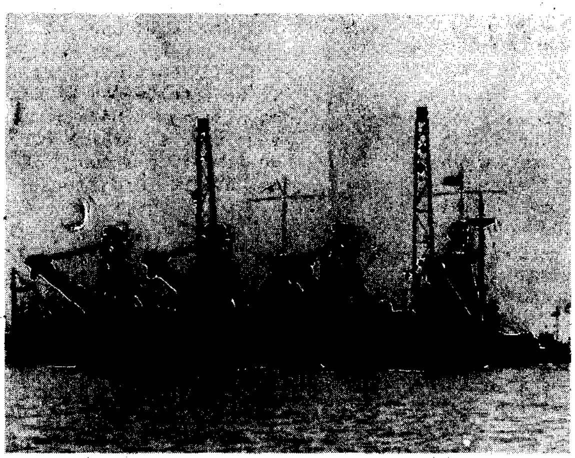
U.S. NAVY DEEP SEA DIVERS
WE DIVE THE WORLD OVER

THE FACEPLATE

DEEP SEA DIVING SCHOOL
EXPERIMENTAL DIVING UNIT

WASHINGTON D. C. 20390

DIVERS HONORED



On Sunday, 15 October 1967, the former German heavy lift craft AUSDAUER I and ENERGIE II were renamed CRILLEY YHLC-1 and CRANDALL YHLC-2 in honor of two Chief Petty Officers who were awarded the Medal of Honor for extraordinary heroism in the line of duty. The principal speaker for the ceremony held at the U.S. Naval Station, Subic Bay was Rear Admiral Norvell G. Ward, Commander Service Group THREE, who gave the following brief history of Chief Petty Officers Crilley and Crandall.

CRILLEY, Frank William

Rank and organization: Chief Gunner's Mate, U.S. Navy. Born: 13 September 1883, Trenton, N.J. Accredited to: Pennsylvania. (19 November 1928). Citation: For display of extraordinary heroism in the line of his profession above and beyond the call of duty during the diving operations in connection with the sinking in a depth of water 304 feet, of the U.S.S. F-4 with all on board, as a result of loss of depth control, which occurred off Honolulu, T. H., on 25 March 1915. On 17 April 1915, William F. Loughman, chief gunner's mate, United States Navy, who had descended to the wreck and had examined one of the wire hawsers attached to it, upon starting his ascent, and when at a depth of 250 feet beneath the surface of the water, had his life line and air hose so badly fouled by this hawser that he was unable to free himself; he could neither ascend nor descend. On account of the length or time that Loughman had already been subjected to the great pressure due to the depth of water, and of the uncertainty of the additional time he would have to be subjected to this pressure before he could be brought to the surface, it was imperative that steps be taken at once to clear him. Instantly, realizing the desperate case of his comrade, Crilley volunteered to go to his aid, immediately donned a diving suit and descended. After a lapse of time of 2 hours and 11 minutes, Crilley was brought to the surface, having by a superb exhibition of skill, coolness, endurance and fortitude, untangled the snarl of lines and cleared his imperiled comrade, so that he was brought, still alive, to the surface.

CRANDALL, Orson L.

Rank and organization: Chief Boatswain's Mate, U.S. Navy. Born 2 February 1903, St. Joseph, Mo. Accredited to: Connecticut. Citation: for extraordinary heroism in the line of his profession as a master diver throughout the rescue and salvage operations following the sinking of the U.S.S. SQUALUS on 23 May 1939. His leadership and devotion to duty in directing diving operations and in making important and difficult dives under the most hazardous conditions characterize conduct far above the ordinary call of duty.

The lift craft Crilley and Crandall are used by Harbor Clearance Unit One in the Salvage and clearance of wreckage blocking water ways in Southeast Asia.

FACEPLATE

Published quarterly as an unofficial publication. This periodical is compiled and edited at the U.S. Naval School, Deep Sea Divers, with the assistance of the Experimental Diving Unit, Washington Navy Yard, Washington, D.C. The opinions expressed in this publication are those of the writers and do not necessarily reflect the official policy of the U.S. Navy. The purpose of the FACEPLATE will be an exchange of information between all men who work under the sea.

