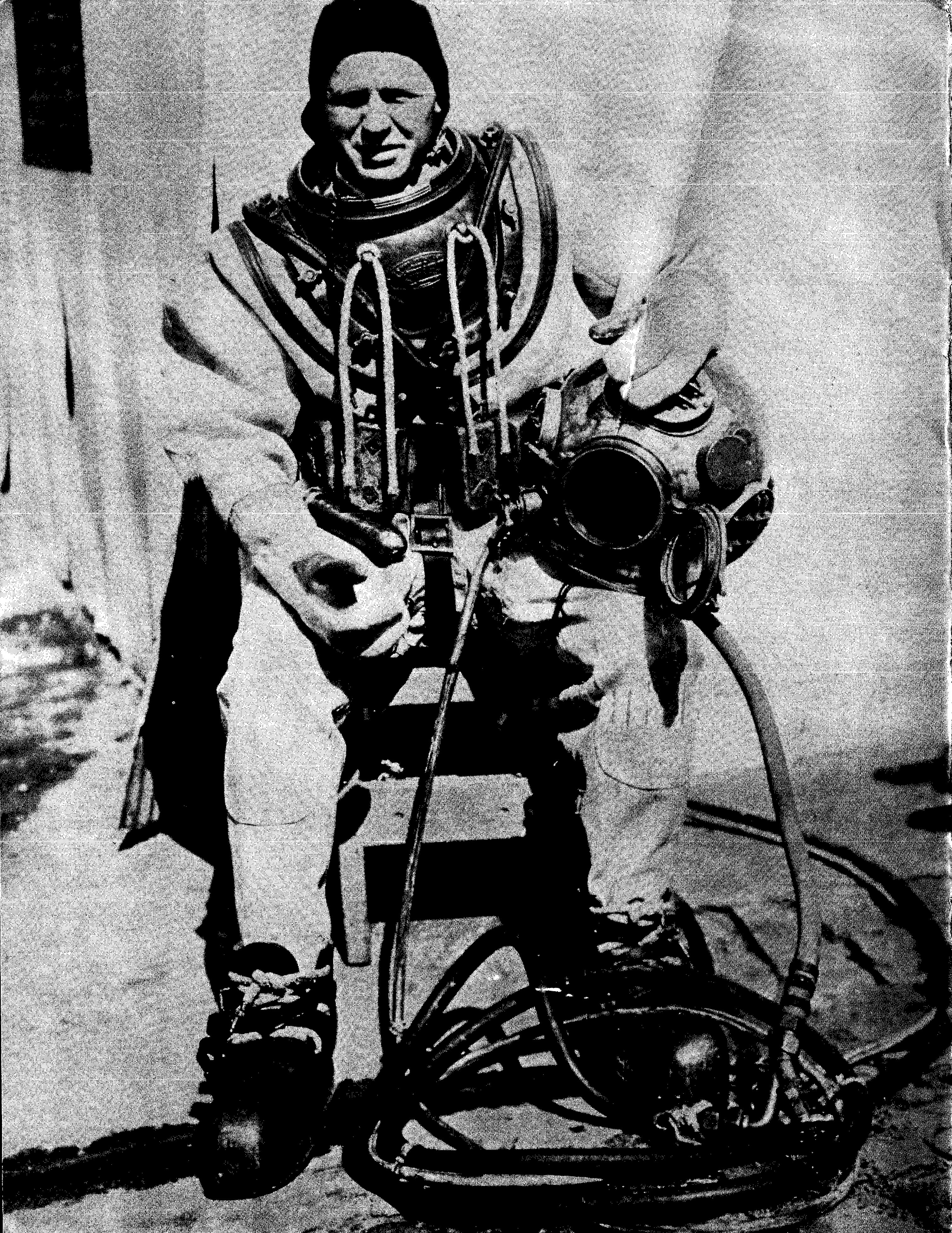
FACEPLATE

SPRING
1980



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EDITOR-IN-CHIEF
CDR James E. Roper

ASSISTANT EDITORS-IN-CHIEF
LCDR Stan Cwiklinski
LCDR Frank DiGeorge

MANAGING EDITOR
Bruce Miller

EDITORIAL ASSISTANT
Robert K. Armour

DESIGN
Lisa Degenhardt

PRODUCTION
Brent Emery

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. . . the official magazine for the divers of the United States Navy

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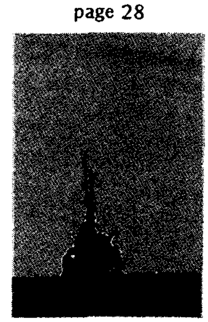

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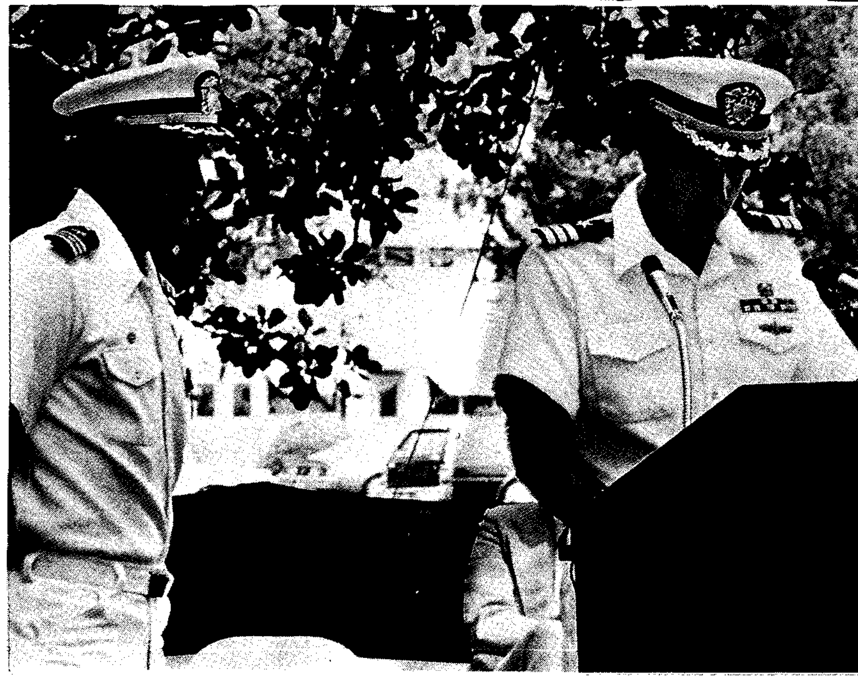
Front cover: Salvage Master LCDR S. Delaplane (front center) discusses salvage of BLACKTHORN with Diving Officer LT J. Gibson (front right) and CDR C. Maclin (left).
Inside cover: May 1938 photo shows MDV Bill Badders after his record dive to 500 feet.
Back cover: Mk 12 Mixed Gas OPEVAL divers go over the side.
Photos for the INDIANA story were provided by the Center for Archival Collections, Bowling Green State University.



Change of Command at NEDU: CDR Bartholomew (left) and CDR Bornholdt (right). Complete story will appear in summer FACEPLATE.

CHANGE OF COMMAND SET FOR NEDU

On June 6, 1980, Commander Robert Alan Bornholdt relieved Commander C. A. Bartholomew as Commanding Officer of the Navy Experimental Diving Unit in Panama City, Florida.

CDR Bornholdt reported to NEDU after having served since 1977 as the Fleet/Force Diving and Salvage Officer for Commander, Naval Surface Force, U.S. Pacific Fleet, San Diego, California. CDR Bartholomew, who was Commanding Officer of NEDU since 1977, reports to CINCPACFLT, Pearl Harbor, for duty on the staff.

FIRST MANNED DIVE FOR CANADIAN FACILITY

The Canadian Diving Division of the Defence and Civil Institute of Environmental Medicine, Toronto, Ontario, recently completed its first manned, non-pressurized "saturation" dive in its new Deep Dive Facility.

The dive, "Operation CETPE," was conducted over a seven-day period with four subjects at one atmosphere to establish baseline data in the related scientific disciplines, to evaluate operational and functional aspects of the facility and selected subsystems, and to train diving personnel in the use of the facility.

FACEPLATE SUBSCRIPTION CHARGES

Since the spring of 1970, *Faceplate* has been published by the Navy Supervisor of Diving as the official magazine for U.S. Navy divers. Over the past 10 years, the subscribers' list has grown to encompass a world-wide readership in excess of 5000; likewise, the cost has grown significantly. In order to avoid the possibilities of reducing the quality of the magazine or discontinuing publication, budgetary constraints have made it necessary to begin charging a nominal subscription fee to subscribers. In order to continue receiving *Faceplate* beyond this issue, all civilian, ex-military, and commercial firms must complete the form provided in this issue and return it to the Superintendent of Documents at the address indicated by August 1, 1980. These categories include all subscribers with subscription numbers beginning with 5, 8, or 9. Commencing with the summer '80 issue, the following subscription rates will be in effect for these subscribers:

For U.S. subscribers: $6.50 per year or $2.00 per copy.

Outside the U.S.: $8.15 per year or $2.50 per copy.

Subscribers in all other categories will continue to receive *Faceplate* at no charge.

The necessity to begin charging for *Faceplate* is unfortunate, but necessary. With the continued support of our many loyal subscribers, it is anticipated that the publication of *Faceplate* will continue for many years to come.

CORRECTION

Total bottom time for the Duke University 2,132-foot dive listed on page 17 of the Winter 1979 issue of FACEPLATE is incorrect. Actual bottom time during this dive was 24 hours.

NAVY TRAINING PAYS OFF

If it hadn't been for U.S. Naval Reserve Petty Officer First Class James Keith Garvey's quick thinking, Oakland, California, Police Officer Keith Carlin might not be alive today. ET1 Garvey, Naval Reserve Harbor Clearance Unit ONE, Detachment 220, Treasure Island, California, is credited with saving Carlin's life when he was injured in an off-duty motorcycle accident.

ET1 Garvey was following Carlin on a freeway when Carlin's motorcycle skidded and hit a guardrail on an off-ramp. "I pulled over . . . and

ET1 Garvey used Navy training to aid injured Oakland, California, police officer.

ran back (to the accident scene)," Garvey said. "When I got to him, he was choking and turning blue. His helmet strap was cutting off his breathing and he was choking on his tongue. I rolled him onto his back, released his helmet strap, cleared his throat, and proceeded to administer mouth-to-mouth resuscitation. It took a couple of breaths and he was breathing on his own," Garvey stated. The police rushed Carlin to the hospital where he remained unconscious for the next two weeks.

The first aid training ET1 Garvey receives in the Navy, which keeps him up-to-date on the latest lifesaving methods, taught him how to handle the emergency, Garvey says. Because of these skills and his willingness to get involved, Officer Keith Carlin is patrolling Oakland streets again.

ET1 Garvey received certificates of appreciation from the Oakland Police Department, the California Highway Patrol, and the Municipal Motorcycle Officers of California.

EFFECTIVE DIVING ADVISORIES (AIG-239 MESSAGES)

Messages promulgating diving safety notifications or urgent information of general interest to the entire Navy diving community are released to AIG-239 by CNO (OP-23), CHNAVMAT (08D12), NAVSEA (OOC), and the Naval Safety Center. CNO (OP-23) is the cognizant authority over release of AIG-239 messages and as such assigns sequential serial numbers to the messages by Fiscal Year. AIG-239 messages in effect as of 27 May 1980 are listed below (1):

RELEASING AUTHORITY	MESSAGE IDENTIFICATION FY-76 (By Date Time Group)	FY-77, 78, 79, & 80
CNO (OP-23)		79-8, 79-9, 79-15, 79-17, 79-19, 80-1
CHNAVMAT (08D12)		77-20, 78-8, 80-5 (312156Z JAN 80)(2), 80-14
NAVSEASYSCOM (OOC)	251905Z FEB 76 042328Z MAR 76 171545Z MAR 76 300505Z MAR 76 182005Z JUN 76 121452Z JUL 76	77-8, 77-17, 77-22, 77-24, 78-2, 78-3, 78-4, 78-6, 78-7, 78-10, 78-11, 78-13, 78-14, 78-15, 79-1, 79-3, 79-4, 79-5, 79-6, 79-10, 79-12, 79-13, 79-16, 79-18, 79-20, 79-21, 80-2, 80-4, 80-5 (102024 JAN 80)(2), 80-6, 80-7, (3), 80-9, 80-10, 80-11, 80-12, 80-13, (102210Z JAN 80)(4), and 80-15
NAVSAFECENT		77-2, 78-12, 79-2, 79-7, 80-3
COMSUBLANT		79-11 (Readdressed to AIG-239 by NAVSEA)

1) AIG-239 messages are intended for distribution within the Navy diving community and are not intended for release to the general public.
2) AIG-239 messages were inadvertently released by both NAVSEA and NAVMAT with coinciding serial numbers of 80-5; see date time groups of each above.
3) Serial number AIG-239 80-8 was inadvertently unassigned; there is no message with this serial number.
4) NAVSEASYSCOM MSG 102210Z JAN 80 was released to AIG-239 without the standard serial number and deals with Mk 12 training.

TRANSITIONS

LCDR DIGEORGE DEPARTS OOC

LCDR Frank DiGeorge, CEC, USN was relieved as the Deputy Supervisor of Diving for CEC (SEA OOC-DB) in June 1980 by LT Kevin Gross, CEC, USN. LCDR DiGeorge is currently assigned as the Assistant Resident Officer in Charge of Construction at NAS Pensacola, Florida.

Before reporting to OOC in September 1978, LCDR DiGeorge earned a Masters in Ocean Engineering at Texas A&M University (August 1978). Earlier, in 1971, he graduated from the Naval School, Diving and Salvage in Washington, D.C. In addition to his duties as Deputy SUPDIVE for CEC, LCDR DiGeorge served as Assistant Editor-in-Chief of *FACEPLATE*.

LT Gross reported to NAVSEA from the University of Hawaii, where he earned a Master's Degree in Ocean Engineering through the Navy postgraduate education program.

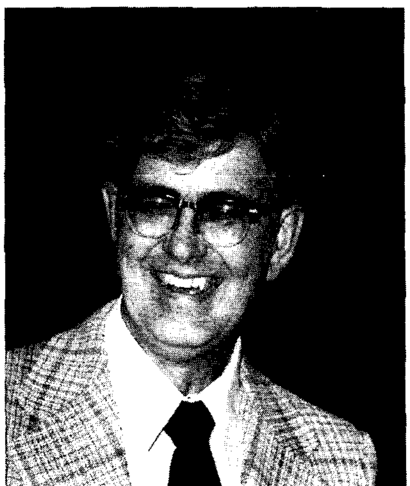
LCDR SELTZER IS NEW NAVMAT DIVING/SALVAGE OFFICER

LCDR George H. Seltzer, III, CEC, USN reported to the Chief of Naval Material as the NAVMAT Diving and Salvage Officer in April 1980, after graduating from the Naval School, Diving and Salvage, Washington, DC. The previous officer assigned to the NAVMAT billet was LCDR Michael Hadbavny, who is currently serving as the NMCB FORTY Operations Officer. LCDR Seltzer can be reached at CHNAVMAT Code 08D12, Washington, DC, A/V 222-9013 or commercial (202) 692-9013.

RAY KELLY RETIRES FROM NCSC

After more than 37 years in Federal service with the Naval Coastal Systems Center, Mr. Raymond E. Kelly retired on January 11, 1980, from his position as Supervisory Mechanical Engineer on the Swimmer Delivery Vehicle Program.

Mr. Kelly's career achievements included several invention disclosures, numerous patents, incentive awards, two Meritorious Unit Commendation awards, and other citations.



Raymond Kelly.

Mr. Kelly arrived at the site of the present NCSC in August 1946. At that time, there were approximately 12 people "onboard." With a barge load of instrumentation from Solomons, Maryland, and surplus salvage equipment they purchased to go with it, Mr. Kelly and crew constructed building after building and the laboratory took shape. "Butler" buildings that they converted from kits are still in use today. Already standing when he arrived was a two-story wooden barracks. This building, which still exists, was to serve as the main administration building (Building 1) for the new Mine Defense Laboratory.

Mr. Kelly continued to design and build and remained a vital part of the laboratory development process. His latest efforts were on the SDV Program.

At his retirement ceremonies, Mr. Kelly said, "There've been a lot of good times, a lot of good jobs. I'm particularly proud of having been able to work on the SDV; but everything's smooth there now, and it seemed like a good time to go."

ROBERT CORDY NAMED HEAD OF OCEAN ENGINEERING DEPARTMENT

Robert N. Cordy, 45, who joined the Civil Engineering Laboratory (CEL), Port Hueneme, California, in 1968 as a Senior Electrical Engineer, has been named head of the Ocean Engineering Department and Manager of the Ocean Facilities Engineering Program. He succeeds Henry Gill, who retired last year. Mr. Cordy has served as Director of the Construction Systems Division of the Ocean Engineering Department for the past 10 years. In his new position, Mr. Cordy is responsible for four divisions of 60 full time and temporary personnel and an annual budget of $7 million. These funds are used for research and development pertaining to design, construction, maintenance, inspection, and repair of fixed surface and subsurface ocean facilities. The wide variety of ongoing efforts include projects involving undersea structures, cable dynamics, geotechnical engineering, and diver tools.


CDR C.S. Maclin, USN.

CDR MACLIN RELIEVES CDR KLORIG AT OOC

After nearly four years at NAVSEA OOC, CDR W. N. Klorig was relieved by CDR C. S. Maclin in April 1980 as the Deputy Director of Ocean Engineering/Supervisor of Salvage. CDR Maclin had served as the Assistant Supervisor of Salvage since October 1977. CDR Klorig is remaining at NAVSEA, and relieved CAPT D. F. Hayman, Jr., as the Director of the Amphibious and Combat Support Ship Logistic Division (NAVSEA 941) on 2 May 1980. NAVSEA 941 is the type desk for Fleet units with diving capabilities.


