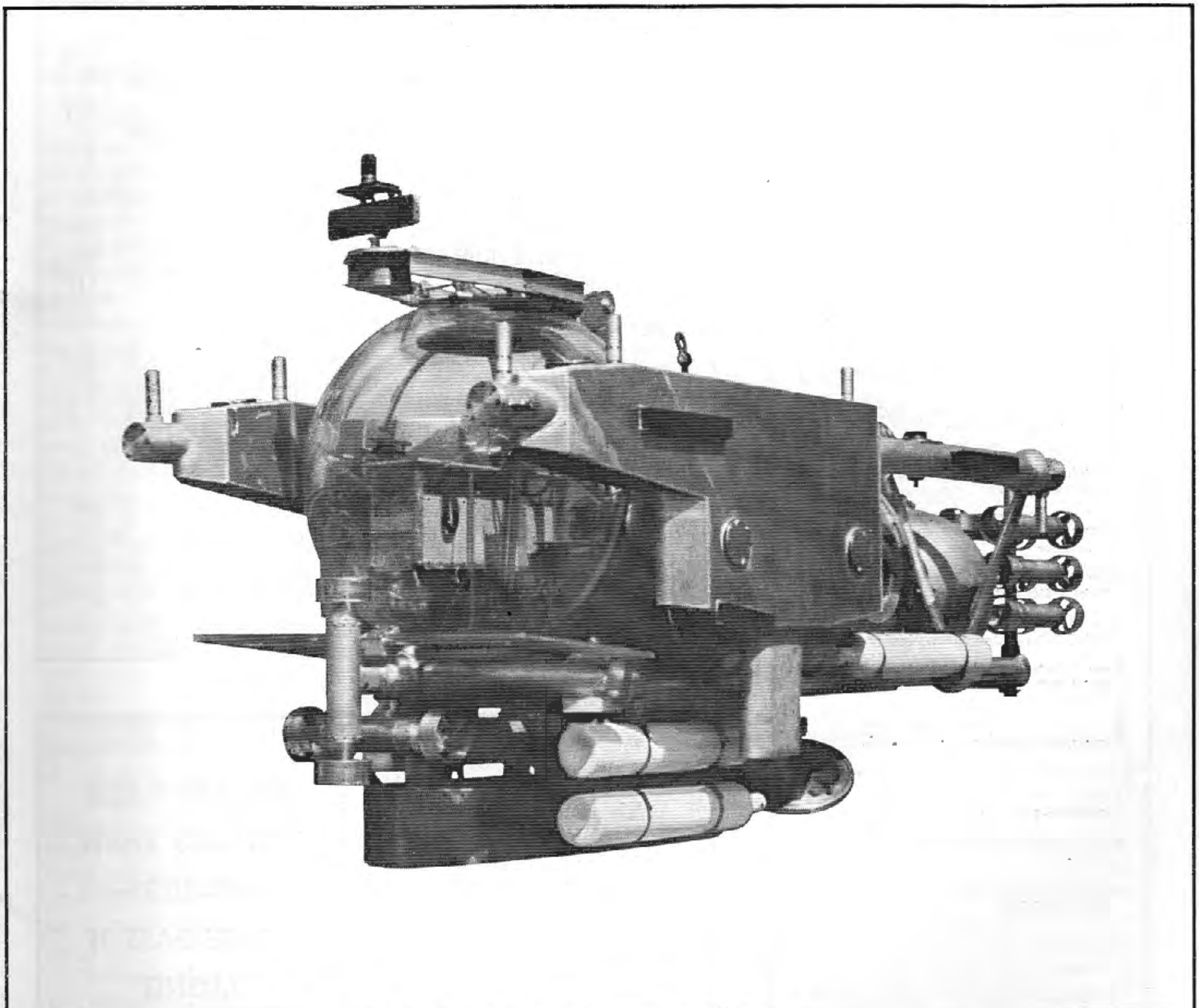
PROCEEDINGS
OF THE MARINE SAFETY COUNCIL



DEPARTMENT OF TRANSPORTATION UNITED STATES COAST GUARD

Vol. 32, No. 7 CG–129 July 1975

PROCEEDINGS

OF THE MARINE SAFETY COUNCIL

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FRONT COVER

The *Johnson Sea Link* is a submersible capable of prolonged underwater operations. Incorporating both neutral buoyancy and lock-out capabilities the *Sea Link* is adaptable to a variety of scientific duties.