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EDITORS COMMENTS

On 11 August 1967 the Additional Duty provision of the Officer in Charge, U.S. Naval School, Deep Sea Divers which encompassed duties as Officer in Charge U.S. Navy Experimental Diving Unit was terminated by establishment of an allowance for an Officer in Charge billet for U.S. Navy Experimental Diving Unit. Commander E.B. Mitchell, USN, relieved Commander W.R. Leibold as Officer In Charge. The two activities while housed in the same building are in fact separate entities with the U.S. Naval School, Deep Sea Divers a field activity of the Chief of Naval Personnel and the U.S. Navy Experimental Diving Unit a field activity of Naval Ship Systems Command. The Secretary of the Navy designated U.S. Naval School, Deep Sea Divers a Command, under a Commanding Officer by SECNAV NOTE 5450 of 18 September 1967. Commander W.R. Leibold has been ordered as the Commanding Officer.

SAFETY NOTE

"NAVSHIPS Instruction 09940.14 of 5 September 1967, Safe Diving Distances from Transmitting Sonars (U), promulgates safe distances and exposure time for suited, wet suited, hooded and unhooded divers operating in the vicinity of ships transmitting with AN/SQS-26 sonars. Additional information is contained in this instruction regarding proximity/time curves for <u>all</u> other surface ship sonars."

WHAT'S NEW AT EDU

There have been many changes here at the U.S. Navy Experimental Diving Unit since the last publication. The largest being a complete overhaul of our pressure facilities and increased depth capabilities for saturation diving.

Since February of 1965 when the Unit had an unfortunate accident in #6 complex we have been diving in only one of our complexes; #6 has been out of commission since then. Finally after a blitzkreig effort involving many hours of hard work by the unit people, the shipyards at Philadelphia, Pa. and Portsmouth, New Hampshire, the Battelle Memorial Institute and Public Works, it looks like we're going to be in business in #6 again in late November.

Among the changes that have been made are a new gas and air piping system all high pressure designed and manufactured by unit people, a new life support system consisting of air conditioning and heating, CO_2 scrubbing and atmosphere control and a new electrical system for Powers readout instrumentation. When completed we will have 1000' saturation diving capabilities.

Our #5 pressure complex is to be overhauled in the same manner and is now in the process of being stripped of all old equipment in preparation. Hopefully we will have it back in operation this year.

A lot of hard work has been done and a lot more has to be done before we can be fully operational again. We will again have an outstanding NAVXDIVINGU next year and be working full time on diving and diving equipment in support of SEALAB, ADS IV and MKI DDS, and EOD/UDT programs.

OLD MASTERS QUIZ

Underwater Cutting and Welding

1. What is the primary purpose of using oxygen with the oxy-arc torch?
2. What principle is employed in the metalic arc method of cutting?
3. What is the tensil strength loss in underwater welding?
4. What polarity is used for underwater cutting?
5. What is the maximum amount of gap permitted when welding a patch underwater?
6. What type of head should be used to weld a small plate to a ship's hull underwater?
7. What is the minimum amount of amperage rating permitted for a welding machine used for underwater cutting and welding?
8. What is the primary purpose of compressed air when using the oxygen hydrogen torch?
9. What is the recommended setting of the distance shoe when cutting underwater with the oxygen-hydrogen torch?
10. At what angle is the steel tubular electrode held cutting 3/4" mild steel plate underwater?

EDU UNDER NEW COMMANDER

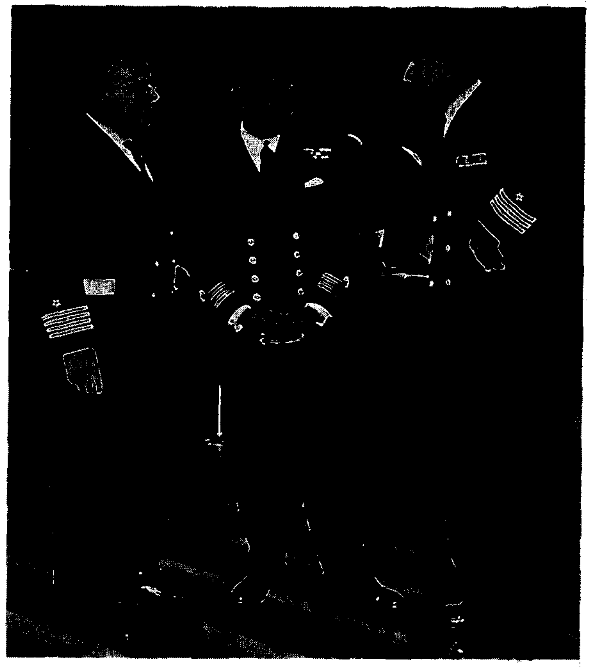
CDR Eugene B. Mitchell, who recently assumed the duties of Officer in Charge of the Experimental Diving Unit, served on the staff of CINCPACFLT and COMSERPAC as Fleet Diving and Salvage Officer for the past three years. He also is the Deputy Supervisor of Salvage and Branch Head, Swimmer and Diver Branch in Naval Ships Engineering Command, NAVSEC code 6138.

