let alone 20, but if you are in a leadership position and you get bad news, is that the time to give up on the Navy, give up on your sailors? Who's going to be there for them? There are plenty of leaders in the good times, what about the bad times or what may appear at the moment to be a bad time in the Navy. Back when you just graduated dive school and things were new, your LPO, LCPO, MDV were all there for you, at least they should have been. It's our turn to support our guys through these and future changes. Help them provide proper feedback on what they like and don't like. Help them understand why some of the policies are the way they are. Doesn't mean we have to agree 100% with them, but it does mean we have to follow them. Think of some of the policies and all the changes MDV Carl Brashear saw in his career. Many of the changes in the Navy would not have been possible without his motivation and his willingness to "change the norm" with proper feedback. If we abandon our sailors now physically or mentally (with our attitude), we have failed them.

I look into the eyes of these young men and women that are training for the EOD and Dive communities and I can tell you, they are motivated, they are excited, and they can't wait to start operating with their teams. They are not letting any feelings of entitlement get in their way. Regardless of which politicians get elected or which new policy is thrown out to the Armed Services, they are ready to serve their country, but they cannot do it alone. They need great leaders to guide them and train them, they need great mentors to talk to, and they need great supervisors to keep them safe and ensure they return home to their families. We cannot fail them; we owe it to the ones that trained and mentored us, the ones that kept us safe, and the ones who didn't get the chance to return home.

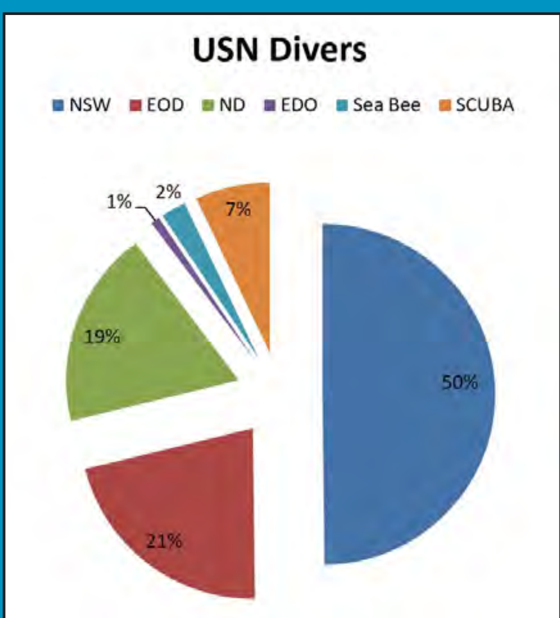
Never have we used the term "being Deep Sea" as a way to describe anyone that quit when the going got tough. Stand tall and be the leader they need.

I will always be proud of the fact I could call myself a NAVY DIVER, didn't matter if I was a Machinist Mate, a Command Master Chief, or soon to be just another fat retired guy.

Hoo Ya!

SUPDIVE SENDS ...CDR John Porter

Hello from SUPDIVE. I recently arrived at NAVSEA from EODMU THREE and relieved CAPT Scott Kraft. I have been a Navy diver for the last 27 years, I always thought NAVSEA 00C was the palace that controlled all Navy diving. I did not realize how complex the diving community is. NAVSEA 00C is the technical SME for diving but we have little control over programs or the destiny of Diving, funding is provided by OPNAV N97, N95 or one of the PMS code authorities are through TYCOMS (FFC, PACOM, NECC, COMSUBFOR…). One of the biggest adjustments for me was realizing our diving community is a collection of different tribes without a single chain of command, no single voice to speak for all of us. Each tribe does things a little differently. Of the ~7,000 divers in the USN here is the breakdown:



CAPT Kraft has done an amazing job of setting goals for all of us and it is my intention to keep those going forward. For my tour here it is my intention to continue his three paths forward:

1. Make diving safer through collaborative learning.
2. Make diving equipment lighter and faster on station.
3. Dive Deeper and longer.

The projects that are currently going on here at NAVSEA 00C3 (Diving):

We are making the final edits on Rev. 7 of the dive manual. Content is complete; we are now going line by line for grammar. I get a call once a week asking when will the new DIVEMAN hit the streets? I promise this is a top priority, but you all know that if we miss place a "may" with a "must" or a "shall" with a "should" it will have significant impact to the fleet.

As a result of the Navy-wide Diving Operational Assessment (DOA), the new OPNAVINST 3150.27C (Navy Diving Policy and Joint Military Diving Technology and Training Program) was signed by the CNO on the 24th of June. This instruction made a lot of changes to the diving community as a whole. If you have not had a chance to go over it, I suggest you set aside about a half hour and give it a read, make notes as you go, and then go over it again with your dive locker; talk about the changes.

NAVSEA 00C will also be releasing a revised NAVSEA 3150 instruction; the overarching intent of the instructions is to align all safety standards within the diving community. To that extend, NAVSEA 00C has been working with Fleet Forces Command and Pacific Fleet Diving SMEs and it was decided the long term goal will be for all of us to use the same DORA/DORI checklist, regardless of who the inspection team is.

Another big project here is creating a roadmap to the future of Diving, we call it DIVER 2030. We analyzed the gaps per the Capabilities Based Assessment (CBA) and looked at where we are with technology; specifically how UUV's and ROV's can assist divers, not replace divers. The DIVER 2030 program is looking at the future of Navy Diving. For example, how to interface multiple online programs that already exist, but are separated by firewalls or proprietary rights.

- *Imagine you are scheduling a dive and you have your smart tablet, prior to the dive you can put in your profile and it will tell you what PMS is required for the gear. You type in the personnel conducting the dive and it generates a Sailing list and notifies you that one of your divers has a physical that is greater than five years old, or he is currently on meds that require a waiver, or that he has not done a dive outside of a pool for the last three years. During the dive this same tablet will record your dive times, it will be interfacing with a transponder on your diver's first stage that will tell you depth, relative location and air pressure throughout the dive. After the dive you hit a button and it is all loaded into DJRS. You complete your post Dive PMS hit a button and your 3M charts are updated as well. All these technologies already exists independently.*

There are a few projects happening here that we could use your help with. We are attempting to create a file of the investigations following every dive Class A mishap we have ever had, not just Navy but all services. If you have a copy of an old diving Class A mishap report, would you please send it my way (john.porter2@navy.mil).

That is a quick view of what I have been learning and putting my effort to the last month I have had the SUPDIVE seat. Before I sign off I wanted to give a quick congratulations to The Navy Dive and Salvage Training Center (NDSTC) as the 2016 recipients of the Secretary of Navy Safety award.

FACEPLATE

60 years ago...

May 1956

May 1956 is the earliest known published issue of Faceplate.
If you are aware of an earlier issue, please submit to faceplate_editor@supsalv.org