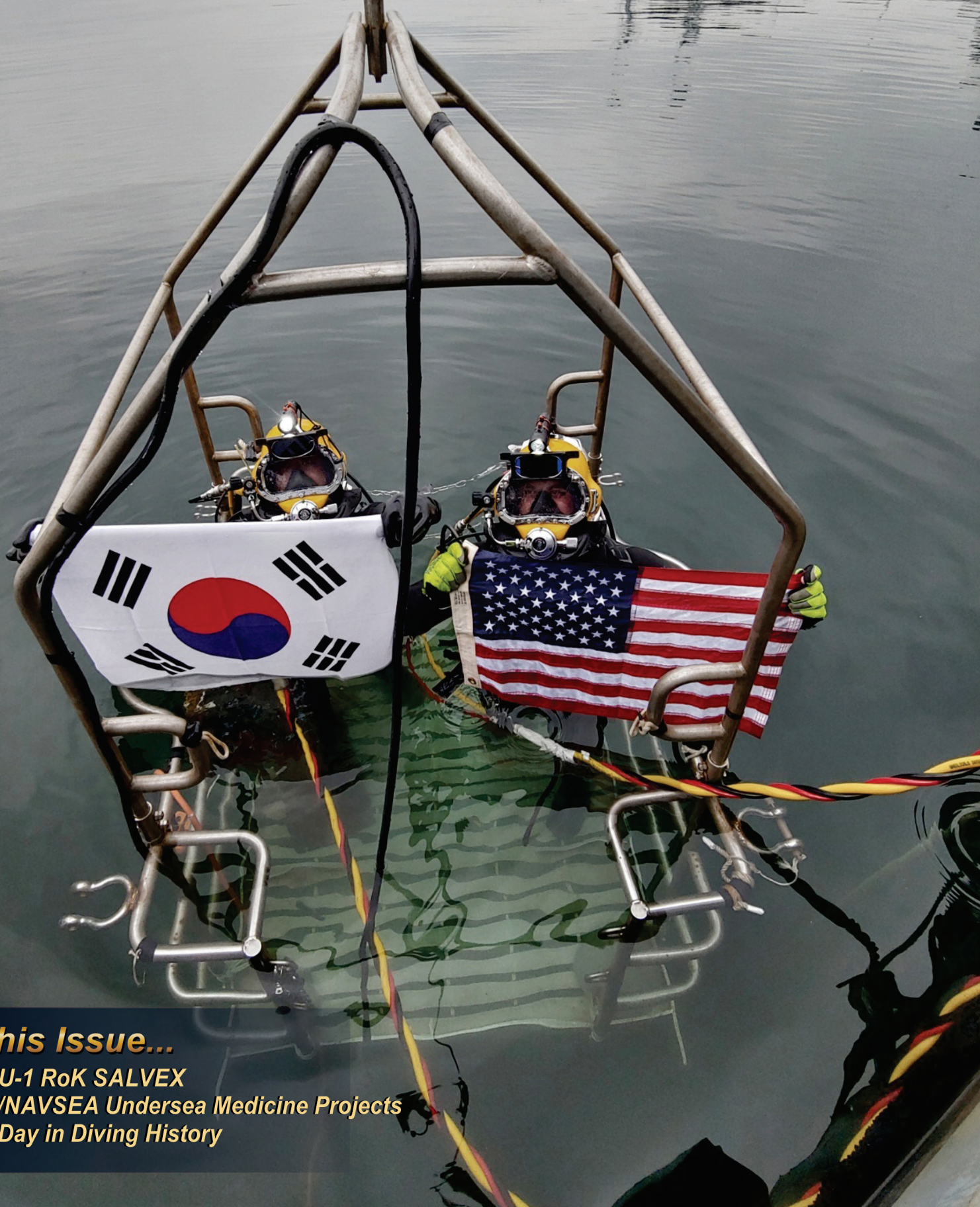




FACEPLATE

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

Volume 25, No. 2 / November 2021



In This Issue...

MDSU-1 RoK SALVEX

ONR/NAVSEA Undersea Medicine Projects

This Day in Diving History

FACEPLATE

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.

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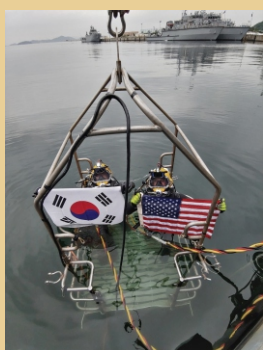
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MDS CO 1-8 & ROKN SSU
Surface Supplied Diving during
SALVEX 2021.





SUPSALV SENDS...CAPT Jay Young

Let me kick-off with a couple of announcements. Welcome aboard to CAPT Bob Marsh as our new Supervisor of Diving. CAPT Marsh checked onboard this summer, and he has hit the ground running. All of you on the Diving Operational Readiness Inspection circuit this summer and fall have already had the great opportunity to engage with CAPT Marsh and will agree that he is an outstanding addition to our team. Also, CDR Dustin Cunningham has been selected to relieve CDR Kiah Rahming as the next Navy Experimental Diving Unit (NEDU) Commanding Officer. The NEDU Change of Command will take place in April 2022, and CDR Rahming will transfer to BUPERS to assume responsibility as the Engineering Duty Officer Senior Detailer. Welcome aboard CAPT Marsh, and Congratulations CDR Cunningham!

On 18 October 2021, our Nation observed the loss of a great American, General, and Statesman in General Colin Powell. General Powell dedicated 35 years of service to the U.S. Military and concluded his military service as the 12th chairman of the Joint Chiefs of Staff. At age 52, General Powell was the youngest officer to serve in this position. After his military service, General Powell served as the United States Secretary of State from 2001 to 2005. Although I never had the opportunity to meet General Powell, I looked up to him as one of the very best leaders to serve in uniform. General Powell was famous for his selfless service as he always put the nation, the military, and his subordinates first. He served his country loyally without thought of recognition or gain. He focused on the commitment of each team member to go further, endure longer, and look closer to see how he or she can add to the mission. General Powell embodied commitment to the greater good and placing the needs of the Nation and military above himself.



I see awesome ideals of selfless service ingrained in our Navy service members everyday; whether it be the long days and nights on the underwater husbandry dive side to get a ship or submarine ready to deploy, or the long deployments by our Mobile Diving and Salvage Units to remote areas around the world, or the long and often cold experimental dives to ensure our diving procedures are safe and effective. Every day, you are placing the needs of the Nation and military above yourselves.

I want to share with you a recent example of selfless service by one of our Sailors assigned to the Navy Experimental Diving Unit (NEDU), Hospital Corpsman Second Class (HM2) Joe Arbogast. On 19 June 2021, a husband and his wife were enjoying a summer morning at St Andrews State Park in Panama City, FL. The husband decided to head out into the surf to catch a few waves. While attempting to surf a wave, the gentleman fell landing on his arm and back. Before he could catch his breath, a wave rolled over him and the undercurrent was pulling him out to sea. As he struggled to keep his head above water in serious pain, he could hear his wife frantically calling for help

on the beach. HM2 Arbogast happened to be out for a run on the beach that morning, and he swiftly and selflessly responded to the calls for help. He swam into the surf, pulled the gentleman onto his surfboard, and safely returned him to the beach. Once on the beach, he stabilized the gentleman until the paramedics arrived. The gentleman suffered a broken arm and nearly drowned during the accident, but is here today because of HM2 Arbogast.

In true selfless servant style, not only did HM2 Arbogast not accept anything more than a thank you from the family, he did not even share this experience with his teammates at NEDU. The gentleman whom he saved sent a letter detailing the event to NEDU. The letter made several stops before actually arriving at NEDU because it was addressed to Naval Station Panama City ICO "Hospital Corpsman Joe". Through the tenant command CMC network, the letter finally arrived in the right place. HM2 Arbogast's actions are a testament to the outstanding Sailors in our Naval force, and his selfless actions likely saved the life of a man whom he had never met. HM2 Arbogast is detaching from NEDU in November on his way to Independent Duty Corpsman School in San Diego where he will continue his outstanding service to our Navy. If any of your commands is looking for a high performing IDC, HM2 will be available next year.

I take pride knowing that if any of our Navy Sailors was faced with a similar situation as described above, they would step up to the challenge in the same manner as HM2 Arbogast. Thank you for all that you do every day. Keep leading, stay motivated, and continue to take care of yourselves, your families, and your teammates. Stay safe, and I look forward to seeing all of you on the waterfront. Hooyah HM2 Arbogast! Hooyah, Deep Sea!

SALVEX Resumes Following a Two-Year Pause

By: CWO3 Jose Castilla

Mobile Diving and Salvage Company (MDS) 1-8 conducted an integrated Salvage Exercise (SALVEX) with Republic of Korea Navy (ROKN) Sea Salvage Unit (SSU) over a 7 day schedule of events, 9-16 June 2021. The exercise was originally planned for 6 days, but was lengthened to 7 by addition of a sports relations day.

The resumption of SALVEX, after a 2 year COVID pause, represented the first post-COVID, in-person, U.S. Theatre Security Cooperation (TSC) exercise with the Republic of Korea (ROK). Renewal of this 32 year partnership helps bolster US/ROK efforts in countering China's quest for hegemony in the Indo-Pacific region - commonly referred to as the Great Power Competition (GPC).

The exercise objective was to strengthen the relationships and enhance mutual cooperation and understanding between ROKN and USN through dive operations and training. The schedule of events included:

- SMEE Briefs and Discussions
- Land and Underwater Detonations
- Remotely Operated Vehicle (ROV) Operations
- Surface Supplied Air Diving
- Salvage Training (underwater cutting & welding)
- COVID Mitigated Sport Relations Day (volleyball, basketball & luncheon)