BACK COVER

The lengthened steamer *Callaway* awaits unloaders at U.S. Steel's Gary Works. The enlarged *Callaway* will be able to transport larger tonnage of iron ore from the mines in Minnesota to the mills in Illinois, Indiana, Ohio and Pennsylvania.

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maritime sidelights

THREE DEAD

In September 1974 a crewboat underway in the Gulf of Mexico observed a shrimp boat drifting with its outriggers down. Thinking that the shrimper was in distress, the master slowed his vessel and circled the silent boat twice. When they received no response from the shrimp boat, a crewmember boarded the vessel to investigate.

He went directly to the shrimp hold and through an open hatch observed three dead bodies. The man tried to enter the wheelhouse and accommodation spaces but he couldn't get the door open. After the crewmember returned to his vessel, the master reported the situation to the Coast Guard and took the shrimp boat in tow for Port Aransas, Tex. A Coast Guard patrol boat escorted the vessels to port, eventually taking over the tow after the crewboat's towline parted.

Investigators at Port Aransas noted the following information about the shrimp boat:

The main engine was in operation but out of gear. The auxiliary generator was in operation. The running lights and deck lights were on. The starboard trawl was on board; the port trawl was entangled in the propeller. The refrigeration unit for the shrimp hold was not in operation; low pressure in the system had triggered the automatic cutoff switch. The sight glass showed no refrigerant in the system. The only access to the hold was through an 18" by 18" hatch, which was open.

Further examination of the circumstances surrounding the casualty led the investigators to the culprit: a leaking refrigeration unit which cooled the shrimp boat's hold. The system held 15 pounds of refrigerant which, though it is nontoxic, displaces oxygen. The refrigeration system service manual cautions, "Never allow refrigerant to escape into the hold. Excessive refrigerant could cause suffocation in a closed hold."

Tests of the unit following the tragedy revealed refrigerant leaking at 13 separate points in the system. Furthermore, it was discovered that the owner of the vessel was continually troubled by refrigerant leaks. Extra bottles of refrigerant were routinely carried to supplant the quickly used supply, and the last entry in the vessel's logbook noted, "——— freezer out one more time."

After finding no evidence of violence or trauma on the bodies, the coroner concluded that the cause of the deaths was asphyxiation. The three persons suffocated as the oxygen in the hold was displaced by the leaking refrigerant. Remember: faulty equipment can be more than just a nuisance. It can also be a killer.

SHIPS' STORES

Three persons were injured recently while handling an oil emulsifier on a naval vessel. The emulsifier had been openly purchased by a shore facility and then issued to the ship. One injury involved oral intake of approximately 1 cubic centimeter, while the other two involved skin contact.

Although the container label warned that contact with the material was harmful, it failed to fully identify the manufacturer, the harmful component, and the antidote or treatment to be given in case of contact. Consequently, much valuable time was lost before this information could be obtained. Although no one was seriously injured in this instance, the lack of immediate treatment information can turn minor injuries into major disasters.

The Coast Guard's ships' stores program is designed to eliminate the problem of incomplete labeling on hazardous materials intended for shipboard use. Under this program, manufacturers or vendors of any hazardous materials (as defined in 46 CFR 146) must have their product approved by the Coast Guard before it may be used or stored on board vessels subject to 46 CFR 146.

One of the criteria for obtaining this approval is that all pertinent warnings and first aid instructions must be clearly displayed on the label. Once a product has been approved, it will display a small ships' stores certification insignia on its label.

Although military vessels are not required to comply with the ships' stores program, the personnel injuries outlined above demonstrate the value of compliance. If a hazardous material is going to be used on any military vessel, every effort should be made to obtain a certified product.

FIREFIGHTING TRAINING

Of the many excellent training programs open to merchant marine personnel, one of the newest is a firefighting course offered by the Merchant Marine School of the Seamen's Church Institute of New York. The course is offered weekly and runs three full days. Two days are spent at the Institute in intensive classroom instruction. On the final day the students are scheduled by the Maritime Administration to attend the Military Sealift Command Firefighting School at Earle, N.J., where a variety of simulated shipboard fires are extinguished by the students.

The course is open to all U.S. licensed and unlicensed marine personnel and is intended to train and refresh seamen in effective shipboard firefighting. For additional information and registration, call 212–269–2710 or write Merchant Marine School, 15 State Street, New York, N.Y. 10004.