CDR W.N. Klorig, USN.

NEDU Reports

Navy Experimental Diving Unit Report No. 7-79. *Part 1: Intelligibility Evaluation of the Tethered Diver Communications System (TDCS); Part 2: Human Engineering Evaluation of the TDCS.* LT J.I. Brady, Jr., MSC, USN.

Abstract: Part 1: An evaluation of the voice intelligibility of the Tethered Diver Communication System (TDCS) was undertaken during a 1,000-fsw Saturation Dive conducted in the Ocean Simulation Facility (OSF) of the Navy Experimental Diving Unit (NEDU). The Griffiths (1967) version of the Modified Rhyme Test (MRT) was used as the evaluation instrument during this testing. The evaluation provided basic TDCS intelligibility data with a variety of diving rigs at a number of different depths.

Part 2: A human engineering evaluation of the TDCS was also conducted on the 1,000-fsw Saturation Dive. Questionnaires were completed by most of the personnel closely involved with the day-to-day operation of the equipment. Recommendations were made concerning future modifications to the system.

Navy Experimental Diving Unit Report No. 12-79. *Mental Abilities During a Simulated Dive to 427 Meters Under Water.* LT R.C. Carter, MSC, USN.

Abstract: An experiment was conducted with six divers at a simulated depth of 427 m to investigate the possibility that the underwater environment affects mental abilities. The effects of depth, immersion, their interaction, and repeated testing were assessed with a battery of 10 tests representing seven cognitive abilities. Results show impairment of Perceptual Speed and Number Facility and improvement of Associative Memory at 427 m, compared with abilities at sea level. Hidden patterns and division test scores improved with repeated testing. Possible causes of the results, and implications for design of divers' tasks, are discussed.

Navy Experimental Diving Unit Report No. 8-79. *Mk 12 Surface Supplied Diving System Helium-Oxygen Emergency Mode Study.* CAPT W.H. Spaur, MC, USN; CDR E.D. Thalmann, MC, USN; and R.C. Maulbeck.

Abstract: This experiment tested the duration that respirable gas would be available in the Mk 12 helmet when gas supply from the umbilical has been stopped. The emergency mode semi-closed recircular operation was tested in 40°F (4.5°C) water in a wet chamber at depths of 390 and 80 fsw. The duration of reasonable life support was considered to be the time between shut-off of the umbilical supplied mixed-gas and the time when the helmet gas reached 3% SEV. The results indicate that approximately 8 min. of adequate life support are available in the emergency mode.

These research reports have been issued by the Navy Experimental Diving Unit, Panama City, FL. Non-DOD facilities desiring copies of reports should address their request to National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151. DOD facilities can obtain copies from the Defense Documentation Center (DDC), Attn: DDC-TSR-i, Cameron Station, Alexandria, VA 22314. Prices vary according to the individual report.

CEL DEVELOPS A BETTER OCEAN CURRENT SENSOR

A solid state thermal ocean current sensor, which can accurately measure even low speed currents as well as their direction, has been developed by the Navy's Civil Engineering Laboratory, Port Hueneme, California.

The instrument, a fraction of the size of conventional ocean current meters, was devised by the Navy in a project jointly funded by the Naval Ocean Research and Development Activity (NORDA) and the Naval Facilities Engineering Command (NAVFAC).

A significant feature is a new method of completely protecting the metallic sensor from biological fouling, which normally quickly coats all materials placed in seawater.

The sensor was developed to provide a system for measuring deep ocean currents that would replace present cumbersome, costly, and frequently unreliable techniques, particularly when used for long periods. For example, the rotor vanes of standard current meters tend to turn erratically in slow currents and cannot measure them accurately.

It is important to ocean engineers that accurate current measurements be taken before placement of structures in the water column or on the sea floor is attempted. Presently, CEL is developing a higher frequency response model of the sensor to enable measurement of rapidly changing current speeds. This would permit development of a free-falling current profile device that could be deployed during an ocean construction operation.

Because of its size, the sensor is the first capable of measuring currents only inches above the sea floor. It also may help solve the mystery of the ever-changing topography of the ocean bottom. Do large infrequent currents dramatically alter the sea floor? Or are slow erosion processes the cause? The sensor, only one inch long and a quarter-inch in diameter, also is small enough to mount adjacent to the walls of pipelines and structures in the water column and measure currents very near their surfaces for the first time.

The device is based on a principle known for some time. When four metallic films are heated by an electric current, the flow of water past them causes heat loss. The speed and direction of the flow can then be determined by the change in temperature in each of the four films. Practical use in the ocean, however, depended on fabricating a watertight package that would not leak and lose calibration through short circuits and would not deteriorate through biofouling.

Working with platinum, an inert metal, CEL engineers, led by Project Manager Theodore Kretschmer, devised a means of using a laser in a high speed computer-controlled process to cut the platinum into four film resistors only a half-inch long and 0.1 micron thick. The four films are deposited on a hollow cylindrical alumina ceramic substrate and then covered by a special plastic coating that provides complete insulation and water proofing. An outer layer of platinum is placed on top of this to protect the plastic coating. This exterior platinum layer provides the key to the antifouling.

The platinum is made the anode in an electrochemical cell. With the stainless steel mounting shaft serving as the cathode, a slight electric current is impressed on the anode. Chlorine is formed on the platinum surface and, through hydrolysis, forms hypochlorite, a potent anti-foulant. A sensor protected in this manner has been exposed in sea water for as long as nine months with no biofouling detected. In comparison, a standard sensor recovered from the ocean after 16 days was found to have a 70 percent speed measuring error due to severe fouling by marine growth.

Since only a small electric current is required for the antifouling process, energy consumption is minimal. It is estimated that a D-size lithium cell has sufficient energy to keep more than 20 sensors (strung along a cable) free from fouling for a year. Since the chemicals generated by this technique only affect the platinum surface, there is no environmental hazard. It also was observed in the tests that, when the electric current was turned off, fouling buildup occurred. But the buildup was completely removed when the current was turned on again.

Another feature of the solid state sensor is that relatively low electric current is used to heat the films, which prevents overheating and promotes long life. The thermal sensor also increases in sensitivity and accuracy as current speed decreases. Presently, the sensor provides speed measurements with a four percent error. The goal is reduction to two percent error. Accuracy of current direction is within five degrees. Other advantages of the sensor include the capability for in-line mounting, no moving parts, and high frequency response.

Further development of the sensor will improve fabrication techniques, exploit its capability for low speed current measurement, and explore the possibility of producing it in an expendable form as well as deploying it from an aircraft. Since only a tiny amount of platinum is used for sensor components, and automated techniques are being developed to cut the resistor pattern, the sensors should not be expensive to produce in large quantities, probably costing less than conventional current meters.

SALVOP '79

A SYMPOSIUM ON LESSONS LEARNED

With the central theme, "SALVOP 1979—Lessons Learned," a salvage and diving symposium was held in Pearl Harbor, Hawaii, on December 18, 1979. The purpose of the symposium was to promote in-depth discussion of achievements within the U.S. Navy diving and salvage community during 1979, with particular emphasis on the accomplishments of the Pacific Fleet diving and salvage forces.

Eighty-five people from 15 commands attended the symposium, which was co-hosted by Commander, Service Squadron FIVE and Harbor Clearance Unit ONE. Although originally conceived as a local conference solely for discussion of COMSERVRON FIVE units' salvage accomplishments during 1979, enthusiasm for the concept spread to other commands. This resulted in the attendance of personnel from throughout the Navy diving and salvage community, including CAPT Colin M. Jones, Director of Ocean Engineering, Supervisor of Salvage; CDR Robert A. Bornholdt, CINCPACFLT/COMNAVSURFPAC Salvage and Diving Officer; and LCDR Larry T. Bussey, SUPSALVWESTCOAST representative.

Thirteen talks were given during the day-long symposium, which covered such diverse topics as new design heavy lift salvage bags, aircraft recovery, harbor clearance operations, and the COMNAVSURFPAC diver consolidation program. Also, CAPT Jones briefed the attendees on the state of the diving and salvage community, stressing the need for professionalism among fleet salvors.

The focus of the talks was lessons learned. As RADM Thomas M. Ward, Jr., COMNAVSURFGRU MIDPAC, stated in his keynote address, "I believe, with Commodore Campbell, that emphasis must be placed on how we can do a better job in the future. That is the earmark of any professional, either in or out of the Naval community."

The quality of the speeches throughout the day showed that all speakers had been meticulous in preparing for the symposium. The speeches were concise, informative, and beneficial to the working salvor.

USS BEAUFORT gained the honor for most spectacular presentation with a movie of BEAUFORT's P-3C Orion recovery in Subic Bay, Republic of the Philippines.

Besides affording the Pearl Harbor area salvors with an opportunity to share experiences in a convivial atmosphere, the symposium participants were exposed to the whole spectrum of projects concerning the Pacific Fleet diving and salvage community in 1979. This particularly benefited junior officers and enlisted personnel who attended the symposium because they rarely have the opportunity to get in-depth information first-hand concerning new developments and concepts in their fields.

The success of the symposium will be determined during salvage operations in the 1980s and will show whether U.S. Navy salvors learn from others or attempt to "re-invent the wheel" on each operation in which they participate.

Lieutenant Ken Harvey, HCU-ONE, stated the general feeling of the symposium participants when he said, "The SALVOPS conference was the first time all the players in the Pearl Harbor salvage community have assembled in one place at one time. The topics presented were informative and directly applicable to the working salvor. I think the seminar is a great idea that should be implemented Navy-wide in order to share concepts with people who do the work."

"VIEW FROM OOC"

I'd like to begin by commenting on several salvage operations that have occurred in the last few months. First, I want to give a BRAVO ZULU to both the Atlantic and Pacific fleet salvage forces. Certainly, all of us are delighted with the results of, the experience with, and everything else about the three major salvage operations that we—the Navy— have conducted in the last few months. These are the ex-USS OZARK; BLACKTHORN, a Coast Guard buoy tender; and a bulk carrier, ANANGEL LIBERTY. Articles discussing the OZARK and BLACKTHORN salvops appear later in this issue of *Faceplate*, so I will be very brief about them. The most appropriate summation, however, is that Fleet Salvage Forces "can do."

The OZARK salvage was a classic stranding situation. This ship, approximately 6,000 tons, had been used by the Air Force as a target ship off the coast of Ft. Walton Beach, Florida. Atlantic Fleet salvage forces undertook the salvage job for the Air Force, and their solution was truly a textbook one for such a case. A lot of hard work, a lot of pulling, coupled with some washing and dredging, eventually freed the ship. Certainly, the removal progressed once everyone "got in harness" and started pulling. This operation provided an excellent opportunity for the forces involved to work with beach gear, with the new hydraulic pullers, and with each other.

The buoy tender BLACKTHORN collided with the tanker CAPRICORN and sank in a capsized position athwart the channel just south of Tampa's Sunshine Skyway Bridge. Once again, the Atlantic Fleet salvage forces did an excellent job under a great deal of pressure, clearing the ship from the channel with hardly a hitch. Diving on this job was considerably more difficult than usual because of the large amount of debris that had broken loose in the ship, making movement in its interior arduous. Fortunately, there was no damage to BLACKTHORN's hull below the waterline. Once she was raised, pumping her out was not too difficult.

The ANANGEL LIBERTY, stranded on French Frigate Shoals, was another classic stranding. Prompt action by all concerned enabled the Pacific Fleet salvage forces to remove the ship before she broached and became a much more serious undertaking. This operation was not as simple as it may sound. It was carried out in a very short period of time with a great deal of hard work by all participating forces. Basically, the salvage plan was to offload enough of the cargo from the ship to free her bow from the strand while keeping constant tension on her with the salvage ships that were available. This was done; of course, the element that is most difficult to put into words is the backbreaking labor involved in removing 1,800 tons of cargo, which in this case consisted of 55-pound bags of a special clay used in the paper manufacturing process. The real lesson learned from this operation was the need to get to the job as quickly as possible with all of the equipment you can obtain: a fundamental rule for any salvor. A secondary lesson is the need to remove any cargo and free the ship, rather than spend a lot of time worrying about whether that's the right thing to do—which could lose the ship and all of its cargo. Once again, "well done" to everyone involved in this operation.

When the salvage reports of these operations are published, I plan to make them available to those of you who are interested. At this point, perhaps a few words on the subject of salvage reports are in order. I have long criticized salvage reports because I find them to be exceedingly lengthy—yet never explaining what the real lessons are. It is my strong desire that a narrative of the salvage operation include what the fundamental plan was initially, what was actually done to salvage the ship, what the problems were, what went right, what went wrong, and the lessons that were learned. We should be able to do this in a very few pages, and we should be able to do it in such a way that it is not an inordinate burden on anyone to read it or to learn from it. We must take advantage of learning from the salvage operations we are involved in; because, unfortunately, that has to be one of the major vehicles by which we train future salvors.

The responsiveness of both Fleet Salvage Forces to every operation that has occurred recently certainly brings credit on everyone in the salvage Navy. We have undertaken some tough and interesting jobs so far this year, and they have all gone well. There has been fine cooperation between the various components involved, and this cooperation has played a major role in the ultimate success of the task.

Our oil pollution equipment is on its way back from Texas, where it has been since last summer. The IXTOC I oil well was finally capped a couple of months ago, and the residual oil has essentially dissipated. I consider it extremely unfortunate that the restriction on travel funds prohibited rotating more of our salvage personnel down there to see this oil pollution equipment in operation. If funds can be found, I intend to conduct an oil pollution training session, and you may rest assured that

CAPT Colin M. Jones, USN
Director of Ocean Engineering, Supervisor of Salvage (NAVSEA OOC)

the fleet will get first crack at the quotas.

Nonetheless, to bring you somewhat up to speed on our oil pollution operations, let me summarize the IXTOC I oil spill clean-up, including the oil pollution efforts in the salvage of the BURMA AGATE—since both took place in the Gulf of Mexico. First, the Navy oil pollution equipment worked well—it worked as designed, and we can all be very proud of the job we accomplished there. I am particularly proud of the people in OOC who developed this gear and who made it work. While others had theories and ideas—we got down there and did the job. I must say that the oil boom and skimmers saw a tremendous amount of wear. It is amazing to me to see shackles worn half-through from working in a seaway, but there were many in the mooring systems and the oil boom down there that were just so worn. Our skimmers were reliable; they worked when we needed them, and they worked with minimal downtime. One item we found to provide an extremely good payoff was the maintenance van, which we have procured and placed in the ESSM pool. These vans contain a small maintenance shop and proved to be one of the most outstanding features of our operation in the Gulf. We also learned that our oil pollution equipment is not fireproof. We had a fire in one of the pools of oil that had been collected and it burned a significant amount of boom and several buoys in the mooring system.

We have plans this summer to complete testing of at least two of our hydraulic pullers. We expect to test one of them until destruction of the puller or failure of the wire in the puller. The purpose of this test is to ascertain what the failure mode may be with this equipment if stressed beyond its working limit.

Many of you have seen articles in other publications concerning problems with nylon braid. I would like to alert you to this problem. There have been two serious accidents on surface ships caused by failure of nylon braid mooring lines. We have learned from this a lesson that should have been apparent to us earlier—splices in nylon braid are not as strong as the line itself. Inherent in the process of splicing braid is the fact that the core is cut and the splice is made up essentially from the outer braid. As a matter of policy, you can expect to see less braided nylon and more of three-strand and other types of line used on salvage operations. Meanwhile, everyone must be aware of such problems and provide a larger safety margin.

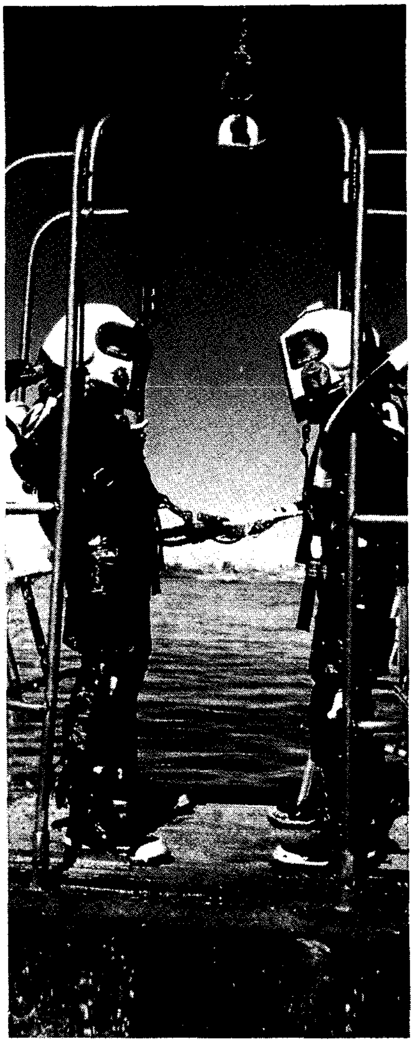
CDR Maclin and I expect to participate with the Royal Navy in a submarine salvage exercise off the south coast of England this summer. We hope to bring back a descriptive report on this exercise.

We are reviewing and ascertaining the condition of equipment in the ESSM pool. We recognize that some of this equipment has not had the maintenance that it needs. Maintenance for ESSM pool items has been one of those areas where funding has consistently been either cut or eliminated in the past several years. We are now trying to get an accurate assessment of the condition of this equipment so we may either overhaul or replace items that require such action. Meanwhile, we have ESSM bases that are operational in Singapore, Livorno, Rosythe, Stockton, and Cheatham. If you have a salvage operation and need equipment from one of these bases, it may be obtained by either a phone call or message to SUPSALV.