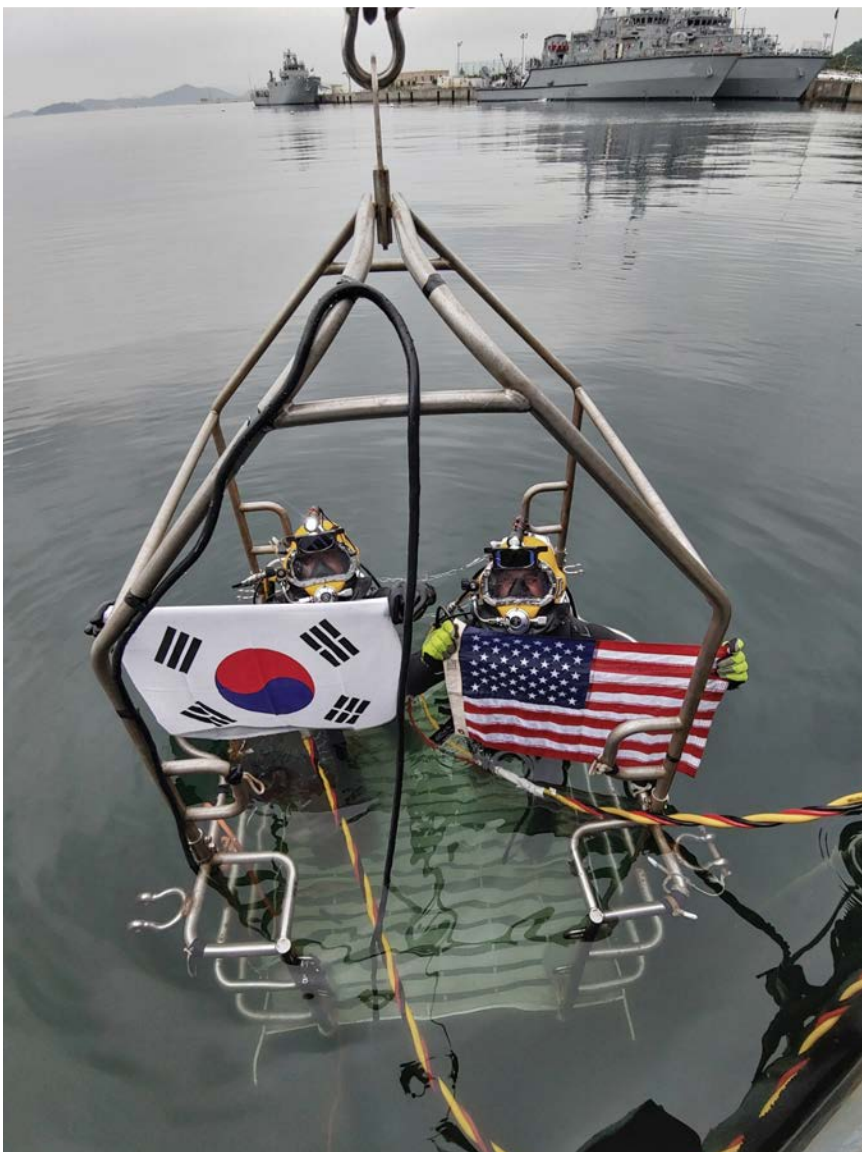
MDS 1-8 Company Commander CWO3 Jose Castilla III and Company Master Diver NDCS Steve Vanzant observed ROKN divers to be highly competent and proficient in all facets of salvage diving operations. "Lessons learned related to operating jointly vice improving safety, proficiency or skills - as one might encounter when working with lesser developed countries' navies", said Castilla.

Lessons learned included the importance of NAVSEA diving system waiver & metric system familiarity, as well as maximum flexibility in logis-

tics and lodging arrangements in order to adequately mitigate for COVID-19. For example, the MDS was required to extend 'working quarantine' and separate from the USNS SALVOR for the entire period of SALVEX. This was due to MSC's inability to meet the ROKN level of acceptable COVID mitigation.

MDS Company 1-8 and ROKN SSU earned a "Bravo Zulu" from COMROKFLT (VADM Lee, Jong-Ho) for the successful planning and COVID free execution of SALVEX 2021.

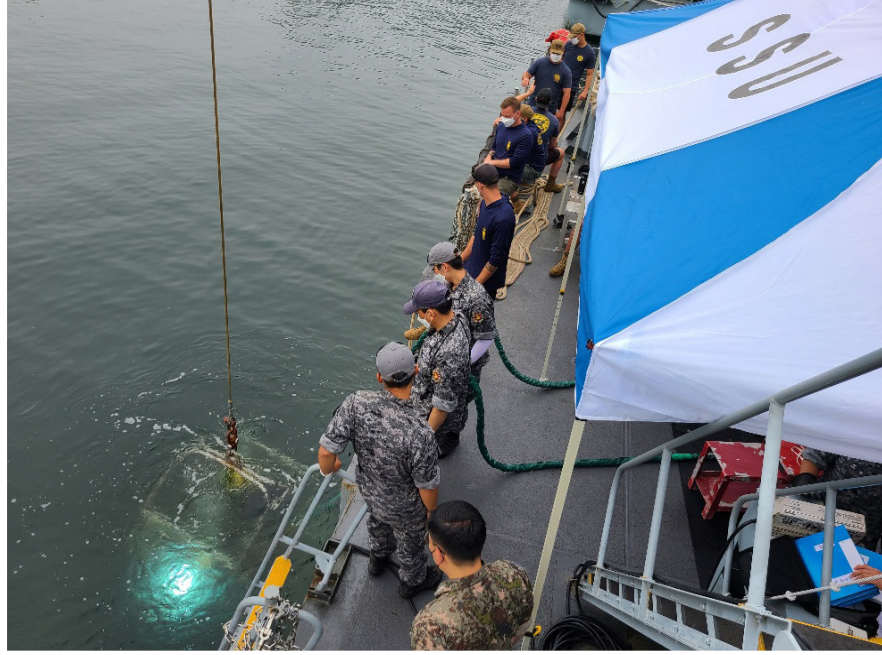
In an effort to further strengthen the relationship between the US and ROK diving forces, MDSU ONE is hosting the ROK-N SSU for DIVEX 21, a bilateral diving subject matter expert exchange and interoperability exercise in Pearl Harbor, Hawaii in October 2021. Concurrently, MDSU ONE plans to host the ROK-US Salvage Staff talks, where key leaders of the salvage forces of both countries can coordinate efforts and share relevant information.



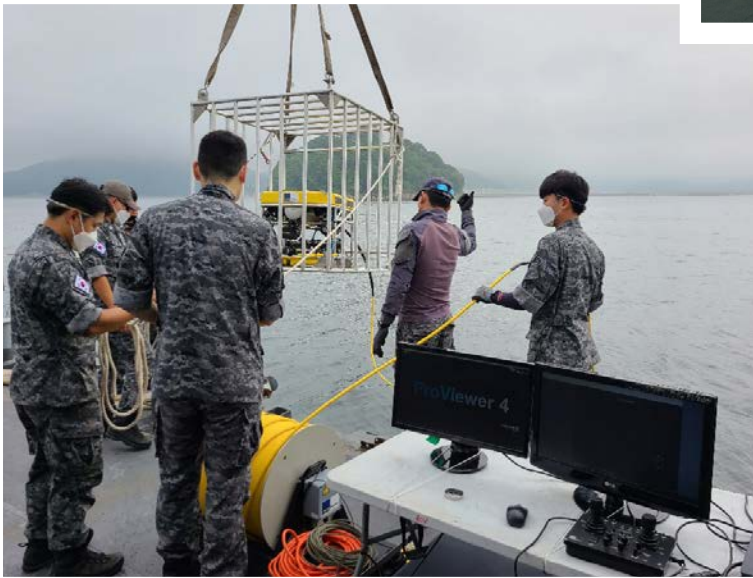
MDS CO 1-8 & ROKN SSU Surface Supplied Diving.



MDS CO 1-8 & ROKN SSU UNDET Shot Build Up.



MDS CO 1-8 & ROKN SSU Surface Supplied Diving and Underwater Cutting and Welding.



MDS CO 1-8 & ROKN SSU ROV Operations.



MDS CO 1-8 & ROKN SSU UNDET Execution.



SALVEX 2021 Closing Ceremony; SSU Commander CAPT Hwang, Byung-Ik and CWO3 Jose Castilla III along with members of MDS CO 1-8 & ROKN SSU.

CWO3 Jose Castilla III has been the Commander of Mobile Diving & Salvage (MDS) Company 1-8 since September of 2019.

*Photos by: HM1(DWS/EXW/SG/SW/PJ)
Vladimir Link*



ONR/NAVSEA

Undersea Medicine Projects

By: CAPT Bryan M Hooks, USNR, Dr. Sandra Chapman, CAPT David Regis, USN, and CDR Jeremy Sword, USNR

On 14-16 May 2021, the Office of Naval Research (ONR) / Naval Sea Systems Command (NAVSEA) Undersea Medicine Program Review was held virtually to discuss advances that had been made over the past year.

Scientists from Department of the Navy laboratories, including the Naval Medical Research Center, Naval Health Research Center, Naval Submarine Medical Research Laboratory, and the Navy Experimental Dive Unit, along with U.S. and international researchers from universities and industry attended the program review to present research findings from ONR and NAVSEA funded projects. The goal of the meeting was to review the status of biomedical and engineering projects devoted to overcoming human deficiencies that limit operations in the deep sea environment.

The ONR Undersea Medicine Program develops science and technology solutions aimed at optimizing diver and submariner health and performance, while enhancing the flexibility, efficiency, and safety of undersea warfighter missions. Similarly, the U.S. Navy Deep Submergence Biomedical Development Program sponsors biomedical research aimed at improving diver health, safety, and effectiveness as well as improving the survivability of submariners in a disabled submarine (DISSUB) scenario. Projects were presented on topics supporting Navy undersea medicine, including decompression sickness, oxygen toxicity, human performance, and disabled submarine rescue. A subset of projects are described in greater detail in this article.

Authors: CDR Sword and CAPT Hooks are reservists with the Office of Naval Research, Reserve Component. Dr. Chapman is Program Officer for Code 342 Undersea Medicine. CAPT Regis is Program Manager for the NAVSEA 00C Deep Submergence Biomedical Development Program.

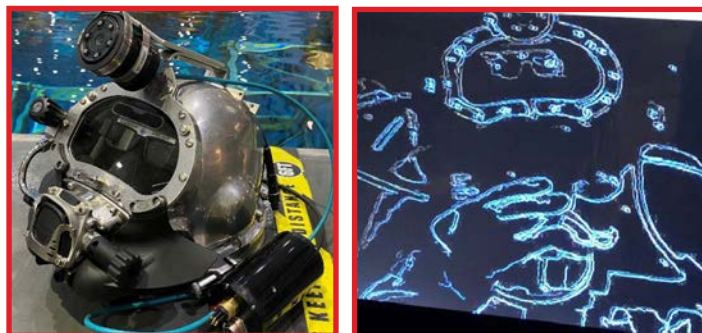
DIVER AUGMENTED VISION DEVICE (DAVD)

Principal Investigator:

Allie Williams, DAVD Project Manager, Naval Surface Warfare Center Panama City Division

Paul McMurtrie, SUPSALV Diving Systems Program Manager, NAVSEA 00C3

Description of Project: Military diving is regularly conducted in low to zero visibility environments in which standard visual displays and gauges are virtually useless. Even in visible environments, situational awareness and communication to topside can be limited. Heads-up displays (HUDs) using emerging waveguide optical display technology is a potential solution to this limitation.



DAVD Gen 2.0 System with Edge Mode capability

Theory of Operation: The DAVD system couples topside images and data into thin waveguide display optics and translates the images through a series of internal reflections, projecting them to the diver's eye. The display provides magnified, see-through virtual images at a specific distance in front of the diver. Currently this data includes real-time sonar imagery, text messages, schematics, and augmented reality overlays. Data is transmitted from the surface to the diver via a thin ethernet umbilical. Keyed by voice commands from the diver, data can be placed anywhere on the HUD screen, and the diver can easily return to full see-through mode whenever needed for the mission.