His staff at NAVXDIVINGU are:
- LT H. CHILDERS, Assistant Officer in Charge
- LCDR John V. HARTER, Research Project Engineer
- CDR Robert C. BORNMANN, (MC), Senior Medical Officer
- LT Donald E. FOSTER, EOD/UDT Liasion Officer
- LT Carl J. RUBENSTEIN, (MC), Ass't. Medical Officer
- LT Willis H. BELL, (MC), Assistant Medical Officer
- LTJG Raymond M. CURRAN, (MSC), Supply (Med. Dept.)
- LTJG Robert J. BIERSNER, (MSC), Research Psychologist

Engineering:
- Mr. Murdoch, Head Engineer
- Mr. Foran, Assistant Engineer
- Mr. Black, General Engineer
- Mr. Stockard, General Engineer
- Mr. Miliner, General Engineer
- Mr. James, Laboratory Technician
- Mrs. Breidinger
- Miss Hutchson

The personnel assigned to NAVXDIVINGU are:
- DCCS Frederick H. BRAUNER, Master Diver
- ENC Alan (N) MAY, Master Diver
- BMC James R. TAYLOR, First Class Diver
- BMC Frank M. WYATT, Jr., First Class Diver
- BM1 Murray P. CATO, First Class Diver
- BM1 William D. MEEKS, First Class Diver
- BM1 James E. MULLEN, First Class Diver
- BM1 Irwin C. RUDIN, First Class Diver
- GMG1 Arthur G. MANDIBLE, First Class Diver
- DCC Robert L. MULALLY, First Class Diver
- DC2 James L. PRATT, First Class Diver
- ST1 Charles B. KENNEDY, First Class Diver
- MMCS Everett B. SUNDSTROM, First Class Diver
- EN2 James C. LAZARO, First Class Diver
- ETC William T. FRENCH, Second Class Diver
- EMC Joe J. BATES, First Class Diver
- SFC William L. MESPLAY, First Class Diver
- SFC Francis J. SMELKI, First Class Diver
- HMC Charles W. DUFF, Diving Medical Technician
- HM1 Herbert G. JONES, Diving Medical Technician
- HM1 Thomas E. HENDRY, Diving Medical Technician
- SK1 Samuel L. REID, Supply
- YN2 Marvin L. PULLEY, Admin
- PH2 Eugene P. McCRAW, (SCUBA) Photo Lab
- PH2 Billy D. DOUTHIT, (SCUBA) Photo Lab
- YN3 David G. DAVIS, Admin
- DM3 Kenneth R. ELLIS, Project Draftsman
- YNSN Geraldine LODYGA, Admin

BRITISH DIVING HEAD VISITS EDU



On 5 October 1967 CDR P. WHITE, Superintendant of Diving, and Commanding Officer of the Admiralty Experimental Diving Unit of the United Kingdom visited Captain W. F. SEARLE, Supervisor of Salvage (left) and Commander E. B. MITCHELL, Officer in Charge of the U.S. Navy Experimental Diving Unit, (right). Commander WHITE's visit to the Experimental Diving Unit concerned future cooperative efforts between the U.S. Navy and Royal Navy in the field of deep diving. Commander WHITE accompanied Captain SEARLE, Commander MITCHELL, Lieutenant CHILDERS, MMCS SUNDSTROM, and BM1 MEEKS to Columbus, Ohio for the two day symposium on underwater tools sponsored by SUPSALV and Battelle Institute.

DSDS PERSONNEL

Transfers

	From	To
DC1 C.C. LIGHTSEY	DSDS	USS SUNBIRD (ASR-12)
LT. E. SHIPP	DSDS	DSSPTO, San Diego, Calif.
SFC R. THOMPSON	DSDS	Ship Repair FAC, Subic
GMG1 T.A. JENKINS	DSDS	USS PROTEUS (AS-19)
ENC C.E. CARTER	DSDS	Fleet Reserve