In the diving area—as most of you know, the diving school closed. There is an article in this issue describing this event, which I do not want to call a "celebration," but an "evolution." I was proud to sit there among the many notable members, past members, and friends of the Navy diving community who were in attendance. I was particularly honored to have an opportunity to visit once again with Bill Badders, recipient of the Congressional Medal of Honor for his role in the SQUALUS operation. I told Bill how much of an inspiration he has been to several generations of Navy divers that have gone through the school. I am sure all of you share with me the pride in Bill's accomplishments and believe as I do that those who have attended the school have been motivated by his example, among others.

A few other words on the subject of diving: We continue to deliver Mk 12 equipment to the fleet. We are also delivering the Mk 15 closed circuit scuba equipment to the special warfare community; and we are developing the Mk 16—a low magnetic signature version of the Mk 15. We are continuing work on the Mk 14, a push-pull diving system for use with saturation and mixed-gas diving. In addition, we are working on a number of other developments. Meanwhile, I hope we are making some progress with our budget, which I am sure is not of great interest to most of you. I also hope we are making some progress in laying the foundation of our future diving and salvage programs. Once again, I earnestly solicit comments, questions, or ideas from those of you out in the fleet—please call and communicate them to us. I am always delighted to hear from you.

MK 12 MIXED GAS OPEVAL CONDUCTED



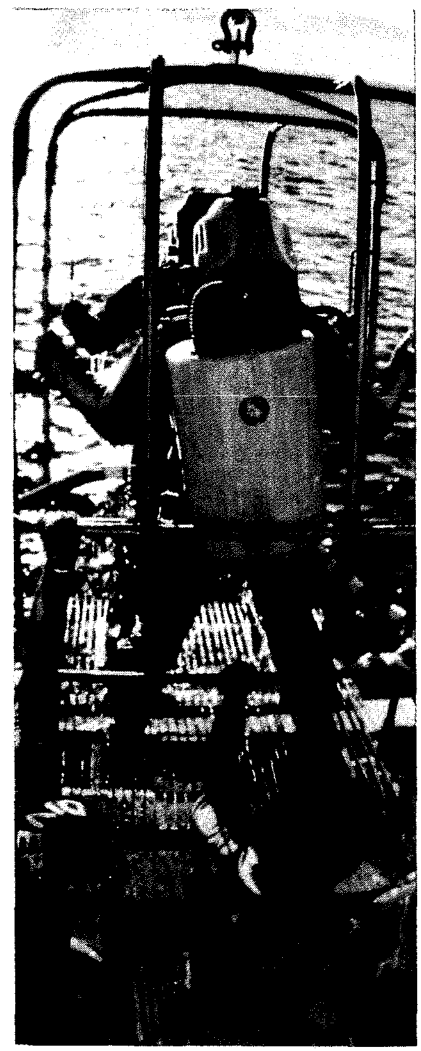
LT M. A. Coulombe, CF,
Navy Experimental Diving Unit

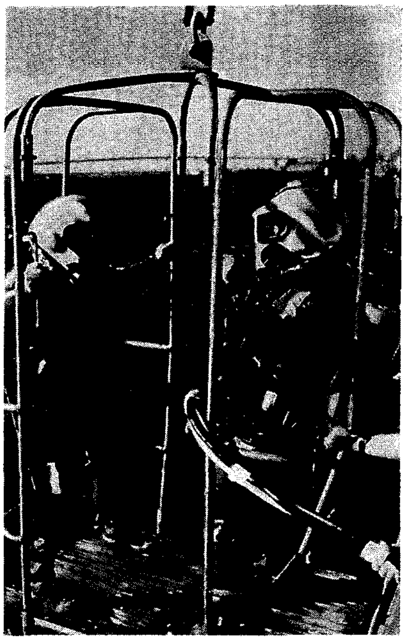
Another milestone in the development of the Mk 12 Surface Supported Diving System (SSDS) was reached in southern California during January and February 1980, when the Mk 12 Mixed Gas SSDS successfully completed Operational Evaluation (OPEVAL). (Refer to Winter '78 issue of *FACEPLATE* for an article on Technical Evaluation of the Mk 12 Mixed Gas SSDS.)

The Mk 12 Mixed Gas SSDS, designed to support life during heavy work at depths requiring helium/oxygen gas breathing mixtures, underwent OPEVAL on board USS FLORIKAN (ASR-9) following two weeks of classroom and one week of pierside training for OPEVAL participants in San Diego, California.

Under the direction of the NEDU Mk 12 Project Officer, Lieutenant M. A. Coulombe, training was conducted by MMCS(MDV) W. E. Yarley and GMC(DV) W. B. Joslyn on board FLORIKAN and at the Ballast Point Mobile Dive Team Locker. Upon completion of training, the equipment was turned over to FLORIKAN for OPEVAL under the direction of LT J. E. Peck of COMOPTEVFOR, Norfolk, Virginia.

OPEVAL consisted of 48 pairs of dives at depths of 150, 250, and 300 fsw conducted from FLORIKAN moored off San Clemente Island, California. Underwater welding, a submarine rescue scenario, and various salvage-type tasks were among the projects completed by the divers. The primary parameters tested during





Photos on p. 12-13 show various scenes during OPEVAL. (Photos by B. Campoli.)

the OPEVAL were the ability of the diver to work, to be comfortable, to remain warm, to communicate, and his overall ability to successfully and safely complete a dive mission while using the Mk 12 Mixed Gas SSDS. Specific data that will appear in the COMOPTEVFOR OPEVAL Report will include overall material reliability, maintainability, logistic support capability, and compatibility of the equipment and the support ship.

A successful OPEVAL answers the question, "Can the Fleet sailor, without outside assistance or outside technical expertise, operate and maintain the equipment to the degree required to successfully perform his unit's mission?"

Participating personnel, other than those already mentioned, are listed at right.

Parent Command	*Participant*
USS FLORIKAN (ASR-9)	CDR Timothy S. Brady
(All qualified Mk 12 He/O_2 Divers)	LT Erwin C. Morris
	LT Robert A. Reish
	ENS Raymond T. Machasick
	LT(jg) Thomas J. Murphy
	CWO3 Judson W. Murdock
	HTCM(MDV) Frank Buski
	MMCS(MDV) Fernando Lugo
	BMCS(DV) Steven A. Miller
	HTCS(DV) Larry G. Hecht
	BMC(DV) Larry J. Marsh
	HM1(DV) James A. Spelich
CSDG-1 Mobile Dive Team	BMCS(MDV) Samuel J. Sangrey
(All qualified Mk 12 He/O_2 Divers)	EMCS(DV) Murdock J. Weltzien
	BTC(DV) Jerry D. Henson
	EN1(DV) Daniel Tosteven
	EN1(DV) Darroll D. Thornton
	HT2(DV) Michael W. Pangburn
Naval School, Diving and Salvage	MMCM(MDV) Fred Schunk
(Qualified Mk 12 He/O_2 Diver)	
OPTEVFOR	LT James E. Peck
(Qualified He/O_2 Diver)	
USS FLORIKAN (ASR-9)	HT2(DV) Robert D. Knauss
(All qualified Mk 12 Air SSDS Divers)	TM2(DV) James W. Goodwin
	HT3(DV) Michael A. McZeal
	HT3(DV) Thomas K. Sheahan
	BTFN(DV) Randolf R. Kila

EDITOR'S NOTE: The Mk 12 Air SSDS successfully completed OPEVAL in 1976 and is being introduced into the Fleet. "Well Done" to all who participated.

CAPRICORN aground after collision with BLACKTHORN.

AFTERMATH OF A TRAGEDY
HCU-TWO RAISES BLACKTHORN

LCDR Stephen W. Delaplane, USN
Commanding Officer,
Harbor Clearance Unit TWO

On a clear, mild, moonlit night, January 28, 1980, U.S. Coast Guard Buoy Tender (WLB-391) BLACKTHORN and SS CAPRICORN, a 585-foot long T-2 tanker displacing 10,000 tons, collided in Tampa Bay, resulting in the deaths of 23 of the 50-man BLACKTHORN crew.

The 180-foot BLACKTHORN had just completed a 20-week overhaul in Tampa, Florida, and was proceeding down the main channel of Tampa Bay past St. Petersburg, approaching the Sunshine Skyway Bridge and a right turn into Mullet Key Channel – the last leg to open water. CAPRICORN was inbound in Mullet Key Channel, approaching a turn into the main channel to the port of Tampa. The two vessels collided at approximately 2045 hours as they were negotiating the dogleg in the channel. CAPRICORN struck BLACKTHORN's port bow and CAPRICORN's anchor peeled down BLACKTHORN's port side, finally embedding itself with its chain in BLACKTHORN's port side superstructure about five feet above the main deck.

BLACKTHORN, with a gaping hole on the port side, was pushed backward and violently heeled to port by the weight of the embedded 12-ton anchor and chain. BLACKTHORN quickly sank in 48 feet of water approximately 500 yards seaward of the bridge near the center of the Tampa Bay shipping channel. Civilian divers were unable to gain entry into BLACKTHORN and, from all indications, no survivors remained inside. It was later determined that of the 23 crewmen killed, 14 were trapped inside BLACKTHORN.

CAPRICORN separated from BLACKTHORN after the collision and ran aground approximately 600 yards seaward of the bridge. CAPRICORN was refloated within two days by civilian tugs.

This tragedy set the stage for one of the most intensive peacetime salvage operations conducted by U.S. Navy salvage forces. At the request of the Commandant, U.S. Coast Guard, U.S. Navy diving teams from HCU-TWO and Explosive Ordnance Disposal Group (COMEODGRUTWO Detachment, Ft. Lauderdale, Florida), along with divers from the Coast Guard Atlantic Strike Team, mobilized and arrived at the Coast Guard St. Petersburg Group Headquarters on January 29.

A combined diving and salvage team headed by Lieutenant James H. Gibson and ENCM(MDV) James L. G. Starcher of HCU-TWO started the task of attempting to recover the missing crewmen and surveying BLACKTHORN. BLACKTHORN lay on its port side, approximately 100 degrees from vertical. Repeated attempts to gain access to engineering, berthing, and working spaces failed because of the vessel's attitude and debris that impeded diver mobility. The hull survey indicated no apparent damage to the hull below the main deck.

A salvage element from Service Squadron EIGHT was ordered to the salvage scene and USS PRESERVER (ARS-8) was deployed from Norfolk, Virginia, arriving on February 7. Lieutenant Commander F. D. Meyer, Commanding Officer, assumed the duties as On-Scene Commander.

The Salvage Master, LCDR Stephen W. Delaplane, developed the salvage plan based on the diver survey results and began mobilizing civilian lifting assets through the office of the U.S. Navy Supervisor of Salvage. D/B CAPPY BISSO (New Orleans, Louisiana) with a 650-ton lift capacity; 100-ton D/B LITTLE DAVID (from Tampa); and the barge KENYON, with a 150-ton crawler crane loaded on board, arrived on the salvage scene to assist in the operation.

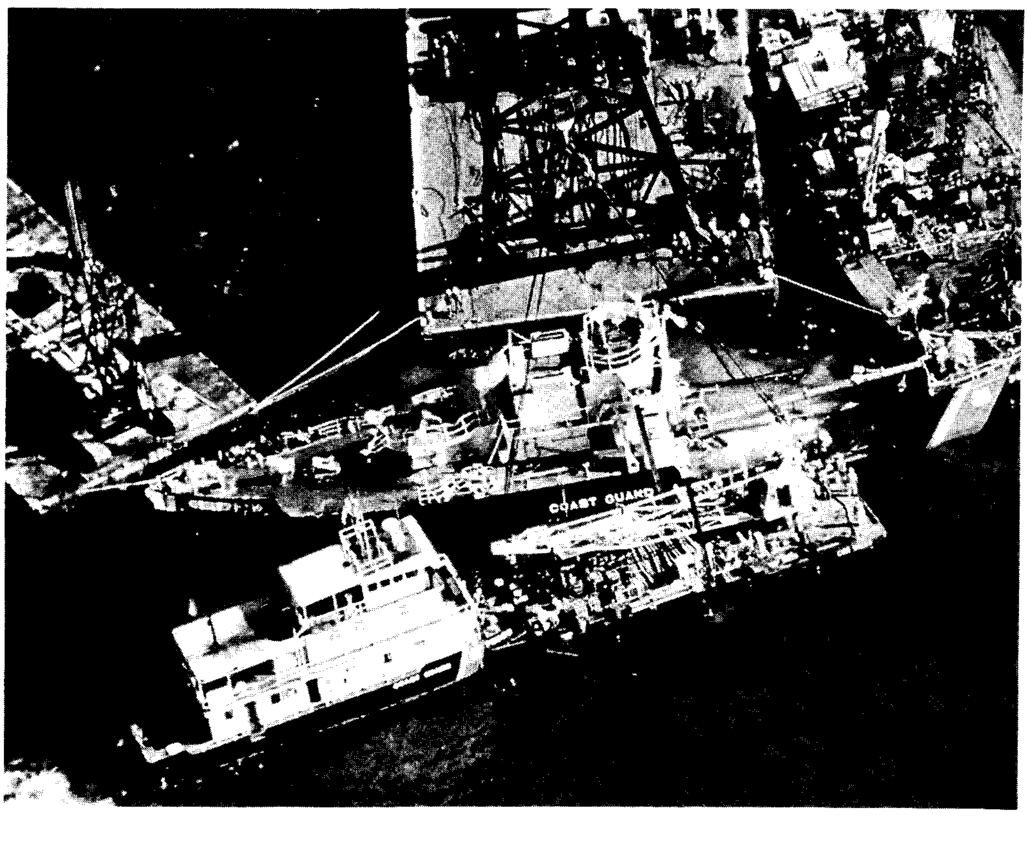
Salvage of BLACKTHORN was to be accomplished by: (1) removing BLACKTHORN's mast; (2) parbuckling the vessel into an upright position; (3) using the three lifting platforms in a coordinated effort to raise BLACKTHORN to the water's edge to clear the steep dredged walls of the main channel; (4) moving BLACKTHORN (in lifting slings) clear of the channel; and (5) dewatering and refloating BLACKTHORN.

The salvage team flew to Mobile, Alabama, on February 5, where they inspected USCGC SALVIA (WLB-400), a buoy tender of the same class as BLACKTHORN. This paid significant dividends in acquainting divers with the internal and external configuration of BLACKTHORN and did much to expedite the dives conducted during the salvage operation.

With CAPPY BISSO moored over BLACKTHORN and LITTLE DAVID moored alongside on February 7, messenger wires were passed in preparation for positioning three-inch parbuckling wires around BLACKTHORN. The parbuckling wires were passed to the main hook on CAPPY BISSO on February 9 and the salvage team was ready to attempt to roll BLACKTHORN into an upright position. A two-day delay occurred to allow civilian divers representing CAPRICORN owners to conduct survey dives, and then BLACKTHORN was rolled upright and settled on the bottom with a slight list to port. This allowed divers to inspect the port side of the vessel and confirm that the hull had not sustained any significant damage.

BLACKTHORN had a full load displacement of 1,087 tons and in-water weight was computed to be approximately 690 tons. Preparations began to rig lifting bridles. BLACKTHORN's peak tank was fitted with a pump and vent hoses to permit dewatering an estimated 25

Clockwise from top: D/B CAPPY BISSO, D/B LITTLE DAVID, USCGC VISE (WLIC 75305), Barge KENYON; center – USCGC BLACKTHORN (WLB 391).



Salvage Master LCDR S. Delaplane (front, center) discusses salvage operation with Diving Officer LT J. Gibson (front, right) and CDR C. Maclin (left).

tons of water. A centerline water tank forward was rigged with a compressed air hose and a large vent hole was cut at the bottom of the tank by using an oxy-arc cutting technique. An additional 88 tons of buoyancy was achieved by using compressed air to force water through the sunken vessel's vent hole. At 2300 hours on February 16, all preparations to lift BLACKTHORN had been completed.

The two main lifting slings from CAPPY BISSO were positioned around BLACKTHORN equidistant fore and aft of the center of gravity. Another sling was in place around the stern and passed to the crawler crane of KENYON. The last lifting sling was passed through the hawsepipe forward and to the main hook of LITTLE DAVID.