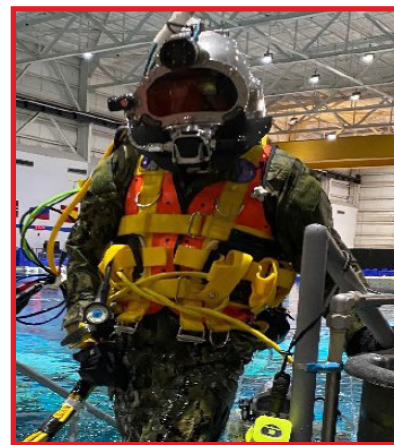
Benefits to Navy Diving: As this technology is optimized for the military diving environment it will radically transform a dive mask/helmet into an immersive visual display interface capable of providing critical information to divers such as life support data, live high resolution sonar imagery, advanced underwater navigation cues, 3D augmented reality displays.



DAVD FFM Version Design Identical optics to the Kirby Morgan 37/97 design are used in the DAVD MK20 FFM version, with a custom faceplate designed to house them.

Current Status of Project:

DAVD Gen 2.0 system has met all specifications required for Navy approval and has officially been added to the Authorized Navy Use (ANU) list in February 2021. DAVD systems have been delivered to MDSU-1, MDSU-2 and UCT-1 so far in FY21, with additional deliveries planned. DAVD Full Face Mask (FFM) prototypes are in the assembly process and Dive Lab will complete initial testing of the units at the end of FY21. Optical research and evaluation of available products continues, with commercial units being purchased and lab assessments in process. At the end of FY21, viable optical tabletop demonstrations are planned, as well as the completion of a research paper with the findings.



DAVD Gen 2.0 Evaluation: Test Diver wearing DAVD Gen 2.0 helmet exits water after completing evaluation test at NASA's Neutral Buoyancy Lab.

Future Project Goals:

- (1) Design and Fabrication of DAVD MK 28 FFM version
- (2) Fleet Delivery of DAVD MK 20 FFM Version
- (3) Implementation of DAVD Optical Upgrades
- (4) Continue DAVD fleet deliveries/upgrade kits of Gen 3.0, with ongoing technical support
- (5) Continue NASA Collaboration and evaluate DAVD potential

CHARACTERIZATION OF ACOUSTIC ATTENUATION OF UNDERWATER NOISE IN THE KM37 DIVE HELMET

Principal Investigator: Brandon M. Casper, Naval Submarine Medical Research Laboratory

Description of Project:

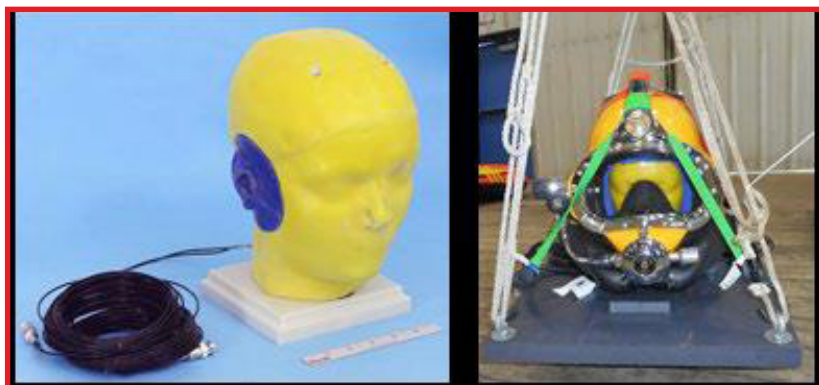
Navy divers are frequently exposed to high levels of underwater sound during dive operations, including sound produced by tools, machinery, boat engines, and occasionally SONAR. Many of these operations require divers to wear helmets (KM37 or similar) for improved communications with the surface. There is little information regarding the transfer of acoustic energy from the outside environment into the dive helmet, creating a challenge for providing guidance recommendations on safe exposure to underwater noise. This lack of information may have resulted in overly conservative recommendations that limit operational capabilities, or resulted in incorrect recommendations that risk hearing damage.

Benefits to Navy Diving:

By characterizing the acoustic energy transfer function between the underwater environment and the Kirby Morgan 37 & 97 (KM37/97) helmets more accurate guidance can be provided to the fleet for helmeted divers exposed to high levels of underwater sound.

Theory of Operation:

The project has already collected sound measurements from different underwater sources using a sensorized manikin head inside of dive helmets. The manikin head is the approximate volume and shape of a human head and was developed with interchangeable microphones and hydrophones located within the ears to measure the sound transmission through the helmet. It has been exposed to three different underwater transducers that broadcast tones over a combined range of 50 Hz to 5 kHz at sound levels between 150 and 180 dB re 1 μ Pa. The head and helmet have also been exposed to the same frequencies using a pressurized vessel simulating depths from 16.5 fsw to 155 fsw measuring both sound volume and energy transfer.



Sensorized manikin head (left), and head inside the KM37 diving helmet on mounting apparatus (right).

Current Status of Project:

Overall, there appears to be less sound attenuation with greater pressure/depth, though the increases in the level of sound that are transmitted through the helmet primarily appear to be around the resonance frequency of 250-300 Hz.

Future Project Goals:

This project is concluding with data analysis and updated guidance to NAVSEA 00C to follow.

KETOGENIC DIET FOR REDUCTION OF CNS OXYGEN TOXICITY IN WORKING DIVERS

Principal Investigator: Dr. Bruce J. Derrick, Duke University Medical Center

Description of Project:

Achieving metabolic ketosis in divers is hypothesized to protect working divers against the effects of oxygen toxicity, including seizures. This study aims to establish a means of achieving nutritional ketosis (NK) and evaluate the effect of NK on delaying Central Nervous System (CNS) Oxygen Toxicity (CNSOT) in immersed (head-out) working divers. Secondary objectives aim to understand CNSOT physiology and NK including cognitive effects, brain function and hemodynamics.

Benefits to Navy Diving:

The benefits of the project include improved diver safety with expanded operational limits for high PO₂ diving. Further, the project plans to enhance understanding of the mechanisms of CNSOT which in turn may lead to further mitigation strategies.

Theory of Operation:

Elevated partial pressure of oxygen (PO₂) puts divers at risk of CNSOT, whose underlying mechanisms are not well understood. Risk of oxygen toxicity is increased by elevated PO₂, inspired or elevated CO₂, immersion, and exercise/increased metabolic rate.

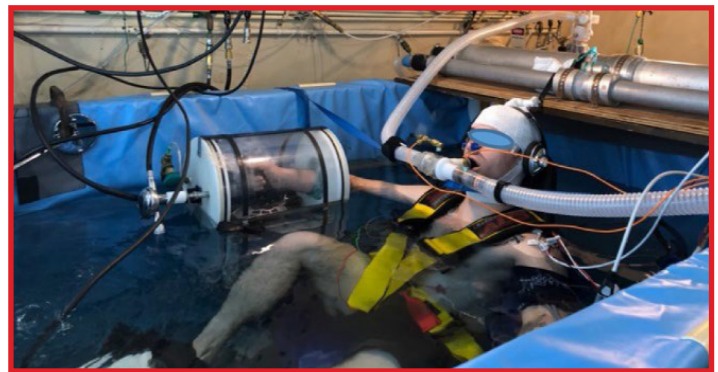
Nutritional ketosis (NK) is proposed as a mechanism to protect against CNSOT due to seizures refractory to anti-epileptic drugs being successfully treated through the ketogenic diet, a high fat, adequate protein, and extremely scarce carbohydrate regimen. While the antiepileptic mechanisms are still under investigation, elevated serum ketone levels from ketogenic diets and other ketogenic mechanisms (starvation and ketone supplements) increased latency to seizure in animal models of CNSOT.

Current Status of Project:

Volunteers were monitored during and after two hyperbaric exposures (100% O₂ at 35 fsw) in a random order: (1) After conventional diet (CD), or (2) after a 3-day ketogenic diet (KD), with serum and urine ketone levels recorded. The exposure is terminated upon manifestation of CNSOT or at maximum of 120 minutes if no CNSOT is observed. A battery of physiologic and cognitive parameters are recorded during this time. During the pilot phase (first 10 subjects), there was a significant increase in delay to CNSOT for the KD group compared with the CD group, 70.2 ± 28.3 min vs. 47.2 ± 17.2 min respectively. Data collection is nearing completion. Of interest, subjects developed CNSOT symptoms in 22/30 dives where electrodermal activity (EDA) data was collected as an assessment of sympathetic nervous system activity. This suggests that EDA may be a viable means of monitoring for CNSOT.

Future Project Goals:

Data collection is near completion and analysis is underway with report(s) on the results to NAVSEA 00C to follow thereafter.



Subject setup in the chamber during physiological and cognitive battery.

21ST CENTURY SURFACE-SUPPLIED HELIOX DECOMPRESSION TABLES

Principal Investigator: Dr. Wayne A. Gerth, Navy Experimental Diving Unit, Panama City, FL

Description of Project:

The current U.S. Navy Surface-Supplied Helium-Oxygen (SS He-O₂) Decompression Tables, which are little changed from their original 1939 issue, have a limited record of success in operational dives to depths of 240 fsw or shallower. The desire for longer and deeper SS He-O₂ dives is increasing within the scope U.S. Navy diving operations. Recent theoretical evaluations indicate that tabulated schedules for these type of dives will incur unacceptably high risks of Decompression Sickness (DCS).

Benefits to Navy Diving:

A new table of schedules computed with modern DCS modeling technology to incur more acceptable risks of DCS over operationally useful ranges of dive depth and bottom time is being developed and man-tested in the present project to replace the present U.S. Navy SS He-O₂ Decompression Tables.

Theory of Operation:

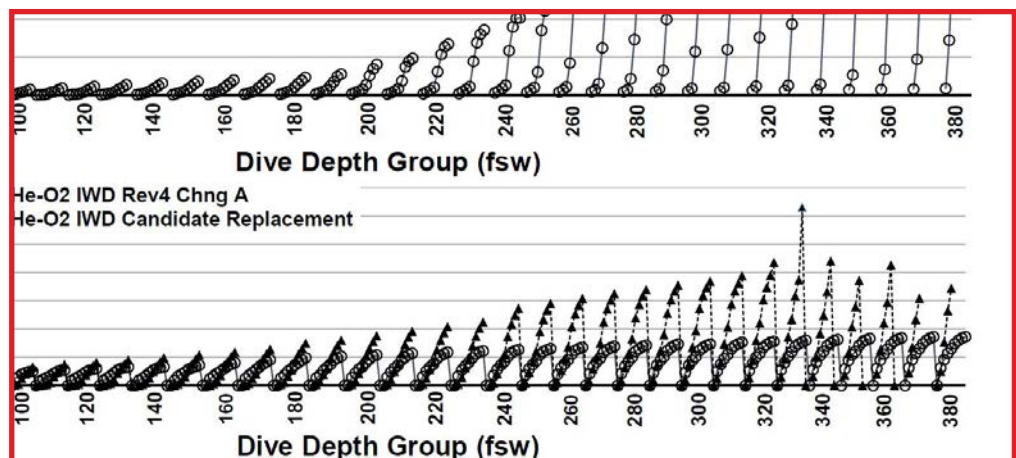
Probabilistic models of DCS incidence and time of occurrence have been optimized using expanded laboratory data for heliox (He-O₂), nitrox (N₂-O₂), and trimix (He-N₂-O₂) dives to improve representation of constant O₂ fraction dives typical of surface-supplied operations. Selection of a model for calculation of replacement SS He-O₂ schedules is based on historical SS He-O₂ diving experience and comparison of candidate schedules to those in earlier abandoned replacement attempts and to schedules in the current MK 16 MOD 1 1.3 ATA constant PO₂ decompression tables with features similar to those in SS He-O₂ diving.