Receipts

	From	To
LT. B.L. DELANOY	HCU One	DSDS
BM1(DV) N.L. McCULLOCK	NS, ADAK, Alaska	DSDS
SK2 C.B. PILCHER	Port Heuneme, Calif	DSDS
BM1 O.R. SOUTHERS	NAVSCOLCOMD, Norf, Va.	DSDS
LT. R.D. YENTES	USS KITTIWAKE (ASR-13)	DSDS
BMC I.R. MILNE	USS SUNBIRD (ASR-15)	DSDS

"BLOW UP" IT CAN HAPPEN

BLOW-UP: CAUSES & CONSEQUENCES

Causes:

Blow-up is caused by a pernicious combination of Boyle's law and Archimedes' principle. Boyle's law describes the behavior of a certain volume of gas under the influence of pressure (assuming no temperature change). As depth-pressure increases, volume is reduced; if depth-pressure decreases volume expands. This is where Archimedes' principle of bouyancy comes in. An object in water will be bouyed up by a force equal to the weight of the volume of water the object displaces. If the object weighs more than the water displaced it will sink; if it weighs less, it will float. For a diver, the volume of gas in the suit obeys Boyle's law and also determines bouyancy.

If the dress becomes over inflated the diver begins to float (according to Archimedes' principle), but this reduces the outside pressure so the gas in the dress expands (according to Boyle's law) displacing more water which increases the bouyancy even more. The result: blow-up. A diver's tenders also need to understand how these two principles interact. If a diver with negative bouyancy is given a strong, rapid pull by his tenders, moving him up too fast, this could activate Boyle's law causing his suit volume to expand making him suddenly positively bouyant. The result: blow-up. Another situation: a strong tide may drag the diver off the stage or away from the descending line, sweeping him up far enough to cause the dress volume to expand. The result - Boyle's law plus Archimedes' principle: blow-up.

Consequences:

Accidental blow-up can be injurious in several ways. If the diver holds his breath while blowing up this will trap the air in his lungs. This trapped air will expand as depth-pressure decreases causing the lung to rupture forcing air bubbles into the blood stream. This is air embolism and it may occur when blowing up from any depth with more than 7 feet of water above the helmet.

If the dive was deep enough or long enough to require decompression blowing up can lead to serious decompression sickness. The diver who blows up, obviously has omitted decompression and is in danger of getting the bends. Blow-up allows the inert gas to come out of the body tissues too fast, consequently the bends may occur. Note that the same thing occurs any time a diver is brought directly to the surface without stopping for the required decompression stops. On a long, deep dive the body accumulates a large amount of inert gas. This gas must be let out of the body slowly to avoid decompression sickness. Therefor, bringing a diver straight up (or blow-up) from such a dive will cause serious decompression sickness which may be fatal.

Blow-up may cause physical injury if the diver strikes the bottom or side of the ship. In addition to this he may suffer from squeeze after blowing up if he exhausts the air from the suit, or it splits, allowing him to fall back down. Squeeze occurs going down; air embolism and bends, coming up.

Prevention:

Prevention of blow-up requires proper function of exhaust and control valves, and attentive tenders. If blow-up does occur air embolism is prevented by normal breathing. A diver should never hold his breath during ascent. Tenders should quickly take in slack to prevent the diver from falling if the suit splits. The diver should not exhaust air from the helmet while on the surface until the tenders have a good hold on him. This prevents falling and getting squeezed.

Consequences:

The article on page 6 of this issue of FACEPLATE should be read carefully. If a dive has been particularly deep or long, the diver may not be able to tolerate omitted decompression. In a recent case, recompression to 165 feet on a Table 4 was not sufficient to prevent a fatal outcome. Diving Officers and Masters should be thoroughly familiar with the probable consequences of omitting a large block of obligated decompression. In an extensive diving operation everyone should be scrupulous in his attention to the prevention of blow-up. The promulgation of the Oxygen Treatment Tables in BUMED INSTRUCTION 6420.2 of 22 August 1967 pointedly did not change the present regulations for handling omitted decompression as stated in the Diving Manual and summarized below.

Action:

If the diver is unconscious, assume that he has air embolism, and recompress him immediately to 165 feet.

If the dive did not require decompression and the diver is all right, keep him near the chamber and observe him. If he develops symptoms treat him accordingly.

If the dive did require decompression it may be possible to use surface decompression if the blow-up occurred at such time that appropriate water stops were completed which would allow surface decompression to follow. When this is not the case the diver's decompression has been compromised and he is in danger of developing the bends. Therefore, if a chamber is available recompress him to 100 feet for 30 min. and if he is all right bring him out on treatment table I or IA. Consider decompression sickness developing during or after this as a recurrence.