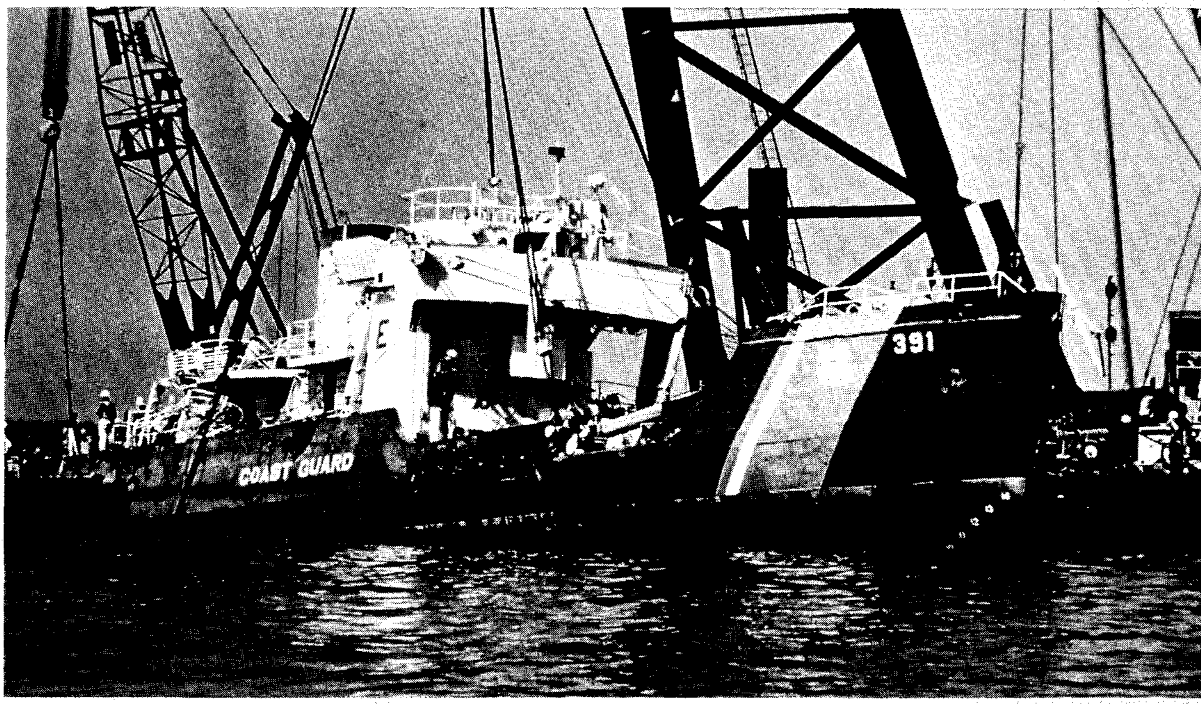
The decision to lift the bow and stern from two separate platforms and to dewater selected spaces did introduce complicating factors of coordination and control. However, these factors were overridden by considerations regarding stability, excessive localized hull stress, and overall operational success. Two days of high winds and adverse sea conditions postponed the lifting operation until the morning of February 19.

At 0800 hours, pumps and air compressors were started and the sunken vessel's two water tanks were dewatered. Then, with a coordinated lift by all three lift platforms, BLACKTHORN was slowly raised. As water drained out of the vessel, it was incrementally raised until the main deck was awash. Using two tugboats, the salvage flotilla with BLACKTHORN securely in harness, moved about 100 yards to the southwest of the channel. Pumping teams then began dewatering spaces accessible from the main deck. A team equipped with self-contained breathing units entered the vessel and rigged pump suctions to the engineering spaces and spaces below decks aft. Thirteen of the missing crewmen were found in the main engineering space and the fourteenth crewman was located in the charthouse.

BLACKTHORN was completely dewatered and fully afloat by 2100 hours. Temporary patches were fabricated and installed over damaged areas. A weary but satisfied salvage team secured at 0100 hours (except for one section) and BLACKTHORN was kept in slings overnight. The Salvage Master and a security crew remained on board in case of emergencies and to make preparations for the transit to the Gulf-Tampa Shipyard where the vessel was to be drydocked.

BLACKTHORN was towed to the drydock on February 20, arriving at 1500 hours, when custody was formally signed over to the Coast Guard.

By their very nature, salvage operations require a diversity of considerations—weather, "Murphy's Law," and various technical aspects. All of these were present during this salvage operation. Moreover, intense legal and public interest, spurred by potential legal suits, the tragic loss of life, and the commercial impact of closing one of the Gulf Coast's largest ports were elements that intensified operational factors. Representing the U.S. Navy in conferences with the port authority,



BLACKTHORN alongside CAPPY BISSO.

shippers, and the media demanded factual description, tact, and propriety on the part of the On-Scene Commander, Salvage Master, and Diving Officer.

The media and port authority were most understanding and supportive during this difficult operation. The Coast Guard Marine Board of Investigation required information that placed additional demands on the salvors in terms of detailed documentation of various aspects of the operation and testimony appearances before the board.

Indicative of the superb support and cooperation on the part of the joint military services participating in the salvage, as well as civilian contractor efforts, is the fact that the operation was completed within two days of the proposed schedule. Salvage operations such as BLACKTHORN are tantamount to major combatant engagements for the special operations community and, in this regard, the experience gained by the salvage detachment will contribute significantly to the readiness and salvage capability of the U.S. Navy salvage forces.

BLACKTHORN SALVAGE ORGANIZATION (U.S. NAVY)

On-Scene Commander
LCDR F. D. Meyer
CO, USS PRESERVER (ARS-8)

Salvage Master
LCDR Stephen W. Delaplane
CO, HCU-TWO

HCU-TWO Personnel:
LT L. M. Sawyer, Engineering Salvage Officer

LT J. H. Gibson, Diving Officer

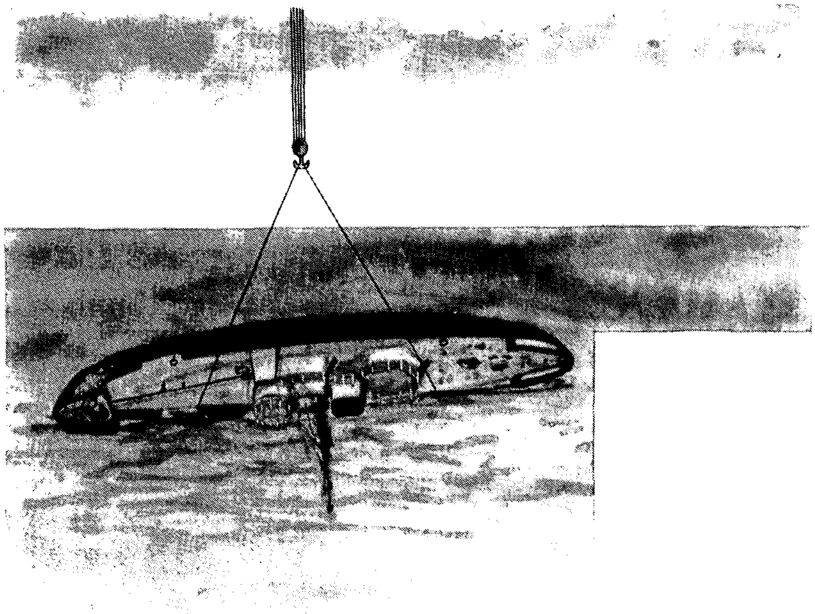
ENCM(MDV) Starcher, Master Diver

Diving Personnel:
ENC(DV) Hagenhoff
HM1(DV) Zawacki
HT1(DV) Salter
HT2(DV) Self
EN2(DV) Jacobson
MR2(DV) Peters
HT2(DV) Berger
HT3(DV) Marceaux
MM3(DV) Sewell
SN(DV) Abrahamson
BM1(DV) Rimes
BM1(DV) Miles
HM3(DV) Himelberger
BM2(DV) Crow
SN(DV) Tibbs
MR3(DV) Ward
MR3(DV) Boyd
EM3(DV) Beatty
EM3(DV) Dahlgard

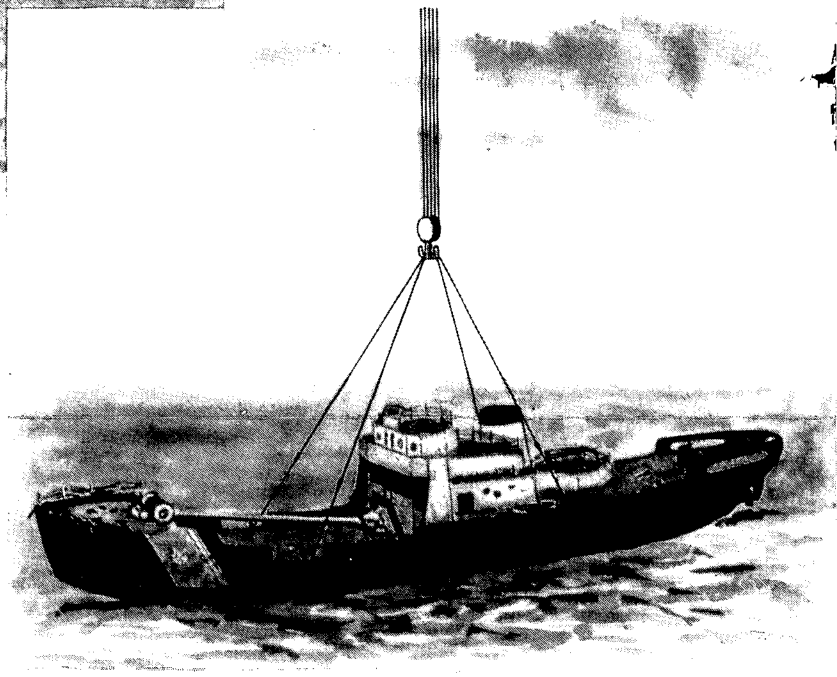
COMEODGRU-TWO Personnel:
LT S. Gilchrist (OINC)
BT1(DV) Cagle
EM1 (DV) Smith
HT2(DV) O'Neil

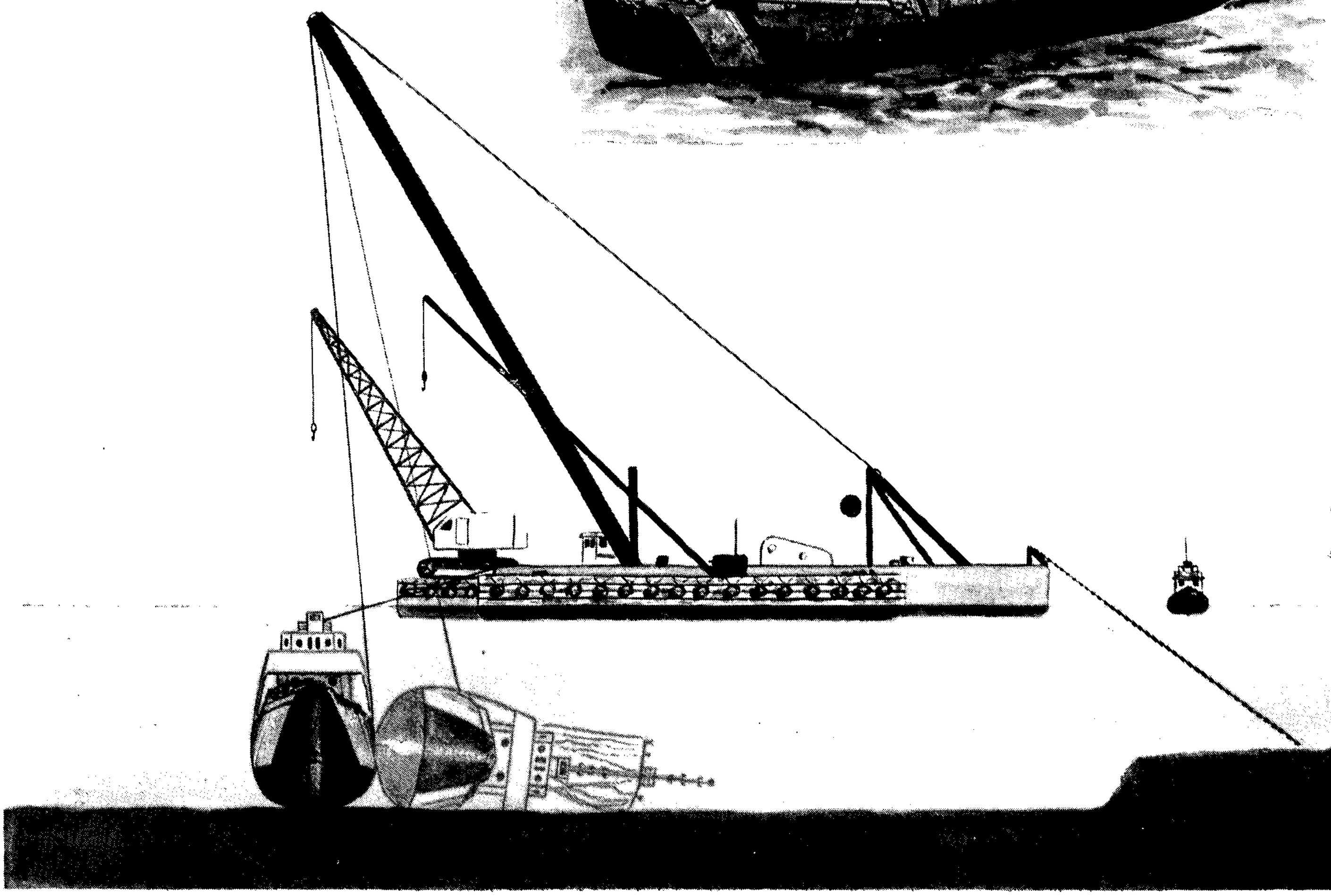
Coast Guard Atlantic Strike Team:
LT M. W. Carr (OINC)
BM1(DV) A. Harker
BM1(DV) J. Boyle
EM3(DV) M. Winslow
MK3(DV) R. Berry
BM1(DV) J. Klinefelter

Naval Coastal Systems Center Personnel:
Wilbur Eaton (Equipment Specialist)
BT1(DV) Gene Williams

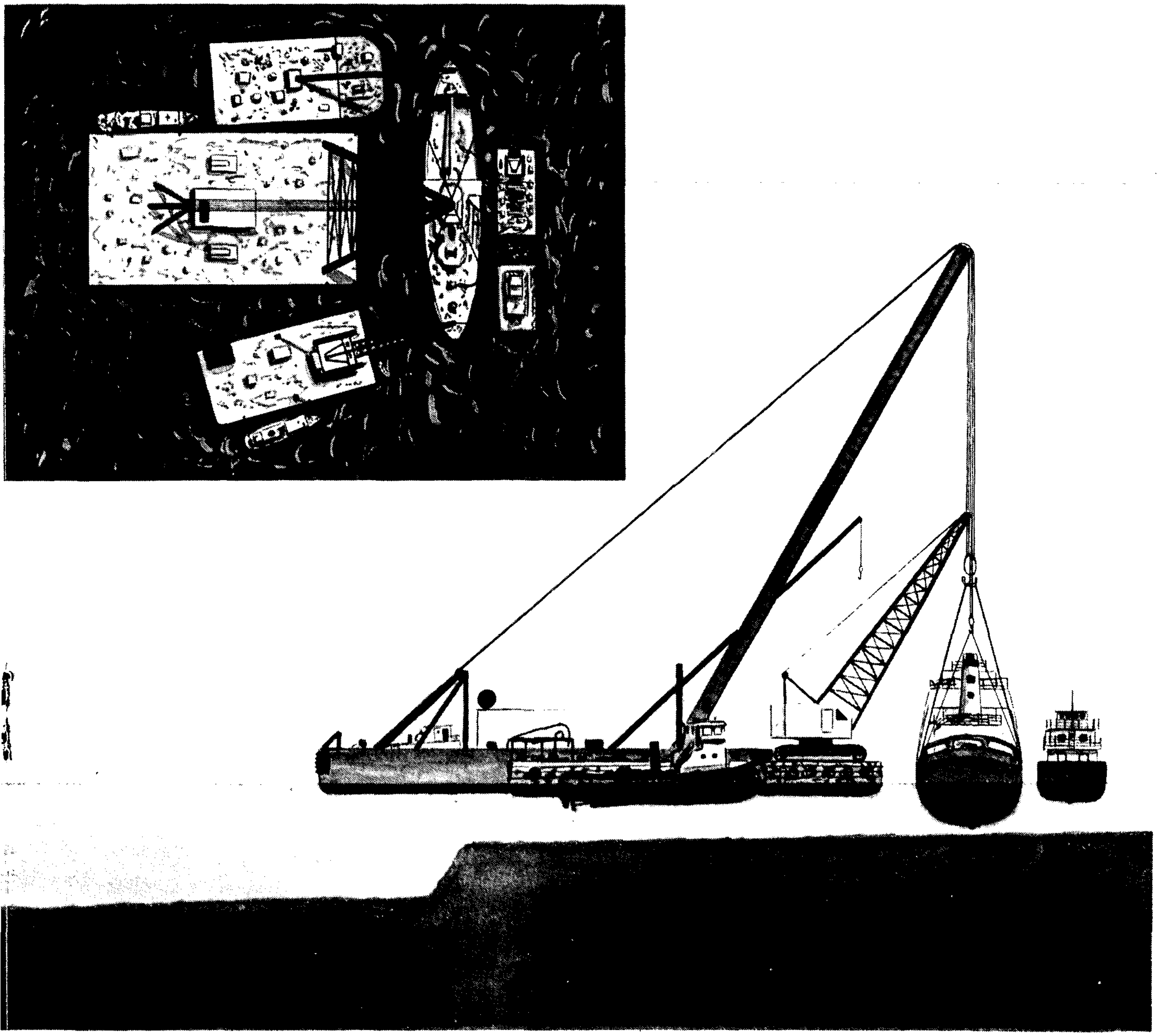


Left: BLACKTHORN lies on port side with lifting wires around her hull. Below: BLACKTHORN readied for lifting off the channel bottom. Below right: Overhead view of salvage station during final stages.