Current Status of Project:

Man-testing is currently underway at NEDU.

Future Project Goals:

- (1) Complete man-testing to validate new SS He-O₂ decompression Tables.
- (2) Complete and forward NEDU Technical Report describing replacement SS He-O₂ Decompression tables to replace the current Tables in a future release of the U.S. Navy Diving Manual.



Estimated risks of DCS for schedules in present in-water SS He-O₂ decompression table (A) and total decompression stop times for schedules in present and candidate replacement in-water SS He-O₂ decompression tables (B). Schedules in each panel include those for exceptional exposure dives and are ordered by increasing bottom time in groups of increasing dive depth. 2.3% acceptable DCS risks in the candidate table require substantial increases in total stop times for long deep dives.

AUTOMATED DETECTION OF VENOUS GAS EMBOLI ON ULTRASOUND RECORDINGS

Principal Investigator: Virginie Papadopoulou, University of North Carolina-Chapel Hill

Description of Project:

Circulating bubbles are one integral component of decompression sickness (DCS). Bubbles can be assessed as circulating Venous Gas Emboli (VGE) post-dive using ultrasound, with either precordial/subclavian Doppler ultrasound (audio) or trans-thoracic echocardiography (2D cardiac imaging). Recordings are evaluated in real-time and/or recorded for future reanalysis. However, grading recordings can be difficult and lengthy to learn, and inter-rater reliability can be a problem. Automating ultrasonic VGE assessment will allow for standardized, continuous, real-time decompression stress assessment.

Theory of Operation:

The project hypothesizes that a deep learning approach to identify VGE can automate the assessment of post-dive echocardiograms. VGE features will be learned through a Generative Adversarial Network (GAN), and VGE spatio-temporal positions in validation recordings are provided through a collaboration with the Diver's Alert Network (Dr. Tillmans, co-Investigator). After the algorithm is trained, real-time implementation will be tested following chamber dives at Duke (Professor Moon, co-Investigator). Doppler recordings lack labeled data and extensive human rater training is required for accurate labeling. In lieu of this, training data will be simulated instead. Validation is assessed both experimentally and on real diving recordings after building a Doppler repository in collaboration with UCSD (Professor Lindholm, co-Investigator).

Benefits to Navy Diving:

The overall objective of this project is to computer-automate the assessment of VGE on both echocardiography and Doppler audio recordings. Automating ultrasonic VGE assessment would allow for standardized, continuous, real-time decompression stress assessment. This is of significance to Navy Divers and Dive Supervisors in optimization of decompression procedures and decision making during diving operations. Furthermore, predictive DCS assessment could enable individualized real-time feedback to generate specific and tailored dive profiles to each diver based on risk bubble detection.

Current Status of Project:

The Echocardiography VGE detection project has fully automated late ventricular diastole frame selection on post-dive echocardiography. A manual review program was created for an experienced rater to vet the data before adding it to the AI pipeline. In parallel, a crowdsourcing initiative has been developed with the Divers Alert Network to label VGE on echocardiograms, which will provide additional training and validation labels.

Future Project Goals:

Complete Doppler database labeling & repository structure and identify additional data sources if available. Automate VGE detection on echocardiograms and on synthetic Doppler recordings.



Detection of venous gas emboli using ultrasound

CHARACTERIZATION OF GAS TRANSPORT THROUGH BIOLOGICAL MEMBRANES

Principal Investigator: Walter F. Boron, Case Western Reserve University School of Medicine

Description of Project: Gas transport across biological membranes is essential for cellular processes supporting life, but also has a central role in disease, especially in diving medicine. Gas exchange across membranes depends on the gas itself, the components of the membrane, and gas channels present. Controlling cellular gas exchange by altering gas channel permeability via inhibitors, regulation of expression, or other modifications could offer new treatments for gas imbalances experienced in diving such as Decompression Sickness (DCS). Designer channels could form selective gas filters, with applications for divers and disabled submarine situations.

Theory of Operation: These experiments address how individual gases (ex: oxygen, nitrogen) move through membrane lipids and gas-channel proteins and how controlled passage through these channels influence physiological function and performance.

Specifically, the major gas channels regulating the blood-gas barrier in the lungs are AQP5 on the air-facing membrane of alveolar type I cells (ATIC). Dr. Boron's group hypothesizes that eliminating AQP5 will slow O₂ uptake from alveolar air into ATICs, thereby reducing intracellular [O₂] in ATICs and reducing pulmonary oxygen toxicity.

Benefits to Navy Diving: Long-term applications of understanding gas transport in body tissues include:

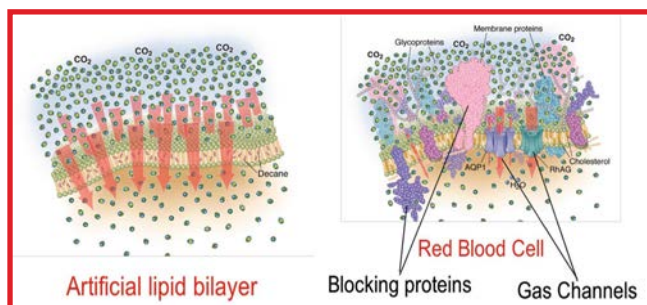
- (1) Biomarkers for personnel: Assess whether human genetic signatures in these gas channels predict differences in diving performance or susceptibility to gas imbalances (including DCI and pulmonary oxygen toxicity)
- (2) Interventions to treat personnel: Drugs to block/enhance gas passage through channels.
- (3) Designer channels: Develop modified or novel channels for use in gas-tight synthetic membranes in devices that act as ultra-selective molecular gas filters.

Current Status of Project:

Several known mutations of AQP5, including some related to disease are known, which offers the potential to create an AQP5 designer channel that nearly eliminates H₂O permeability but retains significant CO₂ permeability via central pore. Future work could tune that permeability to specific gases.

Future Project Goals:

This pilot study could provide the first genetic proof of principle that AQP5 plays an important role in gas pathology, specifically pulmonary oxygen toxicity. Next logical steps could be molecular/cellular experiments to clarify the mechanism of O₂ diffusion through AQP5. Collaborations with Dr. Jay Dean could test the predictions that interfering with pulmonary AQP5 and/or other gas channels could reduce the uptake O₂ into pulmonary-capillary blood and thereby mitigate CNS-OT. The next major step would be genetic proof of principle in swine that the absence of AQP5 mitigates pulmonary oxygen toxicity. The transition to humans would include the development of small-molecule inhibitors of the AQP5 central pore - drugs with fast on/off rates that could be delivered as an aerosol into the inhaled air and allow the fine-tuning of the O₂ permeability of the apical membranes of ATICs. Other approaches could be the identification of biomarkers to identify individuals at high/low risk for pulmonary oxygen toxicity. Finally, the new knowledge gained in this research could produce insights that could lead to changes in guidelines for diving.



Rendering of artificial vs real biological membranes. Photos from Dr. Walter Boron, Case Western Reserve University.

MICROPARTICLES, INFLAMMATION AND DECOMPRESSION SICKNESS

Principal Investigator: Stephen R. Thom, University of Maryland School of Medicine

Description of Project:

Changes in the composition of blood during diving and how these contribute to Decompression Sickness (DCS) are not fully understood. This project evaluates the role of circulating extracellular vesicles (EVs) and cell activation in humans engaged in high gas pressure exposures and decompression during diving. The studies test the hypothesis that circulating microparticles (MPs) are the proximal cause for organ injuries following high pressure and decompression stress because they initiate a damaging inflammatory response.

Theory of Operation:

Injection of MPs is sufficient to cause DCS-like injury in rodent models. Furthermore, plasma gelsolin (pGLN) is thought to play a role in the degradation of the damage-causing microparticles and therefore may offer a promising candidate for prevention and treatment of DCS.

Benefits to Navy Diving:

Decompression sickness is a leading injury and threat for divers and is only mitigated by the practice of delayed ascent time as dictated by the dive tables, which greatly impairs diving efficiency and effectiveness.

It is important to highlight that there are NO pharmacologic treatments available and the only treatment is oxygen and recompression and the only preventative treatment is delayed ascent as provided in dive tables. But due to the modeling that goes into the development of these tables, they are not able to protect 100% and there are individuals that fall outside of the statistical modeling and will suffer DCS injury. Dr. Stephen Thom, has demonstrated in mice that the inflammatory response can almost be completely abrogated with treatment of a naturally occurring protein called Gelsolin. Since this is a naturally occurring protein, this is a likely explanation for the individual differences we have seen in DCS manifestation and could be used to supplement those who do not have sufficient supply. Furthermore, this can be used as a prophylactic AND a treatment and so could be very powerful in applications.

Current Status of Project:

This year, one published paper showed the role of MPs, IL-1 β , and pGSN changes in both humans and mouse models (<https://pubmed.ncbi.nlm.nih.gov/33764168/>). This work documented the mechanism relating MPs to plasma gelsolin. Studies this past year focused on the mechanisms by which MPs activate neutrophils, the primary inflammatory cell type responding to high pressure in mouse models of DCS. Changes in blood-borne MPs and inflammatory proteins (IL-1 β) and plasma gelsolin (pGLN) were assessed in human subjects following high pressure exposure in a hyperbaric chamber. Whether these changes were consistent with neutrophil activation was tested ex vivo. During a 25 minute 300kPa air pressure exposure, plasma MP and IL-1 β rise significantly and continue to rise for two hours post-decompression, while pGLN decreases. This pattern also occurs in mice. Implicating pGLN in the response, decompression-associated capillary leak is prevented in mouse models by administration of human recombinant pGLN (27 mg/kg) either immediately before pressurization prophylactically or after decompression. These results highlight the role of MPs as a cytokine carrier and demonstrate that pGSN plasma levels decrease during and after high pressure exposures.

Future Project Goals:

Further collection of human blood samples to assess Gelsolin levels in normal and DCS injured divers. Testing in small animal model to further validate mouse studies. Randomized controlled trials with Gelsolin treatment pre and post-dive.

NEXT-GENERATION MATERIALS FOR OXYGEN GENERATION, TRANSPORT, AND STORAGE IN THE UNDERSEA ENVIRONMENT

Principal Investigator: Dr. Daniel Nocera, Harvard

Description of Project: The undersea environment engenders extreme challenges for human performance. Of these challenges, the unavailability of oxygen is the most basic impediment to human existence, performance and health. Oxygen generation and its transport and storage must occur in inhospitable light, temperature, and pressure conditions. Additional complications include power limitations and the need for agility. For these reasons, methods developed for the generation and management of oxygen from seawater in our current technological world are insufficient. Breakthrough advances for harvesting and managing oxygen in the undersea environment will require fundamentally new techniques, which this Multidisciplinary University Research Initiative (MURI) seeks to deliver for next-generation U.S. Navy operations.