When no chamber is available recompress the diver in the water, following the procedure in the paragraph above as closely as possible. Keep the diver at rest, provide a standby diver, and maintain good communication and depth control. When the course of action outlined above is impossible use the following procedure: (a) repeat any stops deeper than 40 feet; (b) at 40 ft. stop for 1/4 of the 10 ft. stop time; (c) at 30 ft. stop for 1/3 of the 10 ft. stop time; (d) at 20 ft. stop for 1/2 of the 10 ft. stop time; (2) at 10 ft. stop for 1 1/2 times the scheduled 10 ft. stop time.

AFTER THE DIVE?

It is important to remember that the present decompression tables have been designed to cover most individuals under most conditions, but as depth, bottom time, age, weight, and severity of work increases the frequency of decompression sickness increases also. In his report of 1965 Doll found that in standard Navy dives in which decompression tables were "adequately" followed, the incidence of "bends" ran around one percent. It is this one percent that we hope to help by keeping the diver in the vicinity of a chamber after his dive.

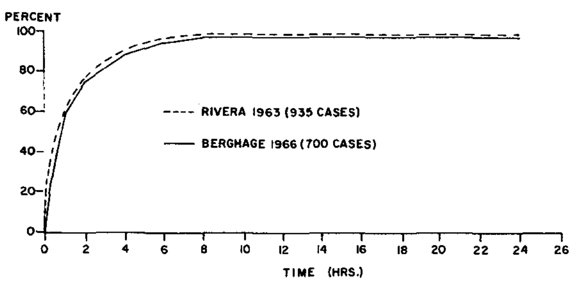
Rivera in his research report of 1963 pointed out that there is a significant relationship between the delay in giving pressure treatment for decompression sickness and the outcome of the treatment. Rivera states that, "generally, the sooner the recompression begins the better the outcome of the treatment. With this observation in mind, there should be little question as to the reason for retaining a diver in the vicinity of a chamber. The U.S. Navy Diving Manual states in article 1.4.7 paragraph 26 that, "after completing a dive, the diver should remain in the vicinity of the recompression chamber or facility for underwater recompression for at least one hour. This time should be extended to twelve hours for any dive requiring decompression."

The Diving Manual also gives some statistics in article 1.6.2 paragraph 7 to show the proportion of symtoms that appear at various surface intervals.

50 percent occurred within 30 minutes.
85 percent occurred within 1 hour.
95 percent occurred within 3 hours.
1 percent delayed over 6 hours.

More recent studies on this question have produced some slightly different results and are worthy of noting. The figure below shows a more recent estimate of the time of onset of decompression symptoms based upon diving accident reports at the U.S. Navy Experimental Diving Unit.

PERCETAGE OF DECOMPRESSION SICKNESS CASES SHOWING SIGNS OR SYMPTOMS AFTER VARIOUS TIME INTERVALS



Remember this one fact, of the sixteen "bends" cases in Rivera's report that didn't receive relief at 165' or less all had a delay in treatment of one hour or more. KEEP YOUR DIVERS CLOSE TO THE CHAMBER AFTER THEIR DIVES.

NEW DSDS XO DECORATED

On Friday, 27 October 1967 in ceremonies at the U.S. Naval School, Deep Sea Divers, Washington Navy Yard, Washington, D. C., CDR W.R. Leibold, Commanding Officer of the Diving School, decorated his new Executive Officer, LT B.L. Delanoy, USN, with the Navy Commendation Medal with combat "V" and presented him with the Navy Unit Commendation Award.

Both awards presented to LT Delanoy were earned by him while serving as Executive Officer and Senior Salvage Officer of Harbor Clearance Unit One during extensive service in combat salvage operations in Viet Nam. These operations covered an area of no less than 18 combat salvage and diving operations. Amongst some of the more note worthy of these operations were the S.S. Sea Raven at ChuLai, communist trawler at Cau Mau (Mekong Delta) the river clearance of the MSB-14, MSB-54, LB-56, SS Clarksburg victory and the mine shattered SS Baton Rouge victory from the Song Long Tau River in the Saigon Delta Rung sat Special Zone.

LT Delanoy was awarded the Bronze Star Medal last April for the clearance of SS Baton Rouge victory. The recent award of the Navy Commendation Medal was for service as Assistant Officer in Charge of Salvage under the Pacific Fleet Salvage Officer, CDR E.B. Mitchell, in the clearance of the shattered giant dredge JAMAICA BAY at Dong Tam in the MeKong Delta following its sinking by Viet Cong swimmers.