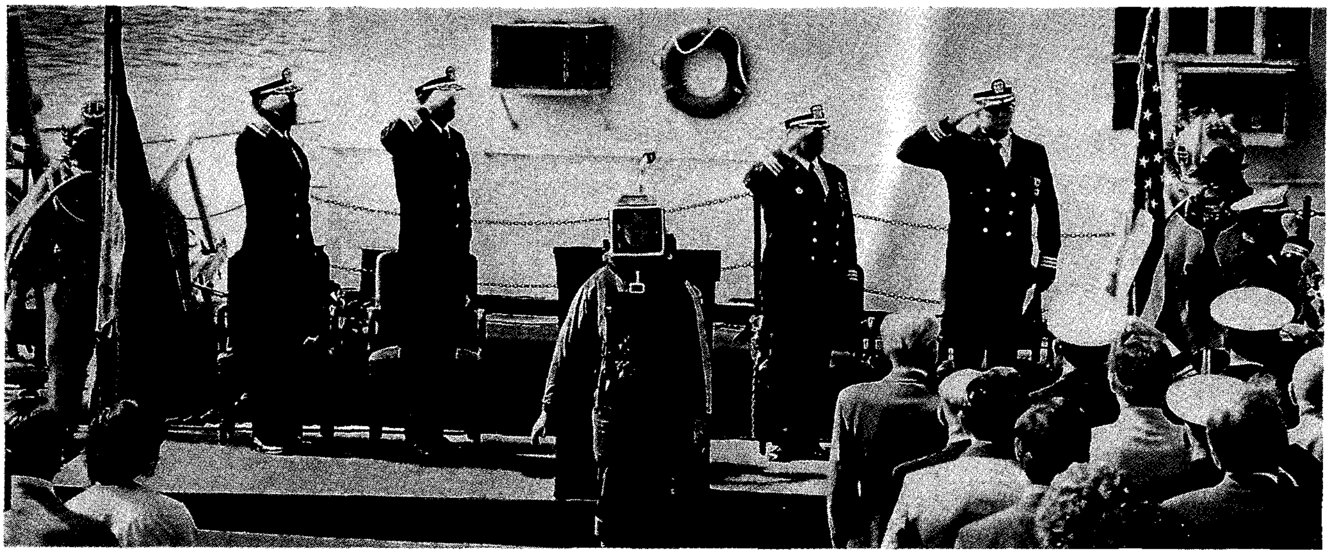


Drawings illustrate BLACKTHORN salvage operation. Lifting wires to the floating crane CAPPY BISSO were passed around BLACKTHORN's hull and fastened to the deck. The mast was removed, and the sunken hull was pulled upright. Slings were passed around BLACKTHORN's hull and it was lifted 23 feet off bottom. Using tugboats, the group of salvage vessels, with BLACKTHORN suspended between them, swung around on their anchors and moved 100 yards southwest to more shallow water (see bottom illustration). Coast Guard ship VISE (WLIC 75305) was then brought alongside to assist, and the remaining water was pumped out of BLACKTHORN's hull.



END OF AN ERA

AND A FEW WORDS FROM THE SCHOOL'S OLDEST LIVING DIVER



Final NSDS ceremony begins with National Anthem.

At this time of year, schools all over the country are having commencement exercises. But on a warm and sunny May 2, 1980, on the waterfront of the Anacostia River, a special commencement was held honoring graduating Navy divers, Commanding Officer James R. Nelson and his staff, and a grand old lady—the Naval School, Diving and Salvage.

In remarks at the final graduation and disestablishment ceremony, Rear Admiral John B. Mooney, Jr., USN praised the school saying, "Over the years she has produced many diver sons and recently some proud diver daughters. . . . She's remained a great institution because Navy divers have made her and kept her that way. Now what she represents will move to Panama City to continue producing professional, dedicated, self-reliant, and respected Navy divers. Her name is being changed to the Navy Diving and Salvage Training Center, but this won't change her true character. Her children will continue the illustrious history of past achievements. Her children are a special breed—they're Navy divers."

The Naval School, Diving and Salvage, largest and most advanced school of its type in the world, was originally established prior to World War I at Newport, Rhode Island. The school was disestablished at the beginning of WWI and its personnel were formed into an overseas salvage division which was sent to France. In 1928, the school was reestablished at the Washington Navy Yard. (EDITOR'S NOTE: For a complete history, see "Naval School, Diving and Salvage Marks Golden Anniversary," Fall 1978, *FACEPLATE*.)

Over the past 52 years, 11,631 students graduated from the school. These divers have gone on to sharpen their skills and perform tasks around the globe, living up to the motto of the Navy Deep Sea Diver: "We dive the world over."

Navy diving has become more professional, more sophisticated, and more technical, yet the basic principles are the same as they were generations ago. With mixed emotions, Commander Nelson said, "I am somewhat saddened by the closing of an era which spans over a fourth of our nation's history. I also look forward to the new challenges the new Navy Diving and Salvage Training Center in Panama City, Florida, will offer the staff and students in the days, months, and years to come. I am extremely proud of the young men and women graduating today . . . . I feel confident that they, as future leaders in the diving and salvage operational and medical fields, will rise to the occasion—whatever it may be—and carry on the proud traditions of professionalism which have made the United States Navy great."

Guest speaker for the ceremony was RADM J. B. Mooney, Jr. (Director, Total Force Planning Division—OP-11). Distinguished guests in attendance included: ADM Isaac Kidd, USN (Ret.); CAPT Colin M. Jones, USN (Director of Ocean Engineering, Supervisor of Salvage—NAVSEA OOC); CAPT J. H. Howland, USN (Deputy, OP-23); Mr. William Badders, MDV, USN (Ret.)—NSDS class of 1929, Mr. Harold Matters, MDV, USN (Ret.)—NSDS class of 1933; and Mr. Roland Fiedler—NSDS class of 1936.

GRADUATING CLASSES,
2 MAY 1980
DEEP SEA (HEO_2)
DIVING OFFICERS (80-01-HE)

ENS D. W. Amberger
LT (jg) V. L. Armstrong
LCDR D. Baek (Korea)
LT C. D. Bernier
ENS G. A. Capkovic
ENS M. E. Gray
LT M. C. Herb
ENS D. M. Iskra
LT (jg) L. Jackson
ENS D. E. Jardot
LT C. A. Kavanagh
ENS T. A. McLees
LT M. J. O'Moore
ENS D. J. Oswald
ENS P. J. Rolow
LT J. H. Strandquist

UNDERSEA DIVING
MEDICAL OFFICERS (80-01-MO)

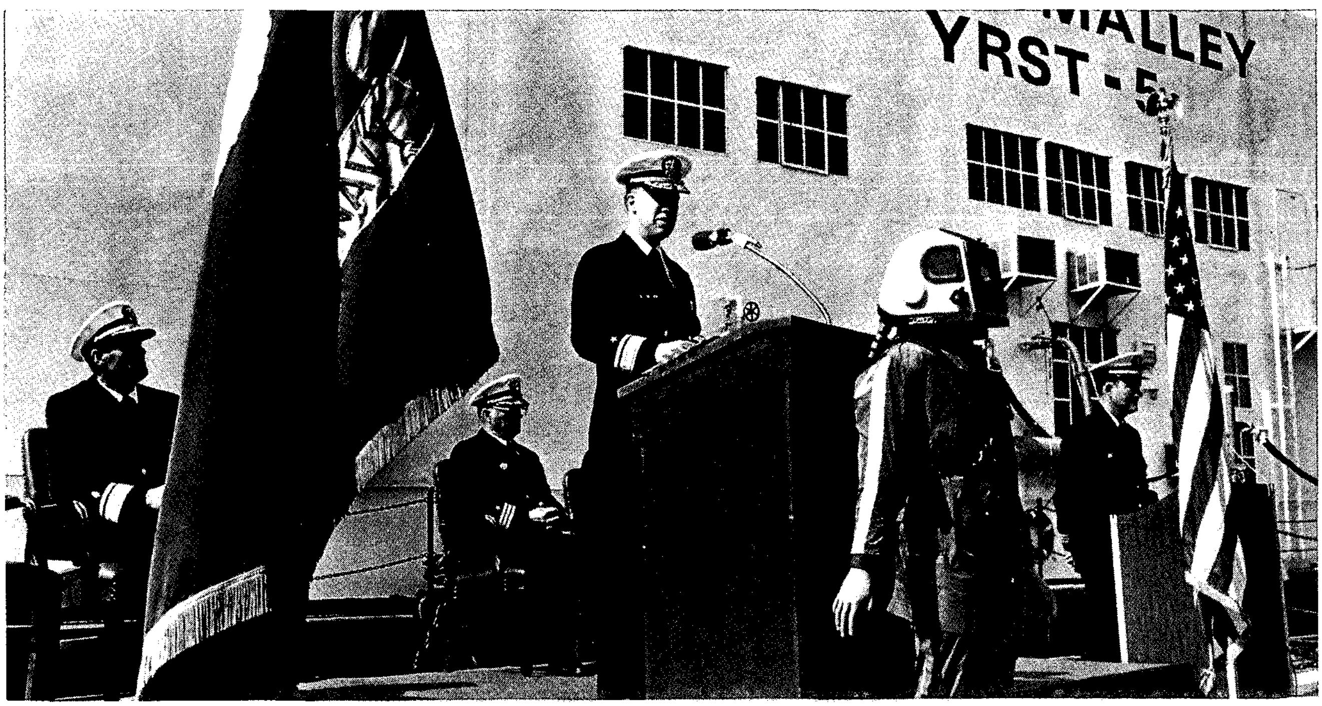
LT G. H. Adkisson
LT D. C. Arthur
LT W. J. Cunningham
LCDR J. C. Jamison
LT R. F. Luce
LT T. W. Luck
LT J. W. Murray
CDR HJ. H. Pieritz (Germany)
LT (jg) D. J. Styer, Sr.
LT R. K. Wade

MEDICAL DEEP SEA
DIVING TECHNICIAN (80-01-HM)

HM2 J. D. Kruse

BILL BADDERS COMMENTS ON HIS USN CAREER---NEXT PAGE.

Above right: CDR Nelson speaks to attendees. Below: RADM Mooney, Jr. was guest speaker.



Editor's Note: FACEPLATE had the privilege of speaking to Bill Badders about some of the more memorable moments in his Navy diving career.

"ANYTHING ANYBODY ELSE CAN DO, I CAN DO BETTER"

That is the motto of Bill Badders, the oldest known living graduate of the Naval School, Diving and Salvage and one of only seven Navy divers to win the Medal of Honor. He helped commission the school in 1928 and graduated in 1929. Two years later, he was designated a Master Diver.

"Henry Hartley and I reported to the Naval Academy in 1921," explained Mr. Badders, "and when he was named Commanding Officer of the salvage ship USS FALCON in 1925, I went with him. I started out working on air compressors and later, through on-the-job training, learned to dive. In those days, divers were paid a nickel an hour on dives over 100 feet."

That winter, the USS S-51 sank in 132 feet of water off Block Island, Rhode Island. Only a handful of divers were qualified to go below 90 feet. Due to the shortage of divers and severe weather conditions, it took 10 months to raise the S-51. Mr. Badders was awarded the Navy Cross for heroism on the occasion of the salvage of the S-51.

It was only after a second submarine disaster, the sinking of the USS S-4 in 1927, that the Navy and Congress were "prompted" to set up a permanent diving and salvage school. "President Coolidge gave Congress hell," said Mr. Badders. "There were six men alive on the S-4 and we couldn't do anything about it."

In 1928, the Naval School, Diving and Salvage, was established at the Washington Navy Yard. The first Officer-in-Charge was LT Henry Hartley. Again, Mr. Badders and LT Hartley were to be reunited. "I was working on a salvage pontoon, when Admiral H.H. King, the Supreme Commander of Salvage, saw me working and said I was doing a good job. We got to talking and I told him I'd like to get in aviation. He told me to stop by his office the next day and he'd send me to

Above: Bill Badders at NSDS ceremony. Below: Rescue divers of SQUALUS demonstrate use of Momsen Lung. MDV Badders is second from right.

U. S. S. ENTERPRISE

NOTB, Norfolk, Va
20 May 1938.

Dear Badders:

Please accept my most hearty congratulations on your record achieving dive to 500 feet 19 May 1938.

Respectfully
T. S. Johnson
Commander (MC) U. S. N.

Pensacola. Well, when I went to see him, he told me, 'The only place you're going to is salvage school.' I graduated in March 1929."

Breakthroughs in helium-oxygen diving were vital if Navy divers were to overcome the dangerous physiological effects of breathing air at great depths. These breakthroughs were soon achieved: by 1937, a diver on HeO_2 reached a simulated depth of nearly 500 feet in one of NEDU's chambers, and on May 19, 1938, MDV Badders made a record dive to 500 feet. (See note above.)

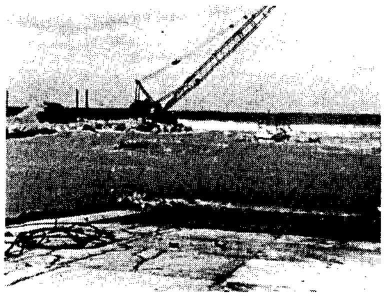
One year later, USS SQUALUS (SS-192) sank in nearly 250 feet of water off the New Hampshire coast. Mr. Badders, along with three other enlisted divers, was awarded the Congressional Medal of Honor for his work on May 26, 1939, the fifth rescue trip to SQUALUS – the first to the after hatch. At the NSDS closing ceremony, Rear Admiral John B. Mooney, Jr., recounted that story:

"All of the living people in the forward end of SQUALUS had been saved. It was thought that none aft were still alive – but if they were alive, time was running out and a positive determination had to be made.

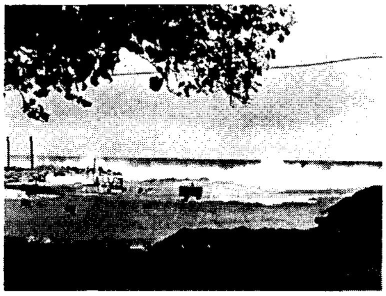
Bill Badders and Skee Mihalowski were named to make the trip. In their rescue bell trips to the forward hatch, both had known that the pressure inside SQUALUS was slightly above normal. But in the after torpedo room, they had every reason to expect that the compartment was filled with sea water at bottom pressure. They knew that they must be prepared for this. If they opened the submarine hatch with the chamber at surface pressure and the torpedo room at bottom pressure, the hatch cover could fly open violently and they would be killed by the rush of water. Once over the hatch, Bill began turning the hatch wheel slowly. Before the dogs worked free, the hatch trembled and cracked open a fraction of an inch. A blast of air poured out of the submarine into the bell. Before Bill could get the submarine hatch closed, water rushed into the bell. Skee bled air rapidly into the chamber to stop the flow of water. The water, which was up to Bill's waist, now slowly went back into SQUALUS. They then opened the hatch of SQUALUS – they saw only dark water in the compartment. Carbon dioxide under pressure in the bell gave Bill and Skee some problems. However, the bell was ventilated. They were decompressed in the bell and arrived on the surface in fine shape."

Today, Mr. Badders marvels at the sophistication and progress in training and education, tools, and the various diving systems. But what intrigues him most is the total saturation concept. "Navy diving has come a long way from the days of 50-foot dives and handpumps. I'd like to go back in (the Navy) right now, but at age 79, I don't think I could pass the physical."

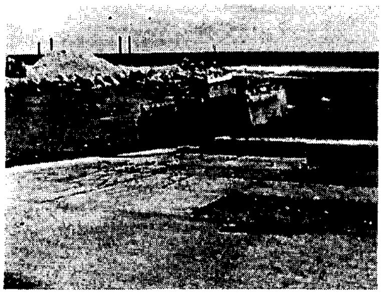
TAU ISLAND HARBOR CLEARANCE



Position of LCU at commencement of SALVOPS. Crane in background owned by Hawaiian Dredging Company.



Work throughout the evolution was greatly affected by surf/current conditions. The concrete Dolphin located in the center of the photograph was explosively removed to allow the LCU to be turned in the harbor basin.



The LCU was pulled closer to shore prior to turning the craft for a seaward retraction attempt.

RECIPE FOR A SALVAGE OPERATION

If a recipe for a salvage operation could be formulated, it would undoubtedly be similar to the following:

Start with:

One stranded vessel (for a different twist, use a downed aircraft in the water or a sunken ship);

One group of dedicated, obstinate, foolhardy salvors.

Add immediately:

Assorted weather conditions (ranging from sunshine and cool breezes to typhoons that include hail the size of tennis balls);

Sea conditions varying from a mirror-like surface to those found in Hawaii's banzai pipe line surf;

Equipment of indeterminate age and questionable reliability.

Mix ingredients vigorously then: Season generously with Murphy's Law. Bake between 0° and 115° Fahrenheit from sunrise to sunset for one to three months and inspect progress periodically between the hours of 0200 and 0400 local time.

(WARNING: Ingestion of the slightest amount of this concoction is considered addictive!)

When Harbor Clearance Unit ONE, Pearl Harbor, Hawaii, completed Tau Island boat harbor clearance in October 1979, they had used the salvage operation recipe many times.

The Tau Island boat harbor clearance operation was one consisting of improvisation, of man working in a hostile environment, and of dogged determination to succeed despite setbacks and frustration. Even more important to the salvage team was that it was a true harbor clearance salvage operation.

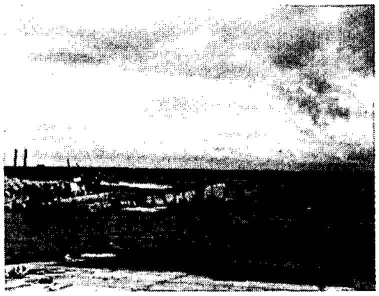
The need for the clearance project began in mid-June 1979, when an American Samoa LCU, carrying supplies to Tau Island, ran aground on a coral table at the harbor's entrance. Because the LCU was the main vessel for carrying materials to the islands that comprise American Samoa, and because it was hindering the on-scene civilian contractor from completing the harbor, the LCU had to be moved.

Attempts by civilians to pull the craft to sea resulted only in the LCU being pulled off the coral table, pushed farther into the harbor, and sinking in six feet of water.

At the request of the Samoan Government, CINCPACFLT sent a two-man team from HCU-ONE to Tau Island in mid-July to determine the feasibility of salvaging the LCU. The team recommended that, although salvage was possible, the LCU wasn't worth saving. The decision was made to pull the craft out of the harbor and sink it in deep water. Two additional divers were sent to augment the salvage team.