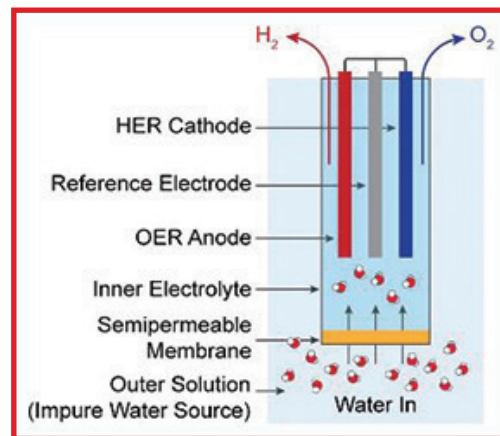
Theory of Operation: This program created a new integrated method for purifying seawater and generating oxygen congruously. By combining electrochemical water-splitting with forward osmosis, an induced concentration gradient is maintained by balancing the rates of water influx (i.e., forward osmosis) and outflux (i.e., water-splitting). This approach of coupling forward osmosis to water splitting allows for the use seawater and other impure and natural water sources for oxygen generation without pre-treatment and with minimal losses in energy efficiency.

Benefits to Navy Diving: This project as well as other related projects explore technologies that can use the oxygen from ocean water and eliminate reliance on surface-supplied and pressurized gas. This could drastically reduce the size and weight of scuba equipment to enable ultimate freedom for multi-domain operations. This may also enable an unlimited supply of oxygen. A related project explores the use of the bi-product of water-splitting, H₂, for converting CO₂ to a salt that would be dissolved directly into the surrounding seawater to replace current rebreather scrubbing technology, which has a finite capacity and also is a common point of fatal equipment failure.

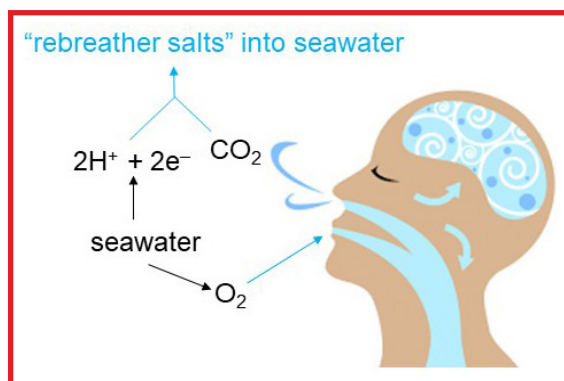
Current Status of Project: The first year of the MURI project has resulted in new chemistries for oxygen generation from direct seawater, new agents for oxygen separation and transport, and new antifouling coatings. In addition, two patent applications have been filed for a new method of oxygen generation from water, and a new method for increasing the solubility of oxygen in water.

Future Project Goals:

- (1) Continue search for new efficient oxygen generating chemistries to achieve energy-efficient water-splitting of raw, dirty, unfiltered seawater by employing mass chemical screening techniques.
- (2) Explore alternative oxygen-storage chemicals and materials that store dense concentrations
- (3) Create anti-microbial coatings to prevent fouling



New invention that couples forward osmosis to water-splitting to generate oxygen from seawater. (Hydrogen Evolution Reaction (HER), Oxygen Evolution Reaction (OER)). Photos from Dr. Nocera, Harvard.



COASTAL TRIDENT 2021

By: SW1 (SCW/EXW/DV) Tyler Ault, NAVFAC EXWC Dive Locker

Divers from Naval Facilities Engineering and Expeditionary Warfare Center (NAVFAC EXWC) participated in an exercise in Port Hueneme CA to explore emerging technology that could assist divers engaged in salvage and recovery work. Exercise Coastal Trident is a regional port and maritime security exercise that is used as an operational research program conducted to advance the state of the art in countering threats to port and maritime security and sustaining the global operations of naval forces.

The salvage survey, mass casualty and recovery portion of the exercise was led by NAVFAC EXWC. It involved outfitting a 20' ISO container with hallways and rooms containing bunks and furniture to provide obstacles to navigation. This training wreck was lowered to the bottom in 40 feet of water. The wreck had cameras installed that let surface personnel observe divers as they penetrated and conducted work. To maximize the value from this unique training ground, a team of 51 public safety and military divers from NAVFAC EXWC Dive Locker, Coast Guard, Ventura County Sheriff's Office, Santa Barbara Sheriff's Office, Los Angeles Fire Department, and Los Angeles Port Police were brought together to work and dive together. The Navy/Coast Guard Divers were in Surface Supplied KM97s with the DAVD system's latest hardware and software. They were working on expanding the DAVD capabilities to help divers working inside a wreck. They used SONAR

data collected on site and LiDAR scans of the container that were taken on surface to help them navigate and accomplish a series of tasks. The NAVFAC EXWC Divers worked with Naval Surface Warfare Center Panama City (NSWC PC) to

vessel in 1919 that took the lives of 34 people. That operation was one of the most challenging in Southern California history and involved over 60 divers from local agencies. This type of multi-agency operation is typically only seen during a

disaster when Defence Support to Civil Authorities (DSCA) operations are conducted. It is a difficult thing to safely bring together a dive team with varied mission areas, equipment, and techniques. The ability to work on a problem like this in a training environment will dramatically increase the effectiveness and safety of the team when the next DCSA operation is conducted.

The NAVFAC EXWC Dive locker serves the fleet by developing tools and techniques for the working diver.

Their focus area is helping divers who breathe the "long hose" be ready with the tools and techniques to succeed. Recent efforts include development of the Diamond Wire Saw (DWS) for underwater use, testing and ANU approval (granted by NAVSEA 00C) of the Artemis Pro Navigator, NECC TOA evaluation conducted in Thule Greenland, and development of contaminated water dive techniques and equipment.

SW1 (SCW/EXW/DV) Tyler Ault is an Underwater Construction Technician attached to NAVFAC EXWC. He is the Tools Development Lead and was the Exercise Lead for the CT21 Diving Mass Casualty Scenario.



CAPT Jay Young (SUPDIVE) getting hands on checks prior to diving the DAVD MK20 FFM prototype.

test and evaluate a 3D printed faceplate for the MK-20 that allows it to house the DAVD HUD. These dives are being used to help NSWC PC refine the faceplate design as the DAVD program grows to include MK20 and SCUBA modes. CAPT Young (SUPSALV), CAPT Murphy (detaching SUPDIVE) and CAPT Marsh (oncoming SUPDIVE) visited the site to observe the operation and see how the DAVD system is being improved to assist divers navigating inside a wreck.

The public safety dive teams used the wreck as a training area for underwater scene documentation and body recovery. Most of the teams involved participated in the recovery efforts following the fire and sinking of the MV Conception dive

Command in the **SPOTLIGHT**

PSNS&IMF

Puget Sound Naval Shipyard and Intermediate Maintenance Facility

A Proud Tradition of Diving and Ship Repair

By: CDR Tom Finley

The Navy's Underwater Ship Husbandry (UWSH) repair capability in the Pacific Northwest resides at Puget Sound Naval Shipyard & Intermediate Maintenance Facility in Bremerton, Washington. PSNS & IMF has a proud 130 year legacy of warship construction, repair, modernization and dismantling.

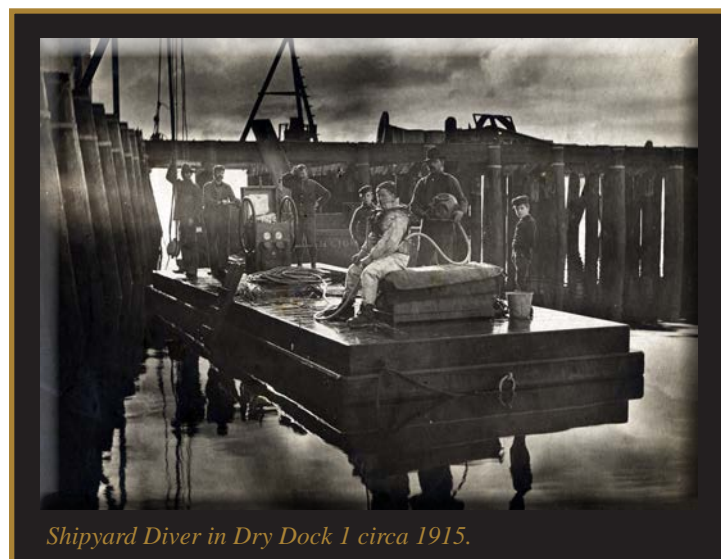
PSNS & IMF was established as a Naval Station in 1891. Early in the shipyard's history, diving became a key component to the execution of the mission. Official accounts of diving operations can be traced back to the 1930s with evidence that underwater work was executed in the shipyard as early as 1915. The dive locker was officially established in 1934 by retired Chief Gunner's Mate John Henry "Dick" Turpin. Turpin's career spanned three armed conflicts and 29 years. He notably became one of the first African-Americans to advance to the rank of Chief Petty Officer. At the time the shipyard dive locker was established, Turpin was a Master Rigger and was selected based on his prior service and training in diving. A dive school was established to train shop workers to execute dives that focused on retrieval of objects dropped pier side and basic underwater ship repair tasks. During World War II, the ranks of the shipyard

swelled as did the complexity of dive work. Based on the demand signal from the war, shipyard divers started training in and executing underwater cutting and some primitive underwater welding. This period also saw significant use of flat and box patches to allow for inboard system repair efforts.

In the years since World War II, the organizational structure of the shipyard has evolved to support the needs of the warfighter. The dive locker now falls under the direction of Code 700, Lifting and Handling Department, and is further organized under Code 760, the Regional Dive Locker. Code 760 encompasses three geographically separated, but very much connected dive lockers in Bremerton, Bangor, and Everett that are all supported by a Boat Maintenance Division.

The Bremerton Dive Locker is located on the shipyard within its Controlled Industrial Area. To date, the team has 26 civilian Navy divers who work aboard aircraft carriers, SSNs, SS-GNs and SSBNs, to support availabilities of varying length and complexity.

They also support the in-port operational and maintenance requirements for USS JIMMY CARTER (SSN-23), which is homeported in Bangor, Washington. Additionally, various waterfront facilities are supported to include critical work to the shipyard's six graving dry docks, encompassing routine maintenance, as well as pre- and post-docking work. The dive locker is roughly comprised of 50 percent prior active duty divers and 50 percent shop workers who transitioned to the dive locker following a locally executed mud pup phase and the completion of Second Class Diver School. This balance has proven successful in leveraging the background, experience, and skills of



Shipyard Diver in Dry Dock 1 circa 1915.



*PSNS Dive Locker Plankowner
GMC John Henry "Dick" Turpin*

individuals to promote safe and efficient execution of the Command's mission.