(Continued on page 109)

THIRTY HOUR RESCUE EFFORT
SAVES TWO IN SEA LINK INCIDENT

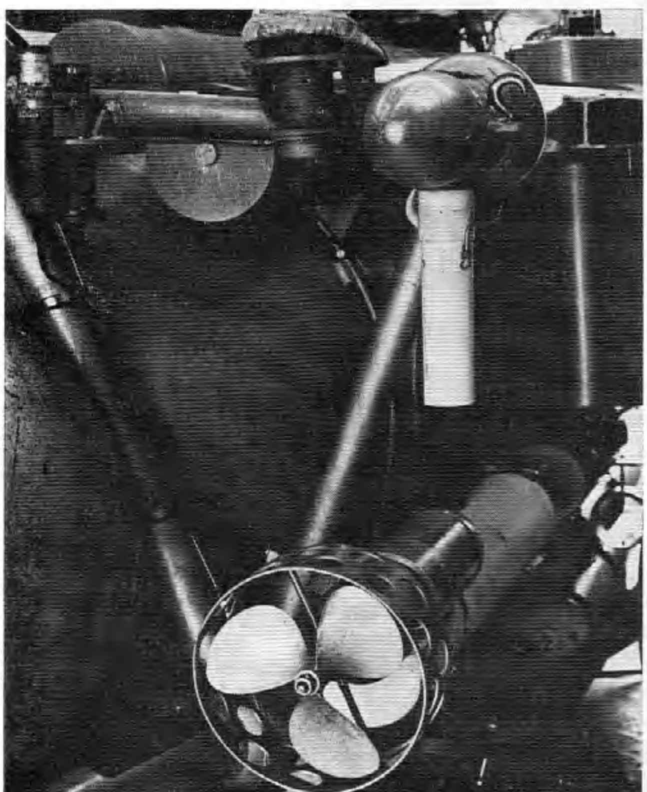
On the morning of 17 June 1973, the submersible *Johnson Sea Link* began operations in the immediate vicinity of the scuttled destroyer USS *Fred T. Berry*. The wreckage of the destroyer is located on American Shoals near Key West, Fla. While attempting to retrieve a fish trap, the submersible became entangled in the wreck. Before the submersible was recovered at 1653 on June 18, two people died of carbon dioxide poisoning.

The *Johnson Sea Link* is a submersible which functions as an observation vehicle and collecting platform. The *Sea Link* has a neutral buoyancy capability which allows the vessel to hang suspended in an area of high scientific interest. It also has relatively large power and life support capacities which allow it to spend many hours submerged. A variety of life support gas systems provide the submersible with a lock-out capability that is utilized in conducting scientific sea floor collections and experiments at depths of up to 1,000 feet.

The submersible defies comparison with any conventional ship. Its modular construction lacks the symmetry normally found in surface and subsurface vessels. The vehicle can best be described as an ill defined network consisting of an aluminum framework, to which various shapes, containers, and appendages have been attached. For a more detailed description of the *Sea Link* and its surface tender, the *Sea Diver*, consult the box on page 101.

The surface weather conditions at the time of the casualty were excellent. The seas were calm with little or no wind. These conditions prevailed throughout the rescue operation. Water temperatures ranged from approximately 80°F at the surface to 50°F at the 350-foot depth. The surface current was estimated to be 2 knots. Estimates of the subsurface current varied from 2½ knots at a depth of approximately 280 feet to four-tenths of a knot tidal influence at the bottom.

On 16 June 1973, the *Sea Link* positioned a fish trap near the sunken USS *Fred T. Berry* (DD–858). The *Berry* is a scuttled former United States Naval destroyer approximately 390 feet long and 40 feet wide. The vessel is lying on its port side in 350 feet of water with its decks inclined slightly from the vertical and its bow inclined up from the horizontal. This



Immediately above the starboard propeller shroud is a steel hook, which is used to restrain guide lines. This hook displayed evidence of chafing and scoring. The spring-loaded mousing device was also wrenched from its normally closed position.