The salvage plan formulated by the team was to refloat the forward two-thirds of the LCU by forcing compressed air into the voids. The LCU engineering spaces had free communication with the sea, could not be patched, and, therefore, could not provide additional buoyancy.

The team had to use primitive or modified equipment to prepare for the seaward retraction. With a tugboat and tour boat pulling in tandem, the LCU was moved seaward until the line between the tugboat and the tour boat parted. The LCU veered to starboard and went up on the same coral table where it had initially grounded. Its bow ramp dropped and became an effective anchor, stopping all forward motion. The LCU ended up in the middle of the surf zone, which had 10- to 12-foot breakers.



LCU turned seaward for first retraction attempt by HCU ONE team.

Position of LCU following first unsuccessful attempt to retract craft seaward by HCU ONE team.

Position of LCU following second unsuccessful attempt to retract boat seaward. LCU was in this position during explosive cutting of craft.

The salvage team, supplemented by two additional divers, was forced to spend a week away from Tau Island to acquire materials for the next pull. Despite the pounding surf, the LCU was prepared for a second pull in 10 days. The tugboat alone was used in this retraction and was able to move the LCU 200 feet farther toward deeper water; however, because of a failure to keep a steady strain on the towing hawser, the LCU broached and sank in the channel entrance perpendicular to the channel axis.

The time had come to regroup and the salvors returned to Pearl Harbor in early September to develop a new plan for disposal of the LCU. The previous salvage plan was modified considerably. The LCU was to be explosively cut into small pieces and pulled to shore by using an on-site civilian crane or a beach gear purchase system. Manning requirements for the next attempt were considered carefully to ensure successful completion of the operation. A four-man detachment from EOD Mobile Unit ONE was assigned to the salvage team primarily to prepare the explosive shots and, also, to augment the salvage team. The USS RECLAIMER Master Diver (MMCS [DV] W. E. Yarley) also joined the new team. The expanded team, with support equipment and 4,000 pounds of high explosives, began the assault on the LCU in mid-September.

Murphy's Law was in full force from the start of the new effort. When a boat with salvage material couldn't land the material on Tau Island as scheduled, the salvage team was forced to ferry enough explosives ashore for a day's work by using a Samoan long boat. After explosives had been used to cut the LCU into smaller pieces for retraction, the on-site crane broke a strength member and was of no further use, forcing rigging of a purchase system. Because of the difficulty involved in offloading a clyde winch from a boat by manual labor, no winch was brought to Tau Island. Instead, the team used a combination of bulldozers and dump trucks as the pulling force on the purchase system.

Over 400 purchases were made with the purchase system, so many that the blocks were actually wearing out by the end of the salvage operation. The EOD detachment had to leave before completion of the harbor clearance because of prior operational commitments, so the salvage team trained Samoans in how to fleet out purchase blocks and set 1-5/8-inch wire in a carpenter stopper. Before the job was completed in October, almost 200 dives were made, with an average bottom time of 63 minutes (in a bottom surge of 3 to 4 knots). Despite divers working in and around jagged metal, no major injuries were incurred.

PROJECT PARTICIPANTS

HCU-ONE
LT(jg) J. F. Steadley
MMCS(DV) W. A. Stephens
BMC(DV) P. B. Currivan
MM1(DV) F. Lifa
HT2(DV) T. W. Lindemann
BM2(DV) J. R. Crosby
HM2(DV) E. T. Brennan
FN(DV) P. R. Ledgerwood

USS RECLAIMER (ARS-42)
MMCS(DV) W. E. Yarley

EODMU-ONE DETACHMENT
LT B. R. Bafford
MMC W. J. McCauley
MM1 D. R. Griffith
FTG2 R. W. Neeley

ENIWETOK CLEAN-UP — AN "1140" VIEWPOINT

The Special Operations Officer Community (1140) was approved by the Secretary of the Navy in July 1978, consolidating three functional areas—explosive ordnance disposal, operational diving and salvage, and expendable ordnance management. This affords a challenge to officers within this community to specialize in an important segment of the Navy while growing competitively with their unrestricted line counterparts. Specifically, the Special Operations Officer must have technical expertise in diving, salvage, ordnance safety, and explosive ordnance disposal.

LCDR John Sedlack, Jr., USN
CO, EOD Mobile Unit One
Barbers Point, Hawaii

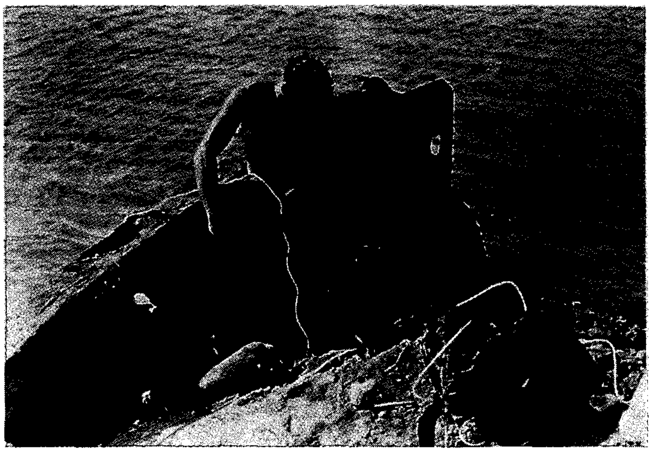
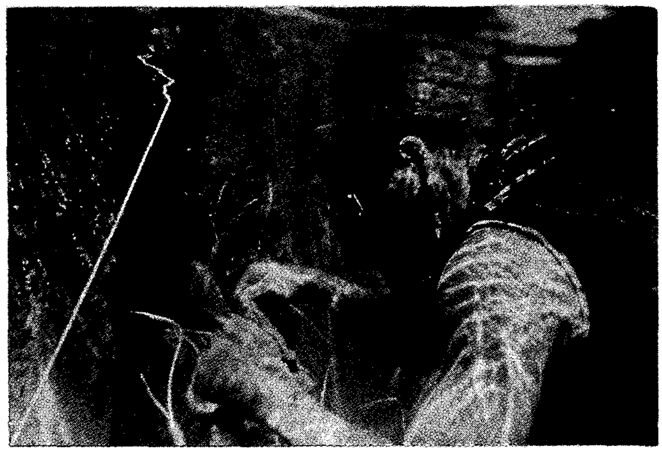
The Eniwetok Atoll clean-up is a recent example of the varied tasks in which 1140 Special Operations Officers participate. (EDITOR'S NOTE: See "Clean-up at Eniwetok" in Spring 1979 issue of FACEPLATE.) Located in the Marshall Islands, about 2,380 nautical miles southwest of Hawaii, Eniwetok Atoll consists of a circular cluster of 40 islands. This is the location of what was once known as the "Pacific Proving Ground," where the United States conducted 43 nuclear tests over a 10-year period.

The Defense Nuclear Agency was designated to manage a joint service effort for comprehensive clean-up of the atoll. The clean-up goal was to remove all debris and radioactive material that might constitute potential hazards during resettlement of Eniwetok.

Explosive Ordnance Disposal Mobile Unit ONE, West Loch Branch of Naval Magazine, Lualualei, Hawaii, was one of the Navy units directly involved in the project. An EOD detachment consisting of one 1140 Special Operations Officer and three EOD-qualified enlisted personnel was assigned to the project on a four-month rotational basis. This team was highly trained in rendering safe all explosives (foreign and domestic) and in underwater demolition procedures.

Photos by SP4 Ken Walker, USA

Based on World War II historical records, four of the islands in the atoll received heavy bombardment prior to and during the amphibious assault in the battle of Eniwetok. Consequently, the primary mission of the Navy EOD detachment was removal of all explosive ordnance below the high water mark. Because of large amounts of metal debris in surrounding waters, use of sophisticated ordnance detectors was not feasible. Instead, underwater visual surveys were conducted by towing two of the detachment members behind a small boat until an ordnance item was sighted. Upon positive identification of the item, a decision for its recovery and disposal was made

Surface (left) and underwater (right) preparations for an explosive demolition of an old causeway.

based on the type of fuze and the condition of the ordnance. All islands in the Eniwetok Atoll have been surveyed at least once; however, this does not preclude the possibility of ordnance being found at a later date due to land erosion and surf action.

The secondary mission of the EOD detachment was explosive cutting of metal debris consisting of deteriorated causeway sections, derelict World War II ships, remains of LCUs and smaller landing craft, and other similar materials. Because of extensive iron oxide build-up, underwater cutting torches could not be used, so explosives were employed. Explosive limits had to be set and safety procedures carefully followed because of shallow water depth and the proximity of wrecks to buildings on the islands.

Channel clearance presented another challenge requiring the expertise of the EOD detachment. A navigable channel had to be established to provide suitable access to allow for the removal of debris and contaminated soil. Demolition of obstacles and repositioning of sand was accomplished by using explosives.

As can be seen by the Eniwetok project, the Special Operations designator offers a unique and challenging opportunity to officers who want a diverse, yet specialized, career in the unrestricted line. The three functional areas: diving/salvage, EOD, and EOM, include a myriad of duty assignments aboard a variety of ship types (ARS, ATS, ATF, AOE, AE, CV, AD, AR, LPD, LPH, LKA, LSD), as well as assignment to duty with EOD Units, Harbor Clearance Units, Weapons Stations, Naval Magazines, Safety Centers, training groups, and major staffs. Detailed functional areas under the purview of the Special Operations Officer include:

- Operational/Experimental Diving,
- Conventional Ordnance Management/Storage/Handling,
- Nuclear Weapons Management/Storage/Handling,
- Ordnance Procurement and Logistics,
- Technical Salvage Expertise to Senior Operational Commanders,
- Technical Ordnance Management/Safety/Disposal, and
- Explosive Ordnance Disposal.

To produce the high caliber officer needed to fulfill the technical expertise of the 1140 community, a demanding training program is in effect. Training is conducted in two phases: CORE and BILLET specialty training. CORE training consists of 19 weeks of Basic Surface Warfare Officer School, 13 weeks of diver training, and 5 weeks of ordnance familiarization. These 37 weeks provide the building block for the 119X officer. BILLET specialty training is tailored to fit the officer's first operational assignment in any one of the three functional areas. Qualifications leading to the 1140 warfare designation include:

- Completion of BILLET specialty training,
  - Five to 13 weeks of advanced diving, or
  - 26 weeks of EOD school;
- Qualification as OOD(U);
- Minimum of one year in an 1140 operational billet;
- Recommendation by the Commanding Officer.

An 1140 officer can expect duty assignments anywhere in the world after meeting these qualifications.

After 28 months of challenging and demanding work, the joint service clean-up effort at Eniwetok has been completed. The EOD officers and technicians of Mobile Unit ONE can look back with justifiable pride on the results of their labor. The skill, ingenuity, and plain hard work of these men has contributed to the restoration of a home for the people of Eniwetok.

SALVAGE OF THE SS INDIANA

One hundred and seventeen years after sinking, the wreck of SS INDIANA was discovered by a group of Wisconsin scuba divers during the summer of 1975. Her bow was smashed open, but the after end, with its pioneer propulsion machinery, was all there. No other American-made commercial engine in its original state, or any screw propulsion system of comparable antiquity, is known to exist.

In the early 1840's, a technological change occurred in the maritime world which would revolutionize the propulsion systems of steamships world-wide. This was the introduction of the screw propeller, which pushed the ship through the water rather than pulled her through, as did the familiar Mississippi river boats with their churning paddlewheels. INDIANA is a classic example of the earliest experiments with the screw propulsion system which, during the next century, would replace all others for both commerce and naval use. By replacing the paddlewheel propulsion system, which occupied the entire midship section of a vessel, propellers simultaneously permitted increased speeds and greater cargo capacity.

INDIANA was among the first propellers to sail on the Great Lakes. Built at Vermillion, Ohio, in 1848, she was a 350-ton wooden vessel with double decks, a single mast, and a freight capacity of 500 tons. She measured 146.6 feet in length, had a 23-foot beam, and had 10.1-foot depth of hold—about the size of a modern, deep-sea tugboat.

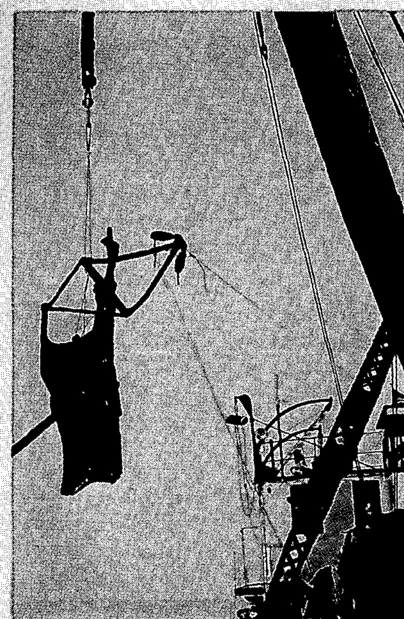
Travelling to wherever a dollar could be earned, INDIANA served new communities springing up along the wilderness shores of Lakes Erie, Michigan, and Huron. New shipping opportunities arose with the opening of the Soo Canal in 1855. Passengers, mining equipment, and other dry goods required transit to the north country, with copper and iron ore composing most of the cargo. Ironically, the greed for iron ore on one such trip ultimately contributed to her demise.

On June 6, 1858, while returning from Marquette, Michigan, with a load of iron ore, a blade on the propeller broke and hit the rudder, jamming it into the port position. Because of the tremendous vibrations resulting from the imbalance, the stern post split, and she began to take in water. Unable to reach the leak because of the massive overload of iron ore covering the shaft alley, her 21-man crew was forced to abandon ship. Barely 10 years old, INDIANA went down by the stern.

She lay there until 1975, when a group of scuba divers, led by John Steele, spotted her on the bottom. She was located 5 miles off Crisp Point, Lake Superior, just above Whitefish Point, in about 120 to 135 feet of water, resting on an even keel on a sandy bottom. Exploratory dives revealed that the screw propeller, steering quadrant, and engine were in good condition— the cold (35°F) fresh water of Lake Superior had served as a preservative.

After viewing films made by the team of divers, Dr. Richard J. Wright, Director of the Center for Archival Collections, Bowling Green State University, and a Great Lakes shipping historian, was struck by the historical technological importance of the find. He contacted the Smithsonian Institution, one of the few and possibly the only institution in the United States capable of housing such a display, about the salvage and preservation of INDIANA.

Through the cooperation of the Michigan Department of National Resources/Department of State Museum programs, the Smithsonian requested Navy assistance in the salvage of the engine and propulsion system. Last summer, Harbor Clearance Unit TWO was tasked with the operation. Overall coordination was handled by John N. Stine, Museum Specialist in the Division of Transportation. Assisting HCU-2 were the Naval Reserve Harbor Clearance Unit TWO DET 813 of Chicago, Illinois; the crew of D/B COLEMAN and tugs LAKE SUPERIOR and BAYFIELD out of Duluth, operated by the U.S. Army Corps of Engineers; and the team of scuba divers led by John Steele.



Rudder and steering quadrant are swung aboard COLEMAN.

The salvage plan was divided into a four-phase operation:

Phase One—A comprehensive survey and study of the propulsion system's items of interest;

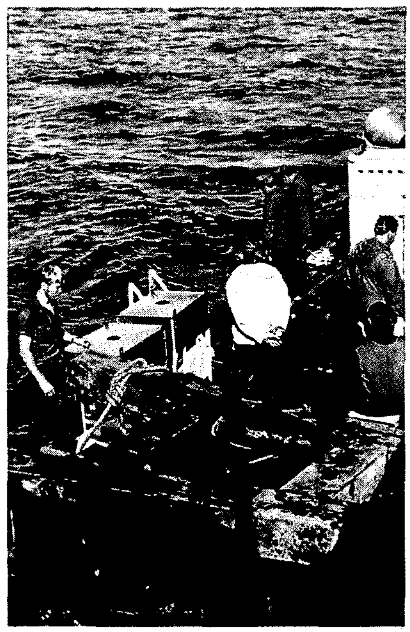
Phase Two—Recovery of the screw propeller and steering quadrant, removal of condenser piping attachments, and lifting of the condenser;

Phase Three—Recovery of the boiler;

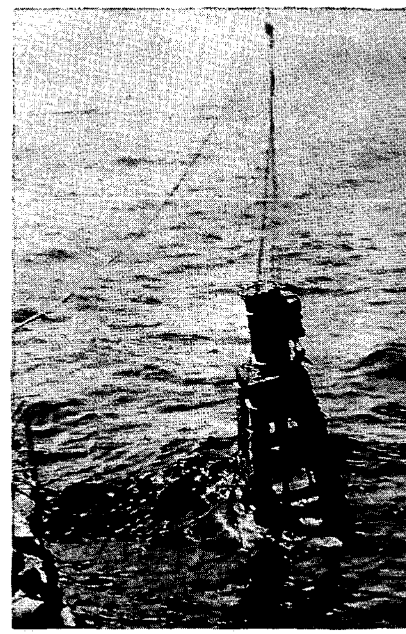
Phase Four—Recovery of the engine assembly.

The operation began on July 31, 1979 and ended on August 8, 1979. HCU-2 surveyed the dive site and entered D/B COLEMAN into a four-point moor over the wreck. COLEMAN was used as the diving platform and was set up with the fly-away dive system compressors, diving chamber, Mk 1 and Mk 12 diving systems, econoheaters, generators, and cutting tools. Diving teams were composed of Regular Navy and Reserve divers. Each diver had at least one dive per day with approximately 40 minutes bottom working time. Visibility was 25 feet with natural lighting outside the wreck, and 15 to 20 feet inside with the assistance of hand-held lights. All dive teams utilized a 120/40 decompression schedule. A Treatment Table 6 was begun on a diver who reported pain and numbness in his right hand. The diver was put on O_2 the last 30 minutes of treatment, resulting in relief of all symptoms.