The Bangor Dive Locker aligned with PSNS & IMF in 2007. The locker is co-located with Trident Refit Facility, Bangor. As such, the majority of the diving executed by these 21 active duty divers, is on OHIO Class SSBNs. The critical firepower that these units provide to our Nation's Strategic Missile Defense requires uncompromising technical excellence in the execution of both routine and emergent ship repair, which the locker provides. The dive locker supports waterfront facility and security missions executed under the direction of Naval Facilities Command (NAVFAC) and Strategic Weapons Facility Pacific (SWFPAC), and special mission sets under the direction of Naval Surface Warfare Center, Carderock Division (NSWC-CD) both locally and at their Acoustic Research Detachment (ARD) at Lake Pend Oreille, Idaho. The dive locker also supported NDSTC in the execution of the Cold Water Ice Diving Course of instruction held in Seattle and Lone Butte, British Columbia. In this role we serve as the Recompression Chamber Team and use Transportable Recompression Chamber System (TRCS) to provide coverage in this remote location.

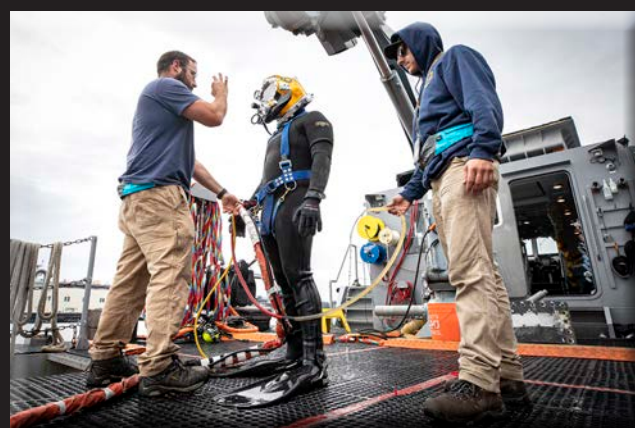
The Everett Dive Locker was founded in 1996 and reorganized under PSNS & IMF with Bangor in 2007. This locker is located at PSNS & IMF Detachment Everett and is a key contributor to the

execution of the Northwest Regional Maintenance Center (NWRMC) mission and the material readiness of homeported DDGs. The dive locker is comprised of 14 active duty divers who execute various underwater repairs, cofferdam support for inboard work, Controllable Pitch Propeller blade changes, etc.

In conjunction with the Bangor locker, they also support NAVFAC, NSWC-CD, and NDSTC.

The structure of the dive locker allows for the cultivation of a culture of collaboration. The unit strives to operate as a single dive locker executing the repair mission on any given week. The dive sides see active duty and civilian divers in the water executing complex work procedures, and topside learning from each other. During periods of significant work load, active duty divers provide critical supplementation to the Bremerton Dive Locker, supporting multiple around the clock shifts. This promotes broadening to the sailors' Underwater Ship Husbandry experience as it exposes them to different platforms and the complex work that is undertaken during major availabilities.

Collaboration between active duty and civilian personnel extends throughout our organization. The civilian Division Head and active duty Diving Officer oversee the execution of diving operations and through active communications with the Master Divers and General Foremen that oversee the individual lockers. The goal and constant



Diving Supervisor, Matt Miller, prepares divers to enter the water. Photo by Scott Hansen



MDV Diego checks diver prior to launch. Photo by MM2 (SW) Leobardo Amezcuita

focus is of safe and efficient execution of the Command's mission, while supporting each diver in their development and career progression regardless of what they wear to work every day.

Like you, we do a lot of work. Like you, each one of us takes a tremendous amount of pride in being a Navy Diver and our ability to execute technically complex and physically demanding work whenever and wherever the need arises. We are proud of the relationships we have developed within the Navy Diving Community and our ability to work to achieve the common objective of supporting the warfighter in bringing the fight to the enemy. We look forward to seeing you out there.

*CDR Tom Finley serves as PSNS&IMF
Command Diving Officer.*

Mark V Monument Scholarship Project

By: Steve Mulholland

“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.

When our founder Dave Sullivan started the Mark V Monument Scholarship Project, he was looking for a way to support our future leaders in their education goals. Unfortunately, Dave passed away in January of 2020. As we mourned the loss of this great man, we all agreed that we couldn't let his legacy and all of his hard work for the foundation fade away with his passing. As friends and fellow divers of Dave's, we made a pact to continue his vision and help these great kids of ours with their education. It has been a rough long road, everything was in Dave's name, against our favor we had to overcome legal roadblocks to transfer the foundation and all of its assets to the new Board of Directors. We understand this small gesture will not fund the high cost of education of today's schools, we hope this will bring comfort in covering some of the smaller expenses incurred with attending college. We cannot thank everyone enough for their support and patience during these trying times. It took a little longer than expected, but we recently distributed the annual scholarship awards for 2021:

Dylan TenBroeck

son of

Charles TenBroeck, USN Ret.
Bartlett, Tennessee

“The heroes of today are those who put the needs of others before themselves. The ones who contribute to something larger than themselves.”

Sophie O’Niel

granddaughter of

Alfred Briggs USN Ret.
Richmond, Vermont

“To be a hero today, it means being resilient in the face of adversity, and being selfless by serving others and putting yourself at risk, regardless of the reasoning behind why.”

Grace Vlaum

granddaughter of

Donald Smith USN Ret.
Salem, Connecticut

“A hero can be defined as anyone who sacrifices, rebels, and fights for their beliefs.”

Cadice Ammons

son of

Matthew Ammons USN Ret.
Enterprise, Alabama

“A hero today is someone who uses courage or compassion to combat adversity and help others rather than himself.”



in memoriam

George David Sullivan

October 14, 1944 ~ January 21, 2020
(age 75) USN RET

**Please visit and support us at:
www.markvmonument.org**



NEDU Scientist Earns Top Navy Distinction for Technical Excellence

By: NEDU Public Affairs

Navy Experimental Diving Unit's (NEDU), Dr. Wayne Gerth earned the 2021 Assistant Secretary of the Navy for Research, Development and Acquisition Dr. Delores M. Etter Top Scientists and Engineers of the Year Award.

Gerth was one of four scientists selected from within the Department of the Navy. The awards ceremony was held on June 25, 2021, at the Melville-Taylor Auditorium at Naval Surface Warfare Center Carderock in West Bethesda, Maryland.

"Dr. Gerth has made significant contributions to the U.S. Navy's diving community and this award recognizes his superior achievements," said NEDU Commanding Officer Capt. (Sel) Kiah Rahming, USN. "This is a highly competitive and very prestigious honor that is well deserved.

We are extremely proud and honored to have him on our team. Hooyah, Dr. Gerth and job well done!"

Dr. Gerth, a Senior Research Physiologist at NEDU since 2000, was cited for his unparalleled dedication to the experimental, theoretical, and practical research and development, that provides state of the art decompression and undersea capabilities to expand our military's competitive advantage and save the lives of our divers, special operators, and submariners throughout the U.S. Navy, Department of Defense, and U.S. allied military partners.

Gerth said this award symbolizes the support from family, mentors, colleagues, program managers, sponsors and members of the NEDU community over many years.

"I was immeasurably surprised upon learning of my selection for this award and am deeply honored and moved to be recognized in this way," said Gerth. "I am thankful for the privilege of having benefitted from the support of so

many others in my career. In particular, I am grateful to the volunteer experimental subjects who put themselves at risk to help develop new diving and decompression guidance and procedures. This award recognizes their unwavering support as much as it recognizes what I have been able to accomplish."

Gerth's Ph.D. is in marine biology from the University of California, San Diego, Scripps Institution of Oceanography.

"Dr. Gerth's exceptional expertise in inert gas decompression theory, modeling, and decompression table development has monumentally impacted the science and application of decompression procedures for diving and submarine escape to produce new U.S. Navy decompression procedures, improving operational capability and safety," said NEDU Executive Director Jim Brawley.

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LT Mitchell Reed, mitchell.d.reed@navy.mil

Faceplate Feedback

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This Day in Diving History

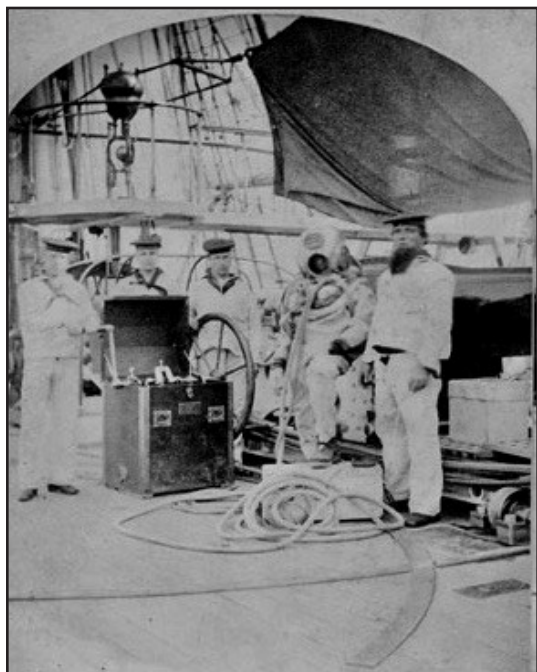
By: MDV David Gove

1882 The First Ever...Navy Deep Sea Dive School

Back in the late 1800s, the very first Diving rating was Gunner's Mate. Instruction in simple diving had been part of the course at the Gunnery School because Gunners Mates were assigned as ship's divers as a collateral duty. The introduction of the torpedo, a weapon that revolutionized Naval warfare, caused the Navy to require a more in-depth training pipeline to support torpedo testing and recovery. In order to support this the Navy established a school under Chief Gunner's Mate Jacob Anderson to teach diving, in 1882. If anyone is wondering why the large helmeted diver is called Jake, GMC Jacobs nickname was Jake. It is likely that this was done to initially joke about his love for diving but it backfired as the name stuck.



This two-week course was based in Newport, Rhode Island and was first designed solely to train divers and was based on the dress of the diver and underwater procedures only. During this time diver-trainees (we will just call them Mudpups) descended to a maximum depth of 60 feet to study and recover exercise torpedoes. This was due the extreme destructive potential these underwater missiles possessed, with no warning for our adversaries. Medical issues involving such things as Decompression Sickness (DCS) and Arterial Gas Embolism (AGE) were still decades from being discovered, despite seeing incidents of DCS called "the Bends" on the Brooklyn Bridge. After torpedo-testing was considered complete the Navy Dive School was no longer used and the amount of Navy Divers diminished to only a handful that were certified to go deeper than 90 feet.



In 1927 Navy Dive School was reestablished at the Washington Yard in Keyport. Training became a bit more involved as the Navies of the world developed a weapon that was designed to sink for very long periods of time and rise when the mission was complete; aka the submarine. The big issue with the submarines is that they didn't always rise back up due to the many issues that they had, forcing sailors into Davy Jones Locker. It was up to the diving community to hopefully rescue or sadly recover submariners initially.