Table 1

BENDS DURING DECOMPRESSION

Case	Depth	Total Bottom Time(min)	Descent Time(Min)	Gas He/O2	Partial Pressure Table	* -,=,+	Symptoms	Treatment Table	Depth At Which Symptoms Occurred
1	257'	39	8	83/17	250/40	-	Pain only	3	1st during surface interval for surface decompression-not reported-relieved at 40' 2nd while surfacing from last stop
2	280'	17	3	80/20	280/20	+	Pain only	Surface Decompression 3	1st-at 40' chamber stop-relief by surface decompression 2nd-6 min. after surfacing
3	352'	17	8	85/15	350/30	+	Pain & Numbness Arm	Surface Decompression 1A	1st 40' water stop relieved. In chamber at 40' 2nd-1:55 after surface decompression
4	306'	27	6	84/16	300/30	=	Pain only	3	During surface interval for Surface Decompression
5	300'	47	10	82/18	290/60	+	Pain only	3 Modified	During last 5 Min. of surface Decompression
6	275'	28	5	82/18	270/30	+	Pain only	3	15' During ascent from surface Decompression
7	230'	36	3	84/16	220/40	-	Pain only	Completion of Surface Decompression	During surface interval for Surface decompression

* The symbols -, =, and + indicate that the decompression schedules used were less than, the same as, or in excess of the schedules which one would select from the Diving Manual purely on the basis of depth, bottom time, and gas mixture reported in the NAVMED 816.

Table 2

BENDS AFTER DECOMPRESSION

	Depth	Total Bottom Time(Min)	Descent Time(Min)	Gas He/O2	Partial Pressure Table	* -,=,+	Symptoms	Table Treatment
8	210'	8.5	2	83/17	220/10	+	Pain & Numbness	3
9	280'	22	16	83/17	280/30	+	Pain only	2
10	193'	20	3	75/25	180/20	=	Pain only	2
11	320'	10	- -	83/17	310/10	=	Pain only	2
12	105'	9	- -	78/22	120/10	=	Pain only	2
13	295'	29	4	82/18	300/30	+	Pain only	2
14	255'	29	4	82/18	260/40	+	Pain only	2
15	327'	28	6	84/16	310/30	=	Pain only	2
16	214'	10	4	83/17	210/10	=	Pain, Numbness and recurrence	2 then 3
17	280'	25	7	81/19	270/30	+	Pain only	1
18	300'	24	3	83/17	290/30	-	Pain only	2

* Same as footnote to table 1

DIVING CASUALTY REPORT

NAVXDIVINGU has 32 reports (NAVMED 816) of decompression sickness and diving accidents involving Navy divers, using deep-sea helium gear, in open seas operations. The period covered is from 1956 to August 1967. This number is less than the actual total number of accidents in the above category, but probably is not off by much.

We can subdivide these accidents as follows:

Decompression sickness (Bends)	18
Omitted decompression, including blow-up	4
Oxygen toxicity	8
Carbon dioxide build-up	1
Ear squeeze	1
	32

DECOMPRESSION SICKNESS

The bends cases are listed in tables 1 and 2. As indicated in table 3, bottom times equal to or greater than 20 minutes were associated with twice as many bends incidents as were bottom times of less than 20 minutes. We see the same proportion, roughly, in both sub-groups (Bends during, and bends after decompression). 71% (5/7) of the bends occurring during decompression, and 91% (10/11) of the bends occurring after decompression involved schedules which, according to the Diving Manual, should have been at least adequate for the given dive. Only three of the cases reported above involved symptoms other than pain only.

Table 3

	Total Bottom Time less Than 20 Minutes.	Total Bottom Time Equal to or greater than 20 Minutes	-	=	+
Bends during decompression	2	5	2	1	4
Bends after decompression	4	7	1	5	5
TOTAL	6	12	3	6	9

One can speculate that early treatment may be responsible in part for the absence of more serious symptoms. More meaningful evaluation of the data above requires additional information such as:

The total number of open sea HeO2 dives done on the various partial pressure tables, and the number of dives involving bottom times less than and greater than 20 minutes.

The extent to which, in Navy diving operations, the decompression schedules are "padded" by using the next greater partial pressure table and/or the next greater bottom time.