Recovered boiler. Notice 4 petcocks for checking water level.



Main engine support beams after engine was recovered. Beams still held some green paint.



Main engine breaks surface.

On July 31, preparations were made for the lifting of the condenser. However, additional piping configurations were discovered on the condenser below decks, so the oxy-arc underwater cutting technique was used to remove them. The next day, after rigging, Phase Two was successfully completed with the lifting of the 10-foot screw propeller, preheater, and steering rudder quadrant. Divers then started to oxy-arc cut the drive shaft for engine removal.

In preparation for Phase Three, more boiler surveys were conducted and revealed that tie-down rods had to be cut before the boiler could be lifted. On August 3, divers cut the tie-down rods and continued their attempts to cut the drive shaft. After wire straps were rigged around the boiler, Phase Three was completed with the removal of the boiler from INDIANA.

Only the engine and A-frame assembly remained. Divers concentrated their efforts the next day to cut the 12-inch-diameter shaft under the adverse conditions of depth and cold water. Surveys revealed that engine tie-down rods held the A-frame to the ship's keelsons, and portions of the main deck would have to be cut. The underwater hydraulic chain saw was used to remove sections of decking and allow removal of the engine and A-frame. Beams of up to 12 inches by 12 inches were easily cut. Due to the slow process of cutting through the shaft, floorboards over the shaft were cut away in search of a flange. Soon, a flange aft of the area being cut was found. It was decided to remove the nuts on the flange instead of cutting the shaft. On August 5, divers easily cut the tiedown rods. Cutting the shaft flange bolts proved difficult but necessary for the final propulsion system lift.

Although the weather was unpredictable, only a total of about one day's diving time was lost. The morning of August 7 was spent repositioning the moor. Severe storms the previous evening caused D/B COLEMAN to drag her anchors and move out of position. Comprehensive surveys of the remaining components revealed that the engine A-frame had divorced itself from the keel mounts, and the piston had moved to bottom dead center. A journal bearing arrangement aft of the engine flywheel was discovered. It was thought that cutting of certain wooden beams would free all components, but the journal bearing was still holding the entire assembly in place. The decision was made to cut the connecting rod and rig for the lift of the steam engine. Phase Four was completed with the lifting of the A-frame and engine to the deck of COLEMAN. The engine, economizer, A-frame, boiler, steering quadrant, and propeller were secured on the derrick barge and shipped to Sault Saint Marie, Michigan, where they were off-loaded and shipped to the Smithsonian. This completed the salvage operation of SS INDIANA.

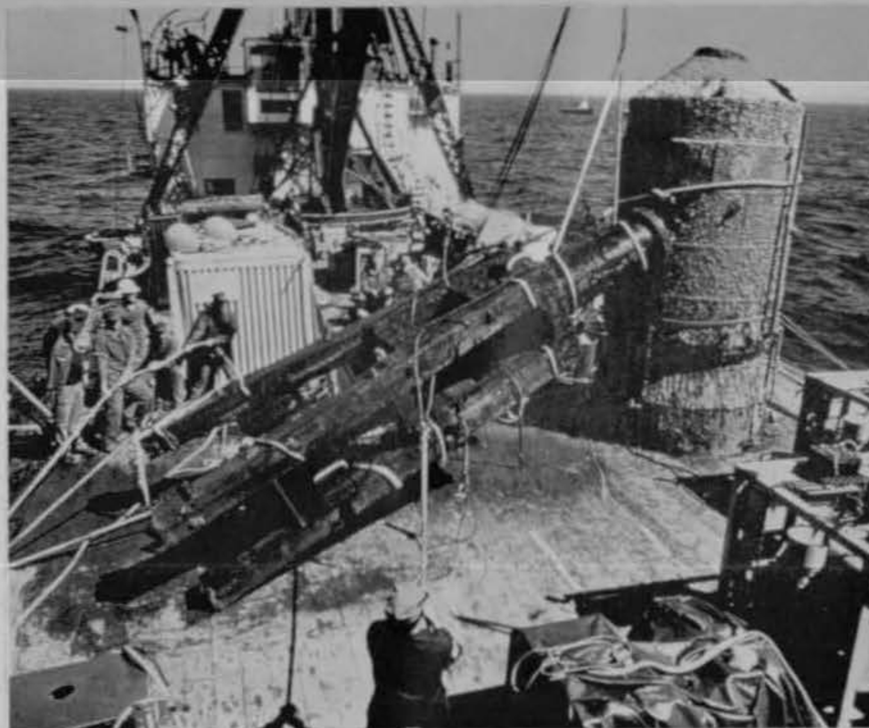
Navy divers made 100 individual descents from COLEMAN, which remained on station round the clock for 12 days. The entire system salvaged weighs 20 tons. The engine stands 18 feet tall on a built-up oak frame bolted into the ship's keelsons. It has a single low-pressure cylinder 16 inches in diameter with a 32-inch stroke, and weighs an estimated 8 tons. The boiler—a simple iron cylinder 10 feet tall and 4 feet in diameter—weighs 4 tons. It is a scotch type (without fire or water tubes) similar to boilers of the 1930's.

The salvage of the S S INDIANA was unique not only from a historical standpoint but also as a training opportunity for the HCU-2 and Reserve DET divers. Divers used the Navy's new Mk 12 SSDS in the third successful working operational test of the Mk 12 at Harbor Clearance Unit TWO. Another first for Harbor Clearance Unit-2 was the use of the new T-ATF Fly-Away Air Diving System (FADS) recompression chamber.

Reserve HCU TWO DET 813 must be commended for its skill and professionalism. It was obvious that without their presence, the operation would have taken much longer than the short "weather window" allowed. DET 813 proved once again that reserves can and should be utilized to augment regular Navy units whenever possible.

DIVING SUMMARY:

Dive Conditions:
Water Depth: 120 Feet
Temperature on Bottom: 37°F
Temperature on Surface: 55°F
Visibility: 20 Feet
Bottom: Sandy
Current: .5 knots
Diving Equipment Used: Mk 12 SSDS
Mk 1 Mod 0
Scuba



Boiler and main engine on board COLEMAN.

PARTICIPATING PERSONNEL

SMITHSONIAN INSTITUTION

John Stine
Nadya Makovenyi
Martin Burke
Larry Jones
Robert Post
Otto Mayhr
Joe Hatch
Ben Lawless
Lisa Milback
Kim Nielson (Photographer)

SENIOR PROJECT OFFICER NAVSEA DET 1006

CAPT William A. Cleary USNR-R
CAPT (Sel.) Vincent J. Shanahan USNR-R
CDR F. Thomas Ingersoll USNR-R
LCDR(MC) Alfred A. Bove USNR-R

BOWLING GREEN UNIVERSITY

Dr. Richard J. Wright (Historian)

HARBOR CLEARANCE UNIT 2

LCDR Robert R. Wells
LCDR Robert W. Schroeder
LT James H. Gibson
ENCM(MDV) James L. Starcher
HMC(DV) Robert W. Matthews

Dive Team

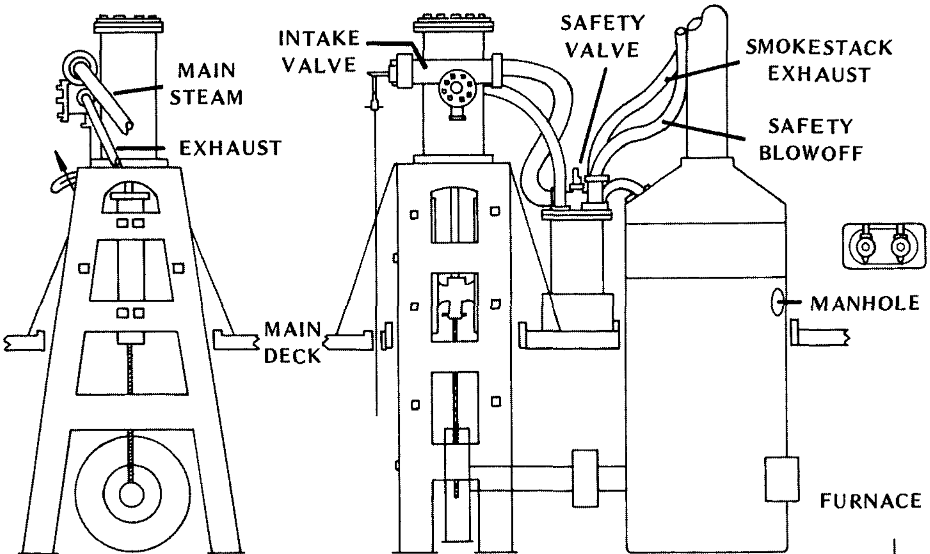
HT1(DV) Roger L. Seeley
EN1(DV) Stephen J. Hagenhoff
MM1(DV) Daniel J. Cronister
BM1(DV) Donald R. Adams
HT2(DV) John A. Sokol
EM3(DV) Craig H. Dahlgard

Underwater Photographers

PH1(DV) Dave I. McNair
PHAN(DV) John G. Mazano

RHCU2 DET 813 CHICAGO, ILLINOIS

LCDR Stephen D. Chubb (CO)
LT Craig B. Laporte
LT Robert Patterson
LT Roger Sacia
LT William Fleming
AE2(DV) Gerald H. Patterson
HM2(DV) Armando Marquez
MM3(DV) David Yost
QM2(DV) Roger Wojcicki
HT3(DV) Robert R. Hall
SK2(DV) John Z. Stajcic
HT3(DV) Howard Roach
PHC Arthur Harrison
ETRSN Rosalie Schull

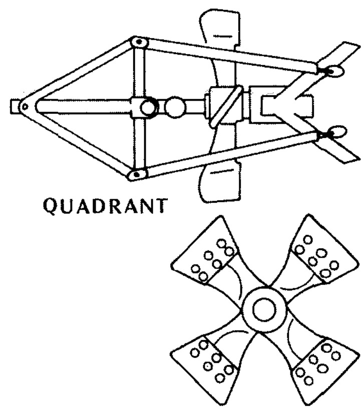


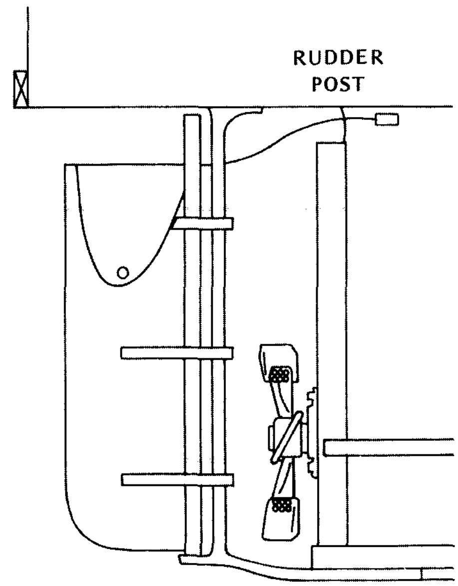
MACHINERY ARRANGEMENT

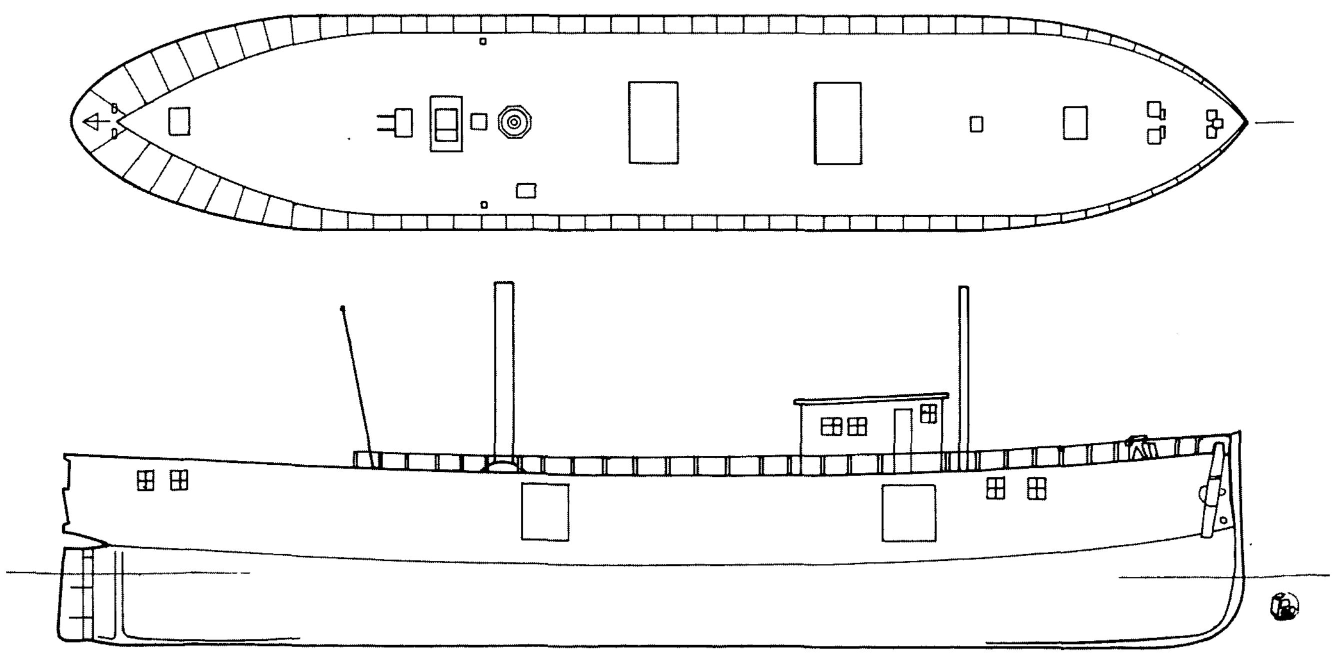
Illustrations have been produced from sketches made by Mr. C. Patrick Labadie, curator of the Canal Park Marine Museum, U.S. Army Corps of Engineers, Duluth, Minnesota. Drawings at left show machinery arrangement. Middle sketches illustrate the arrangement of propeller and steering apparatus. Drawings at bottom of page show reconstructed general arrangement plan, with overview of main deck and profile of SS INDIANA.

INDIANA EXHIBIT OPENS

A temporary exhibit, featuring the pumping system of INDIANA, opened June 1, 1980 in the Museum of History and Technology, Washington, D.C. Equipment salvaged from INDIANA, though remarkably well-preserved after 121 years under water, required conservation measures as unprecedented in scale as the recovery operation itself. When those measures are completed, the *entire system*, one of the most complex artifacts brought to light in many years, will be displayed.

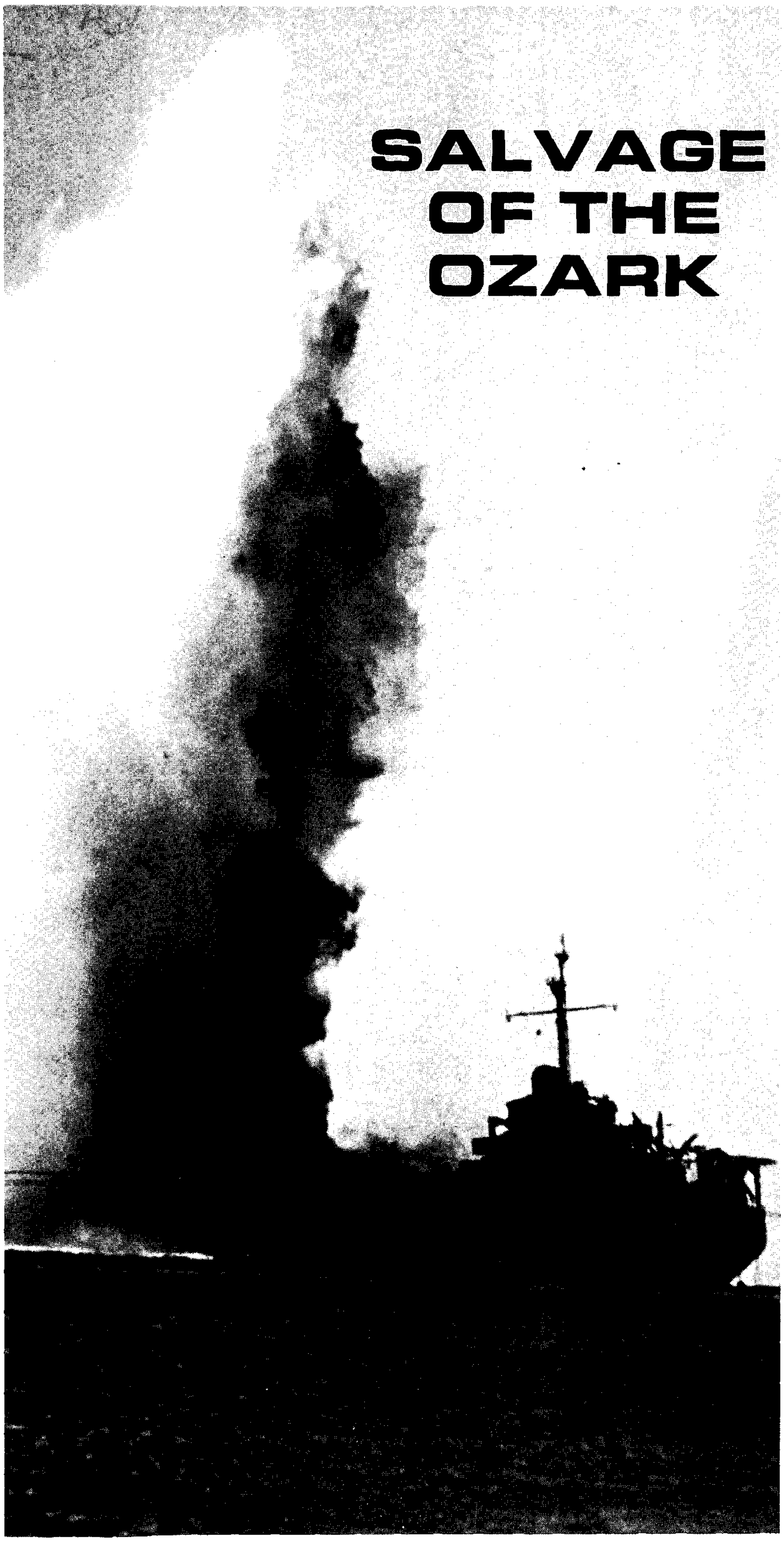






LCDR Stephen W. Delaplane, USN
Commanding Officer,
Harbor Clearance Unit TWO

SALVAGE OF THE OZARK



EX-USS OZARK was moored in the Gulf of Mexico about 40 miles southwest of Ft. Walton Beach, Florida, and Eglin Air Force Base when Hurricane Frederick struck the area on September 12, 1979. The force of the hurricane caused OZARK to part her mooring and pushed her 50 miles northwesterly where she was driven hard aground on Perdido Key near Pensacola, Florida.