Note 1: If you are ever up in the Washington area you owe it to yourself to go to the U.S. Naval Undersea Museum where you will learn about the struggles and successes of the Navy historically.



Note 2: Also take time to visit the Diving Locker located on the same base. To my understanding the dive locker was originally and ironically a church. Inside this "church" you can see one of the oldest recompression chambers in the U.S. nicknamed "The Whale" which is still equipped with large pop rivets on its hull, but gets the job done. Bravo Zulu goes out to the Navy Divers who have preserved this fully functional chamber

As research and the Navy's technical abilities grew so did the need for undersea operational units to save the day. A good example of this was in the year 1942 the passenger ship Normandie caught fire pier side in New York City, after the volume of water was poured in to fight the fire, it eventually capsized the ship. Because of the damage, it was recommend to be used as both a project and training platform and the first Navy Training School for Salvage was born. Four short years later this school was moved to Bayonne, NJ where you may still hear a faint chant of....I stole a pie, I stole a pie.



After seeing the success of the school at Bayonne, NJ the Navy opened up several training platforms in areas like Hawaii, Coronado, CA, Little Creek, and Groton, CT. It was in 1980 that the current Navy Diving and Salvage Training Center (NDSTC) was established in Panama City Beach, FL. While many students attended school at NDSTC, the other school locations still taught diving mostly to the junior divers (or 2C) who were just joining the community. This continued into the very early 1990s when all basic and advanced divers were assigned to attend NDSTC with the exception of the Navy SEALs. Having everything based in the Panama City area was a blessing (and a curse) to those who decided to enter the world of Mud, Muscle, and Miracles. Naval Experimental Diving Unit (NEDU) is a next-door neighbor to NDSTC which allows instructors and medical officers to collaborate on issues or testing



For Those About To Rock (We Salute You)...

MDV David Gove is your friendly neighborhood Master Diver. Copyright David Gove, 2021.

Diving Officer's Perspective

By: CW04 Jason Potts, USN

“Lessons Learned”

In the late afternoon hours of 17 August 2006, three Coast Guard divers from Coast Guard Cutter HEALY (WAGB 20) attempted to conduct two 20-minute cold water familiarization dives at 20-foot depth during an ice liberty stop in the Arctic ice approximately 490 nautical miles north of Barrow, Alaska. After one of the divers exited the water due to equipment malfunction, the other two divers continued the dive in 29-degree Fahrenheit waters. The divers quickly descended to depths far exceeding their planned 20-foot depth, one diver descending to 187 feet and the other diver descending to at least 220 feet. Once it became evident that too much tending line had paid out to support a 20-foot dive depth, the divers were brought to the water surface. The divers were recovered with no vital signs and were pronounced dead after extensive resuscitative efforts failed.” – Excerpt from Commandant, U.S. Coast Guard’s, 10 Jan 2007 overview of the Final Action on the Administrative Investigation into the Diving Mishap and the Resulting Deaths of USCGC HEALY’s Crewmembers That Occurred on 17 August 2006.

In commemoration of the 15 year anniversary of the HEALY mishap, this installment of Diving Officer’s Perspective seeks to present the following factors, all of which were determined causal to the subject event, as a means of refocusing our attention on some of the everyday intervention opportunities that await us on the waterfront. As you review each of these factors, please consider how similar variables might manifest themselves in your locker and on your side and how each of us in the military diving profession can disrupt the associated chains of events in order to assure the safe and effective execution of mission-essential diving and diving support operations the world over.

- **SKILL-BASED ERRORS IN PROCEDURAL COMPLIANCE, OVER/UNDER CONTROL, AND INEFFECTIVE CHECKLIST APPLICATION.**

In day-to-day operations, routine and otherwise, it isn’t difficult to fall victim to complacency, even as we carryout underwater and surface operations that would seem nothing short of impossible to our non-diving counterparts. Recognizing the fact that any of us can be subject to these factors at the individual, team and unit levels, alike, it’s up to us to give our processes routine fresh looks, break the monotonous cycle of checklist application, and not take for granted the balance between safety and efficiency we strike through the careful application of task-based controls. Don’t wait for your next DORI to question, renew and improve your routine processes!

- **JUDGMENT AND DECISION MAKING ERRORS IN REAL-TIME DECISION MAKING, TASK MISPRIORITIZATION, RUSHED OR DELAYED ACTIONS, AND IGNORED CAUTIONS AND WARNINGS.** The age-old adage, “TOO MUCH HOO-YAH WILL DO YA,” is noteworthy in the manner in which we organize interrelated tasks and decide to press on when we can clearly break it down for the night and come back in the morning with clear heads and rested bodies. Factors like these weren’t unique to the HEALY mishap – they’ve been common contributors to both catastrophic and relatively minor accidents ever since humans started breathing underwater. Question organizational priorities and how they inform the choices we make when the hours get long, the team grows anxious and decision fatigue begins to set in. If you’re in a leadership position, take time to ensure every member

of the team knows, and is empowered to speak up on behalf of, organizational priorities. Take a moment to consider:

- Are safety and quality really our top priorities, especially when the going gets tough?
- Where does schedule rank on the list?
- How are standardized priorities sewn into the operational fabric of your unit long before deckplate leaders encounter the frequent tension between internal and external influences?

- **PERCEPTION ERRORS.** It’s no surprise that external pressures and the seemingly countless stressors a military diver faces in their daily lives can lead us to ask ourselves what we were thinking on the backend of an accident or near miss. Disrupting behavioral patterns that lead to faulty perception and poor decision making as organizational attitudes devolve from CAN-DO to MUST-DO is sometimes as simple as taking a moment to interpret the available warnings and indications, but it can also involve the focused development of critical thinking. In the planning phase of an operation, it’s up to each of us, particularly the folks making critical decisions on the basis of sometimes-incomplete information, to anticipate the emergence of possible roadblocks during the execution phase and take that extra second to process external stimuli and apply our cranial weapons system when those and similar opportunities present themselves.

In addition the factors that contributed to the 2006 polar diving accident, I’ll close by reemphasizing two important points I’ve touched on in previous articles: legitimizing operational risk management and eliminating normalized deviance.

- On the ORM side of the house, it’s rather common in our inspection trav-

els that we find folks applying cookie cutter risk assessment matrices while planning diving operations, all of which are inherently high risk, to say the very least. As we continue to inculcate the ORM process, I'd ask that we revisit the reason for applying it in the first place while rejuvenating supporting process to ensure we aren't just demonstrating our administrative prowess, but actually taking time to analyze hazards, new and old; carefully assess those hazards and potential outcomes; make competent,

endurable risk decisions; implement real, meaningful, and innovative controls; and apply the right level of supervision to manage the application of those controls or simply stop and regroup when things aren't quite what we expected.

- Regarding normalized deviance, which is an acceptance of abnormal (e.g. noncompliant) conditions to the extent where they're no longer abnormal, I'd like to once again encourage our collective force to seek out, identify and correct WRONG when and

wherever it stops by the locker. A small course correction now can prevent the ship from steering hundreds of miles off course in the long run.

Until next time, please join me in honoring our fellow divers that lost their lives in the line of duty by learning from the lessons they left for us and ensuring associated factors are kept well clear of our dive stations...permanently.

See you on the waterfront!

CWO Potts is the Fleet Diving Officer at NAVSEA 00C.

A Monument in Honor of **U.S. Navy Divers** *at Miramar National Cemetery*

By: CAPT David Swingle

Former members of the Mobile Diving and Salvage Unit ONE Reserve Detachment 419, San Diego, have been actively planning and doing the administrative work to create and place a monument to honor all U.S. Navy Divers. The monument will be at Miramar National Cemetery in San Diego along its Memorial Walk and it will honor Salvage Divers, EOD, SEALs, SEABEE UCT and USMC combat divers who are all part of the Navy Diving community. If all continues on schedule, the monument should be finished sometime in Spring of 2022.

The idea came about when CAPT Ed Poss (ret) and CAPT David Swingle (ret) were attending the funeral services for a member of the unit three years ago. Both were former commanding officers of the Det in the 1990s. At the time there were three other monuments at the cemetery (Navy Nurses, SEABEES, and Jewish Servicemen) and Ed Poss mentioned that it would be appropriate for Divers to have such a monument. The two met with the director of the cemetery, received the detailed procedure for gaining approval and placing a monument there, and they began researching and organizing the project.

Being a non-profit organization is a requirement for donating a monument to any national cemetery, and also makes donations

tax-deductible. This proved to be an administrative challenge over a nine-month period, but the Det achieved its 501.c.3 status.

The San Diego MDSU ONE Det 419 (originally HCU-1 det 321 in the 1970s) has maintained a considerable network of former members (many served more than ten years in the command and helped two members make Master Diver), and the idea was well-received. In March of 2021, during a reunion at EN1(DV) Frank Purdy's (ret) home in San Diego members learned of the size parameters, requirements, estimated cost, and then discussed the design development. David Swingle encouraged members in attendance to submit ideas for a design, to be creative and to ensure the monument captured the nature of U.S. Navy Diving. As inspiration he brought his statuette of the MKV Jake that stands before the Navy Diving and Salvage Training Center in Panama City.

Many members have contributed ideas and drawings/photos/words for the Memorial's stone surfaces. Another former member, SOC (SEAL) Mike Meoli (ret), former DV/IDC/DMT, has assisted immensely in the process as he had the lead role in designing and placing the newest monument at Miramar cemetery – for U.S. Navy SEALs. ENCM (SW/DV) Rick Tate (ret) contributed through

his writing abilities. Captains (ret) Marc Rasmussen and Ray McKewon, both former COs of the det, and QMCM (SS-DV) Jerome Periera (ret) also helped shape the design and edited written materials.

A surprising thing learned when trying to develop a list of U.S. Navy Divers who have died during operations, is that there was no such compiled list. Research was conducted through the senior diving commands, an undersea museum, the Navy War College, the Navy Historical and Heritage Center and even a Freedom of Information Act request through the US Navy Safety Center found only a very truncated list of divers lost (officially only back to 1973).

The design committee met in late August 2021 and is presently ironing out the final details of what will be a very distinctive monument that will honor U.S. Navy Divers. After it is placed, the Det will consider requests from other organizations to use this monument design for their own location, thereby saving a great deal of design work and time. The former members of MDSU ONE Det 419 San Diego are proud to be accomplishing this mission.

CAPT David Swingle served the Navy and his country for 30 years on Active and Reserve duty as a Deep Sea Diver (1140/5, Special Operations), having graduated from Dive School at the Washington Navy Yard in 1976.



The Old Master

Hooyah Deep Sea Nation - all active, retired, veterans and civil service denizens of the deep! Although my motto has always been "be brief and to the point", the editors and readers of this Faceplate article would be woefully disappointed if I didn't share some takeaways and perspectives from my 29 years of service. Although I am extremely honored to write this article for the community, it only further codifies that I am an old dinosaur Master Diver at the end of service life and ready to hang up my dive gear. I imagine there are Senior Chiefs, Chiefs and First Class Petty Officers looking forward to my departure as it will make some room for them to not only promote but also allow them to lead at a higher level as well. These sailors do tremendous things for our nation and I expect nothing less of them. Get after it!!