OMITTED DECOMPRESSION

Prior to August 1967 we have record of 4 cases of omitted decompression (including blow-up) (table 4). Both deaths involved complete omission of decompression, bottom times of 26 minutes (case 1) and 23 minutes (case 2), and depths of 262' and 246' respectively. The two other accidents differ significantly from those resulting in death. Case 3 reached a depth of only 93', and blew up almost immediately after reaching 93' (2 minutes after leaving the surface). Case 4 had completed 57 minutes of decompression, including 12 minutes at the 80 foot stop.

Table 4

BLOW-UP OR OMITTED DECOMPRESSION

Depth	Descent Time	Total Bottom Time	Gas Mix = He/O2	Description of Omission of Decompression	Treatment and Result	Diver & Date
262'	4	26	82/18	Lost communication at 200' brought to surface at 25'-35'/min. Lost consciousness on surface.	Table 4-no significant improvement. Died while being decompressed per table 4.	19 14 Dec. '54
314'	5	41	83/17	11 minutes actually at 314'-most of remaining 30 min. at 240'. Equipment problem-loss of consciousness after 12 min. at 80'. Had completed 57 min. of decompression, and missed 166 min. more when brought to surface unconsious.	Table 3-recovered consciousness at 165'. No residual defects.	20 9 Sept. '65
93'	2	2	79/21	Blew-up when he reached bottom. Slight dizziness on entering chamber.	Short oxygen table 5 Immediate relief of symptoms.	21 13 Oct '66
246'	5	23	83/17	Blow-up. Unconscious on surfacing	Table 3-Regained consciousness 1 min. after reaching 165'. Normal neurological. Bloody sputum. Loss of peripheral sensation at 100' stop. Table 4-relief again. 60' stop-gasping respiration, coma. 165'-Conscious again, but with left hemiparesis. Died after 1:25 at 165'.	22 7 Feb. '67

THE NEW ERA

The Navy has embarked on a new era of Deep Sea Diving. Preceded by the Navy Leased Advanced Diving System IV, the Navy has proceeded to develop, construct and test a new system to be certified for use by the Fleet. This system, called the Deep Diving System MK I, had been conceived as a means to place divers to depths of 850 feet for extensive periods of time.

This was brought about by the need for a deep diving system capable of providing dives with a safe working environment to the maximum depths of the Continental Shelf of all the oceans. As a result of these needs, the U.S. Navy specified that design and construction of new Auxiliary Tug Salvage (ATS) ships include a capability to support deep diving systems designed to protect a diver from the hazards created by the environments of the ocean depths. Recent experience in unsaturated and saturated deep diving techniques as practiced by U.S. Navy Experimental Diving Unit has proven that maximum control of hazards can be obtained by providing the diver with submersible and surface pressure chambers, specially designed breathing equipment, heated suits, constantly controlled and monitored life support system, (I.E., breathing gas mixtures, carbon dioxide and contaminant scrubbers, humidity and temperature control).

The deep diving system developed to meet these requirements has been designated MK I Deep Dive System (DDS). It provides an operational capability of supporting two two-man diving teams alternately diving to a maximum depth of 850 feet with a bottom work period of four hours for each 2-man team. This diving sequence can be repeated as required to complete salvage or rescue operations within the 14 day mission time plus required decompression time.

A second concept, similar to the MK I system, has also been developed and is under construction by the U.S. Navy. This is designated the MK II Deep Dive System. It is capable of supporting two four-man diving teams. It's capability is greatly extended for saturation diving techniques for use with the SEALAB program. Operational procedures are similar under varied conditions. Training of divers and operators on one system may allow them to operate and work with the other system with a minimum of additional familiarization.

The introduction of these systems into the U.S. Navy and the Fleet expands the capabilities for salvage and rescue operations all over the world. It is a capability that has been greatly needed.

A comparison of these two systems, ADS IV, MK I (DDS), are presented herein.