The U.S. Air Force, which used the decommissioned mine warfare vessel as a weapons systems development target, requested salvage of the vessel by the U.S. Navy. Captain L. W. Freeman, Commander Service Squadron EIGHT, was tasked with the job, and a salvage element was deployed that consisted of USS EDENTON (ATS-1), USS RECOVERY (ARS-43), USS SHAKORI (ATF-162), USS PAIUTE (ATF-159), and a detachment from HCU-TWO. Commander F.P. Grause, Commanding Officer of EDENTON, was designated as the salvage element commander.

OZARK, 455 feet long with a 60-foot beam, displaced approximately 5,700 tons and had a mean draft afloat of 14 feet, 6 inches. She broached in six feet of water on a heading of 258°T. It was estimated that ground reaction was 1,600 tons, requiring a retraction force of 550 tons. Retraction of OZARK promised to be one of the largest salvage efforts conducted by U.S. Navy salvage forces in over 18 years (in terms of magnitude, complexity, and commitment of equipment).

The basic salvage plan called for, first, wrenching the bow of OZARK around to seaward by using three beach gear ground legs from the starboard stern of OZARK with EDENTON, RECOVERY, and SHAKORI in harness pulling on the port bow. Once headed seaward, two beach gear ground legs, operated from the port side of OZARK, were used to assist pulling OZARK into deep water. While the salvage force was preparing for this operation, helicopter support from the U.S. National Guard, Mobile, Alabama, and HC-16, NAS, Pensacola, arrived. The National Guard "Skycranes" were used to put portable salvage machinery on OZARK.

Complex preparations and equipment were needed for retraction of OZARK, both on the salvage ships and on the beach. Problems that the salvors had to solve to refloat the vessel included the following:

- The salvors used cutting torches to cut and remove topside weight on OZARK to lessen ground reaction, positioned pumps in various spaces on the ship for dewatering, fabricated foundations and secured winches to the deck, and buried anchors (with telephone poles inserted between the flukes and shank) as part of the beach purchase system.
- EDENTON, SHAKORI, and RECOVERY were basically in harness on November 4, but winds exceeding 30 knots hit the area that evening. RECOVERY, harnessed between the other two ships, experienced a failure in the one ground leg on board. The shank of the 6,000-pound LWT anchor that had been positioned on one of the beach gear legs parted and RECOVERY began to set down onto SHAKORI. Small boats were deployed to try to keep the two ships apart; however, RECOVERY came alongside SHAKORI and, taking seas directly on the beam, the two ships mismatched at the counters and began pounding against each other. The Commanding Officer of RECOVERY was able to drift back from SHAKORI and, not wanting to trip his tow wire for fear of fouling it, skillfully maneuvered RECOVERY into the weather and held position. Failure of the anchor shank was a most improbable event and served to remind all of the salvors of the need for continual vigil while working in the restricted and hazardous environment generally encountered in salvage operations. Indicative of the skill of the salvors who worked throughout the night is the fact that the ships sustained only minor damage and no one was injured.
- Explosives (1,000 pounds of Mk 8 hose charges) and jetting pumps were rigged in an attempt to excavate a channel when retraction efforts were started. On November 7, EDENTON achieved a line pull of about 210 tons, RECOVERY was holding about 140 tons, and SHAKORI was pulling 90 tons. The demolition field was detonated and the explosion was tremendous and most picturesque. However, OZARK was essentially underwhelmed, indignant, and unmoved.
- Despite maintaining maximum strain on all systems over the next 10 days, a rotation of only about 10 degrees was achieved while heavy weather and surf pounded the port side of OZARK. From the day OZARK grounded, the fine, fluid-like sand where she rested continued to build up around her. Because of slow progress and continual sand build-up, the Salvage Master decided that the most cost effective and expedient salvage option was to dredge a rectangular hole 20 feet deep along the entire port side of OZARK and seaward about 150 feet where the mean low water depth was 20 feet.

On December 1, 1979, OZARK began to slowly incline to port and all pulling systems were "touched up" to maximum capacity. When the port inclination gradually increased to about 14 degrees, the bow of OZARK began rotating seaward and, almost with a sigh of resignation,

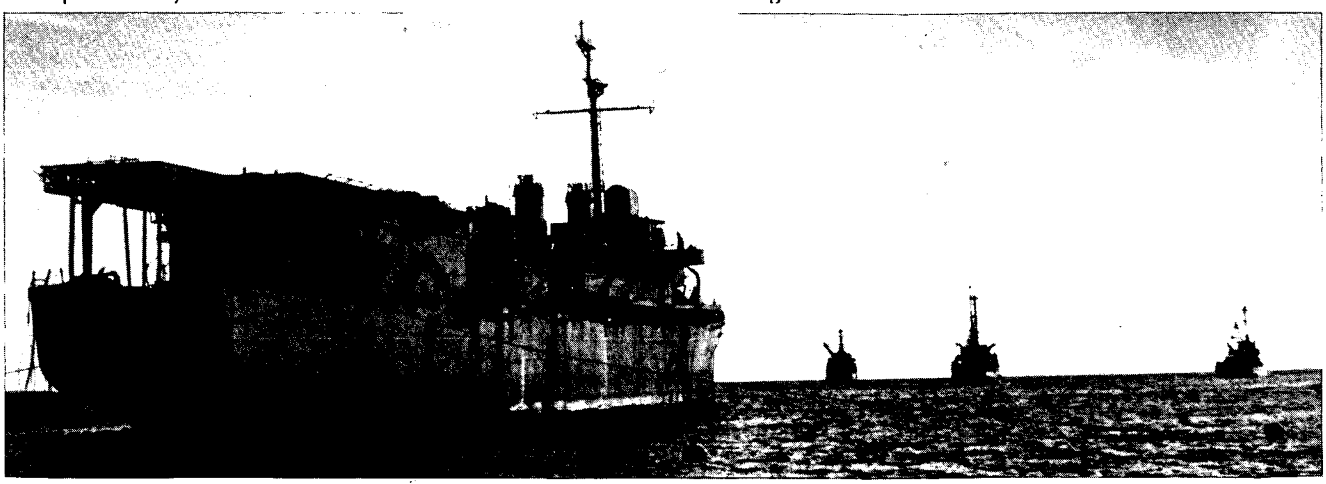


Photo on page 32: Salvors attempt to cut a channel with hose charges. Above: OZARK afloat and underway.

OZARK slid off the real estate she had occupied for nearly three months. With a chorus of cheers the 400 salvors, who had dedicated their collective talents and efforts to the operation, voiced their approval.

As OZARK refloated, she righted herself and settled out with a slight starboard list. On board OZARK, the salvage crews scrambled to trip EDENTON and SHAKORI out of harness and they moved to deeper water. The stern wires to the deadmen on the beach, now acting as preventers to keep OZARK from overriding RECOVERY, were explosively cut. Colors were broken on OZARK, and RECOVERY towed the prize to sea. OZARK was then towed to NAS, Pensacola where she was moored at 1200 hours December 2.

This was a classic salvage operation in every respect. The quintessential elements of skill, ingenuity, flexibility, and hard-headed perserverance were required from all participants to conduct the successful operation. The unsolicited cooperation in all quarters was most instrumental in accomplishing this arduous task. The ships performed their respective assignments with aplomb and, considering that many crew members had never seen beach gear before, their performance was truly commendable and professional.

Salvage of OZARK not only afforded participants the opportunity to learn standard methods of rigging on board a salvage ship, but, more important, many of the young salvors gained first hand expertise in "Ad Hoc" rigging.

There are few challenges in life as demanding as marine salvage and still fewer accomplishments that are as satisfying as success in the salvage arena. Participants in the OZARK salvage experienced a very tangible and personal sense of pride. This operation serves to underscore the viability of the U.S. Navy salvage community and its preparedness to support salvage commitments of the Fleet.

EDENTON, RECOVERY, and SHAKORI "in harness" pulling OZARK (foreground).

PARTICIPANTS

CDR F. P. Grause, USN
Commanding Officer, USS EDENTON (ATS-1)
Task Element Commander

CDR M. W. Kenyon, USN
Commanding Officer, USS RECOVERY (ARS-43)

LCDR Stephen W. Delaplane, USN
Commanding Officer, Harbor Clearance Unit TWO
Salvage Master

LT E. R. Hebert, USN
Commanding Officer, SHAKORI (ATF-162)

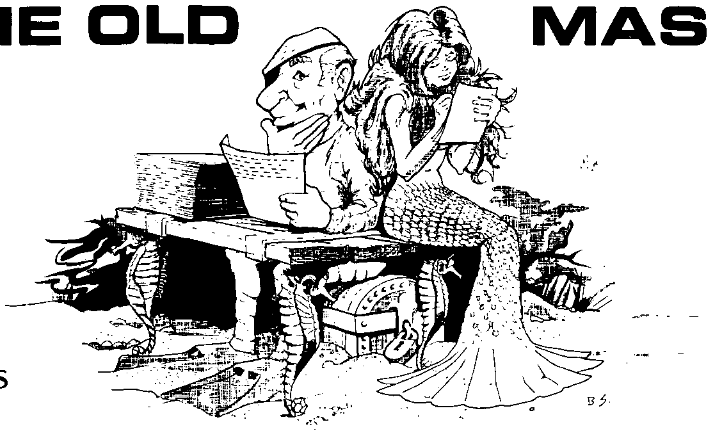
LT A. J. Whittle, USN
Commanding Officer, USS PAIUTE (ATF-159)

BMCS Richard R. Radecki, USN
Officer-In-Charge, Harbor Clearance Unit Detachment

Harbor Clearance Unit TWO Personnel

CWO2 Yatsko	HTC(DV) Seeley
QMC(DV) Bartosh	ENC(DV) Hagenhoff
BM1(DV) Jongquist	HM1(DV) Miller
EM1 Parent	SK2 Niemczyk
HM2(DV) Braswell	HT3 Bays
MR3 Boyd	EN3 Cole
HTFN Polland	HTFN Hughey
SN Thompson	SN Cope
STGSN Tibbs	

THE OLD MASTER



SAFETY IS EVERYONE'S BUSINESS

The Winter '79 issue of Faceplate reported a significant diving milestone when, according to information provided to the Naval Safety Center on OPNAV Form 9940/1 (s), 75,074 dives were completed without fatality by Fleet and shore establishments.

This achievement was the result of hard work, diligence, and safety consciousness on the part of all persons involved in dives. Too often, however, lack of training and overconfidence can contribute to accidents.

The Naval Safety Center's Diving and Salvage Division is devoted strictly to diver safety. They are the Navy's corporate memory of all dives conducted, and analyze all diving accidents as reported by the 9940's.

Also, the Diving and Salvage Division is required to provide Diving Safety Surveys for Navy diving activities and assist in improving the diving safety program of each activity. The Safety Survey Hazard Summary contains highlights of the cumulative data collected over a 12-month period of safety surveys conducted at 70 diving commands. As the summary shows, safe diving requires constant, day-by-day vigilance and adherence to regulations before, during, and after dives.

The Diving and Salvage Division is dedicated to helping you conduct accident-free diving operations. If you would like to make a self check of your activity to find out where you stand, write and request a Diving Safety Check List from:

Commander, Naval Safety Center
Attn: Code 22
U.S. Naval Air Station
Norfolk, Virginia 23511

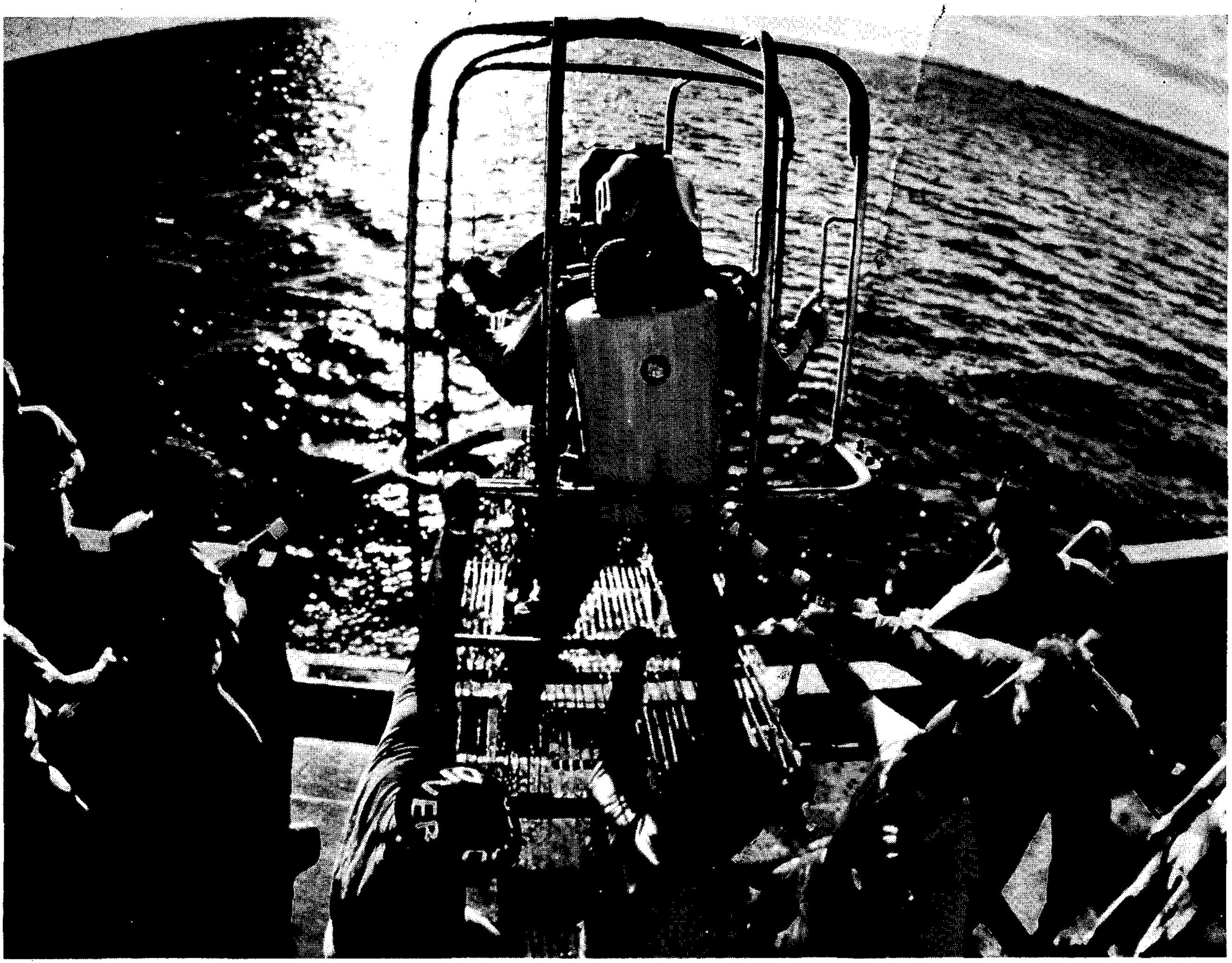
Remember, we are here to help you. Keep up the good work and keep it safe.

HTCS(MDV) John Conneen
Naval Safety Center

12-MONTH DIVING SAFETY SURVEY HAZARD SUMMARY

Fleet Safety Aspect Surveyed	Percentage of Safety Hazards Observed
Diving equipment test and maintenance records not maintained	70
Diving regulators improperly set	56
Warning signs not mounted inside or on diving decompression chambers	52
Diver's PQS program not implemented	52
Training program for diver boat coxwains not implemented	52
Diver's air system valves not tagged "Diver's Air, Do Not Touch"	48
Diver's long range training program not implemented	48
SCUBA bottle reserve pressure settings not within minimum limits	44
Improper stowage of SCUBA diving equipment	37
Pre-dive checklist for SCUBA diving operations not implemented	33

Shore Safety Aspect Surveyed	Percentage of Safety Hazards Observed
Diving equipment test and maintenance records not maintained	79
Diver's PQS program not implemented	68
Diving system certification program requirements training not provided for assigned divers	59
SCUBA bottle reserve pressure settings not within minimum settings	56
Diving officer training, diving supervisor training, and surface decompression (Air/Oxygen tables) and recompression and treatment tables training not implemented within command's training programs	44
Diving air compressor relief valves not tested and labeled	41
Pre-dive checklist for SCUBA diving operations not implemented	38
Diving system valves and gages not labeled and numbered	35
Diver's air system valves not tagged "Diver's Air, Do Not Touch"	3
Emergency operational procedures not provided	32



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