**NDCM (DWS/EXW)
Mike Sonnenberg**

At any given time there are Navy Divers hard at work. There are Deep Sea Divers turning wrenches underwater and are keeping the surface and submarine fleet underway. At the same time, SEAL delivery vehicles Divers are certifying the next dry dock shelter for the next submarine mission or Mobile Diving and Salvage Unit Divers recovering a down aircraft or amphibious assault vehicle. While Navy Experimental Diving Unit Divers continue to conduct human testing protocols which make the U.S. Navy's decompression tables and dive equipment safe for operational use in the fleet and the instructors at the Naval Diving and Salvage Training Center that are training and molding the future Navy Divers of tomorrow. Let's not forget the other units that have been tasked with assignments by the Chief of Naval Operations or have been given presidential tasking that support this nation. All of this occurs while many military and civilian personnel have minimal knowledge of the work that Navy Divers, underwater construction teams, and diving medical technicians are doing in support of our Navy, Department of Defense, and our nation.

So why do we do it? When telling stories of serving on the USS EMORY S. LAND (AS-39) homeported in Norfolk, VA (yes, 21 years ago) the common theme was SSN which stood for Saturdays, Sundays and Nights. In the words of Hull Technician Second Class Petty Officer Brad Fleming "you're only as good as your last dive"! It wasn't uncommon to have a six or seven hour bottom time running cables from the Sonar dome back to main ballast tank 3, or have consecutive Secondary Propulsion Motor replacements over a short period of time. This divelocker cemented my passion for being a Navy Diver as the team made the worst possible days on the dive boat just a little better because of the "No Quit" attitude that always overcame the challenges that were presented. This is where long lasting relationships were developed and have carried on throughout my career. From

La Maddalena, Italy to Keyport, WA and Ford Island, HI to Little Creek, VA, the theme remains the same, friendly competition, comradery and the desire for achieving excellence creates a culture and standard of excellence throughout the command and each individual team.

The job of being a professional military diver is not for the weak. It is a tough job both physically mentally. Young sailors today continue to be tested from accession off the street to the pre-assessment and conditioning course of instruction in Great Lakes, IL to dive school and throughout their diving career. The statistics are staggering. In 2019, there were 270 Navy Diver contracts but only 80 of them were successful in becoming a Navy Diver. The other 190 candidates were sent to the fleet and re-designated to other jobs. Although multiple changes to curriculum and testing procedures have occurred over the years, these numbers have not changed historically. The bottom line is that it doesn't matter how smart or strong you may be, water is the great equalizer and fear is a motivator (both positively and negatively)!

During my tour as the Command Master Chief at Mobile Diving and Salvage Unit TWO, my leadership philosophy focused on people, performance and pride. Every sailor was charged with these three things. People are the greatest asset to any organization. If you contribute to the team, mission, and duties, the command will bend over backwards to support your personal and professional goals, challenges, family issues, etc. Performance means to expect the best out of yourself and everyone around you, keep each other accountable. Pride means to tell your brother, sister, mom, dad, grandparents and shipmates your deep sea tales, send them a blue and gold and most importantly wear that uniform proudly!

My journey started in a small town of Frazee, MN where the population is home to only 1,284 people and is home of the world's largest turkey. My career has taken my wife Heidi and our two daughters to countries and oceans all over the globe and has given us experiences that have been absolutely phenomenal! The friendships created over the years show the impact and importance of the military families. The relationships don't stop after you do another permanent change of station move because saying goodbye is always "until I see you next time". Many of these relationships have continued after friends have retired and its refreshing knowing the uncommon bond that is shared is never really gone. Lastly, I'm forever in gratitude to leaders I've worked for throughout my career. Leaders such as retired Master Divers Frank Gorham, Brian Pratchner, Ray Augustin, Doug Westling, Dave Schoephoester and Mark Leet. In addition to, retired Chief Warrant Officers Jeff Zagurski, Bob Gilliam, Bob Foley, and Dan Mikulski. The list of active and retired Commanding Officers, Master Divers, Chief Warrant Officers, Navy Divers, Diving Medical Technicians and civilians that I served alongside and impacted me is too long to list and they know who they are. Thank you for making the last 29 years incredible, memorable and undeniably.

HOOYAH DEEP SEA!!





SUPDIVE SENDS ...CAPT Bob Marsh

HOOYAH Deep Sea Diving Community! Good to be onboard NAVSEA 00C and officially in the seat as SUPDIVE as of 1 July 2021. I very much look forward to providing updates on 00C3 working efforts, engaging with the Fleet to progress Navy diving, and address your unique operational demands! As always, our NAVSEA 00C3 team will need your help defining and refining your operational needs, but more on that later.

NAVSEA 00C3 Team:

Lots of personnel changes since our last issue in June. The 00C3 team bid “farewell” to CAPT Tom Murphy, as he transferred to U.S. Indo-Pacific Command to assume the Deputy Current Operations role. CAPT Murphy’s efforts throughout the past three years as SUPDIVE progressed and accomplished many initiatives, both for the Navy Diving Community and our international diving partners. His efforts yielded, and will continue to produce, next generation diving and diving support systems for fleet implementation and/or replacement of aging technology. Our NAVSEA 00C3 team continues this work to deliver diving-related equipment through fleet issue and ANU updates now and in scheduled out years. Hooyah Tom, and thanks for all your hard work and dedication!

The past few months have also seen change to NAVSEA 00C3’s Fleet Master Divers, as NDCM King and NDCM Hopkins both departed the D.C. area for tours at Mobile Diving and Salvage Unit (MDSU) ONE. MDV King took the reins as MDSU ONE Command Master Chief and MDV Hopkins as MDSU ONE’s Readiness and Training Master Diver. Their expertise was critical across the gamut of 00C3 efforts and responses to urgent fleet needs over the past 5 years, from deep water salvage and recovery efforts across the globe to time-sensitive assessments of diving issues across the fleet. Although their transfer will be felt at 00C3, their expertise and



dedication to the Navy Diving community is back where it needs to be... mentoring and developing the current and future generations of Navy Divers! With MDV King’s departure, NDCM Josh Dumke assumed the role as the Senior Enlisted Advisory Team (SEAT) Chairman, and has begun engaging the Master Diver Community on a host of items focused on bringing beneficial change and addressing current shortfalls.

In June, NAVSEA 00C3 welcomed NDCS Kyle Hubbard to the team transferring from Explosive Ordnance Disposal Mobile Unit FIVE in Guam. MDV Hubbard brings a wealth of fleet and operational experience to the office, specifically from the NECC and UWSH communities. MDV hit the ground running providing critical expertise to fleet-requested risk assessments, joint force diving needs, and Diving Operational Readiness Inspections for NAVSEA and CNIC diving commands. Versed in running command diving programs and training sailors (MTS), please take advantage of his skill sets and experience to flatten the “learning curve” where you see fit!

Policy and Doctrine:

For the past year, NAVSEA 00C3, in conjunction with operational units, has been developing and refining Ice and Cold Water Diving and Swift Water Div-

ing tactics, techniques, and procedures (TTPs) for future dissemination to the fleet. These TTPs consolidate lessons learned, observations from contracted and unit-level training events, existing joint doctrine, and consultation with joint force divers. Currently under technical review within the 00C3 office, we expect release of these TTPs within the next year to codify requirements and procedures, aid mission planning, and assist with understanding and mitigating risks inherent to these types of diving operations. The U.S. Navy Diving Manual (REV 8) is currently being worked as well, incorporating fleet input and addressing areas requiring more clarity.

In August, NAVSEAINST 3150.1B (NAVSEA Diving Program) was signed and disseminated to NAVSEA organizations, and throughout the Fleet via the Diving Officer and Master Diver network. This instruction, applicable only to NAVSEA commands responsible for diving operations, also provides a template for commands to compare their respective Diving Program instruction against, as it incorporates recent changes required by OPNAVINST 3150.27D, effective 1 March 2021.

Comms is Key / Resources Available:

One of my primary goals as SUPDIVE is to maintain a constant pulse on Fleet diving needs (e.g. equipment, procedures, doctrine, tools, etc.) and desired resources that enable the working diver to get the job done safer and more effectively. To do that, the 00C3 office needs to hear from you, the deckplates! As we concurrently work larger diving and diving system R&D and procurement efforts through our resource sponsors, your feedback will enable us to explore targeted incremental changes to existing equipment, policy, and procedures that support your daily missions/work.

NAVSEA 00C3 works for YOU, the Fleet diver, regardless of your community. The 00C3 team exists to pro-

vide technical and doctrinal expertise and solutions to fleet diving operations and initiatives. If you think something can be designed better...let us know. If you don't understand why a procedure or maintenance requirement exists...ask the question. If you have a great idea for a tool, equipment modification, or procedure that makes your diving mission safer, more efficient, or more effective... please send it our way. Our office contact information is available by clicking on the "00C3 Diving" banner on our secure site.

As a start to this effort, I would like to reemphasize existing resources on the NAVSEA 00C3 secure site. It hosts and maintains valuable information intended to assist with your current or future diving operations. A few items available on the site mentioned below are continuously updated throughout the year and will benefit from input received from the diving community:

1) If you are managing dive programs, please visit our "DORI" tab under the "00C3 Diving" drop down menu. Along with the NAVSEA DORI and QASP checklists, we post historical observations and findings from 00C3 DORIs and QASPs conducted across the NAVSEA enterprise. It's essentially a compilation of "lessons learned" from previous inspections and may assist you managing your respective programs.

2) We are continually updating our "Non-U.S. Navy Recompression Chamber Checklists" tab with chamber surveys conducted globally by operational commands. If you recently completed one for your command, either CONUS or OCONUS, please send it our way. We post surveys by country and state to provide historical chamber locations and conditions to assist future mission planning.

3) Similar to the Non-U.S. Navy Recompression Chamber effort above,

in 2020 we began posting historical diving waivers and risk assessments executed through our office to the "Diving Waiver and Hazard Analysis" tab. This tab can be used as a reference if your command requires a waiver or ETP to meet mission or training requirements.

If you haven't been on the NAVSEA 00C3 website in a while, or have never visited it, give it a spin! If there are resources, references, or information you need posted and maintained on our secure site, please contact us to initiate discussions. Most importantly, please share this information with your junior personnel...knowing how and where to access these resources early in their diving career will smooth out their learning curve! As always, Dive Safe, Dive Smart, and support your teammates! Very Respectfully, SUPDIVE.

Photo by: MC2 Daniel Cleary

Diving Advisories

21-07 UNDERWATER BREATHING APPARATUS/MK 20 MOD 0 SLASH 1 VALVE INSERT ASSEMBLIES

21-08 HAZARDOUS DUTY INCENTIVE PAY FOR DIVING DUTY

21-09 DIVING IN THE VICINITY OF SEA SUCTIONS

For more information on effective diving advisories, go to
<https://secure.supsalv.org/home.asp>