DEEP DIVING SYSTEMS:	ADS IV	MARK I
A. Personnel Transfer Capsule		
1. Internal Diameter	64 in.	78 in.
2. External Diameter	72 in.	79 in.
3. Weight	6,000#	8,640#
4. Height	7 ft.	11 ft. 7 in.
5. Shell Thickness	1/2 in.	5/8-3/4 in.
6. Buoyancy	Positive w/ballast released	Positive w/anchor removed
7. Code certification	ASME & California Navy Certificate to 300 ft.	Navy certificate
8. Communication	TV & Landline	TV & Landline
9. Crew	2 divers	2 divers & 1 operator
10. Life Support System	Breathing Mixture from surface & make-up on vehicle	(same as ADS IV)
11. Electric Power	Surface supplied	Surface supplied
12. Maximum Test Operating Depth	Operation Depth 1000 ft. (444psi)	Operation Depth 1275 ft (567psi)
B. Deck Decompression Chamber (DDC)		
1. Main Chamber (2)		
Length (each)	96 in.	146 in.
Width (each)	54 in.	76 in.
Weight (each)	6,000#	10,000# approx.
Configuration	Cylindrical	Cylindrical
2. Entrance Lock (1)		
Inner Diameter	64 in.	66 in.
Weight	5,000#	5,000# approx.
Configuration	Spherical	Spherical
3. Chamber Operating Pressures	1 to 444psi	1 to 444psi
4. Test Depth	548psi	666psi
C. Mission or Operational Capability		
1. Number of diver teams	2 two-man	2 two-man
2. Maximum duration	4 hrs each team	4 hrs each team
3. Mission Maximum	14 days plus decompression time	14 days plus decompression time
4. Maximum Depth	600 ft.	850 ft.

Diving schedules and decompression tables for use at varied depths are being developed at the U.S. Navy Experimental Diving Unit for use with these systems. The ability to have divers capable of withstanding hazards of depths is predicated upon approved and tested decompression tables. The combination of decompression tables and Deep Dive Systems assures continued successful deployment to the Fleet.

OLD MASTERS QUIZ

(Answers)

1. Oxidizes the molten metal.
2. Melting
3. 20%
4. Straight polarity
5. 1/16 inch
6. Fillet
7. 300 amps.
8. Blows the water away from the flame
9. 3/16 inch
10. 90 degrees

VIETNAM CASUALTY HONORARY DIVER

On 16 Nov 1967 DSDS responded to a request for assistance from National Naval Medical Center, Bethesda in the therapy of PFC L.J. HANEY, USMC, who is a Vietnam conflict casualty. The patient was given hyperbaric oxygenation six times on table 5 in a forty-four hour period. The first three treatments were administered in the first 8 hours followed by two other treatments in the next 8 hours. The last treatment was completed 44 hours after the first treatment. The results were gratifying in that a pedicle full thickness skin graft was saved, thereby avoiding adding 6 to 9 months to the overall reconstruction time of Haney's primary injury.

Such treatment is within the capability of any diving ship or activity possessing a recompression chamber. It is well within the realm of possibility that your ship or activity may be called upon for assistance of this sort.

HCU-1 COMMENDED

The Secretary of the Navy
takes pleasure in commending

HARBOR CLEARANCE UNIT ONE

for service as set forth in the following

CITATION:

For exceptionally meritorious service from 24 February 1966 to 15 March 1967 during combat salvage operations in support of military operations in the Republic of Vietnam. During this period, Harbor Clearance Unit ONE executed over twenty-four hazardous diving and salvage operations, resulting in major contributions to United States efforts in Vietnam. In the face of hostile fire and major obstacles, including heavy seas, strong tidal currents and zero visibility environments during diving operations, unit personnel expeditiously and efficiently accomplished salvage; harbor and river clearance of damaged vessels of all sizes; underwater tasks of all types, including searches for suspected limpet mines; and recovery of aircraft wreckage and enemy ordnance. The outstanding professional competence, ingenuity and personal efforts of the officers and men of Harbor Clearance Unit ONE were in keeping with the highest traditions of the United States Naval Service.

All personnel attached to and serving with Harbor Clearance Unit ONE during the period designated above, or any part thereof, are hereby authorized to wear the Navy Unit Commendation Ribbon.

Signed, PAUL H. NITZE
Secretary of the Navy

CANOPUS REPORTS

USS Canopus (AS34) has been authorized to conduct a second class divers school on board. They report that due to the work load the diving locker turns to 7 days a week on under water repairs and inspections. Being able to train second class divers should help alleviate the shortage of divers in the Rota area. The following divers are on board.

LT E. WHITAKER, Diving Officer
SFC(DV) R.A. DRISCOLL, Master
BMC(DV) R.G. CASART, First Class
DC1(DV) P.E. PUNYKE, First Class
EN1(DV) S.J. VIDRINE, First Class
HMC(DV) J.C. EDGERTON, Med. Tech.
SFC(DV) F.L. GRIFFIN, Second Class
BM1(DV) G.R. HOLMQUIST, Second Class
EN2(DV) H.R. PIERCE, Second Class
SFP2(DV) J.V. KOEPKE, Second Class

GPO 934-170