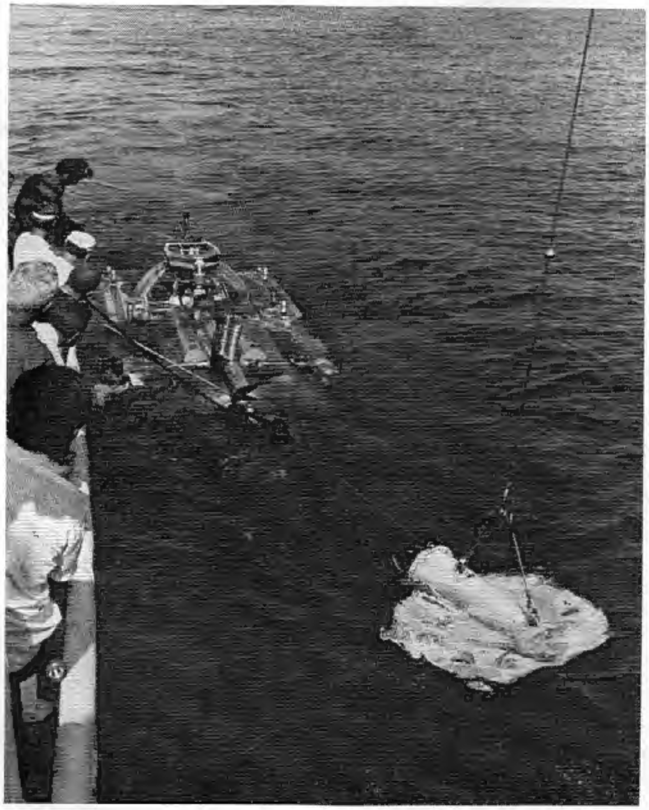
attitude brings the stern of the vessel near the bottom and slightly inclines any masts on the hull away from the bottom. The *Berry* is oriented in a generally southwest-northeast direction with the bow slightly south of west. There were no radar or whip antennas affixed to the hull at the time of scuttling. There was no foremast on the vessel and the permanent aftermast was a derrick-shaped platform with three different levels of walkways on the platform.

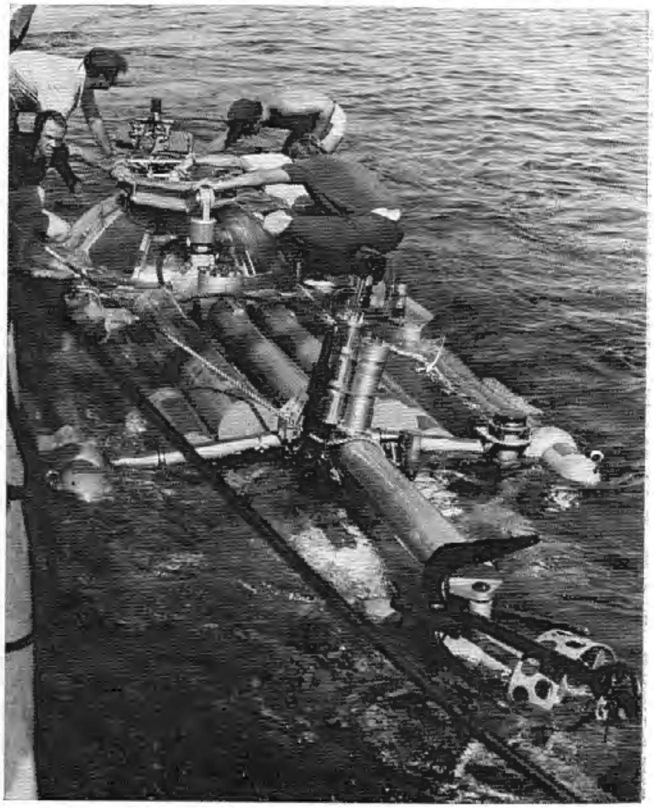
At approximately 0836 EDT on 17 June the *Sea Link* began its descent. The pilot, a veteran of approximately 100 dives, and a scientific observer were in the pilot's sphere. Two research observers, described as experienced divers, were in the diver's compartment. Nine minutes later (0845 EDT) the submersible was at a depth of 340 feet. The pilot secured the submersible's engines to estimate current conditions based on the submersible's drift. After estimating the current to be about four-tenths of a knot and reporting the visibility to be poor, the pilot continued on toward the wreck. At 0904 EDT the *Sea Link* sighted the *Berry's* anchor chain and shortly thereafter passed over the scuttled destroyer.

The submersible settled to the ocean floor approximately 40 feet from the fish trap. At the 0935 EDT position, the pilot placed the *Sea Link* generally south of both the trap and the *Berry*, and trimmed the submersible to eliminate the danger of floating upward under the scuttled hull. Utilizing side motors, after motors, and both bow thrusters the pilot began his approach to the fish trap. During this approach an odor of something burning began to pervade the pilot sphere. All electrical circuits were opened and then closed individually, but no odor or defects were detected.

Continuing in a northerly direction the pilot attempted to pick up the trap with the submersible's retrieving lance. The pilot accurately maneuvered the lance around the fish trap retrieving line, but the operation was unsuccessful because the mousing device failed to restrain the line. The pilot made two more unsuccessful attempts before he aborted the mission. During his third attempt he permitted the *Sea Link*'s bow to fall off five to ten degrees to port, which caused an equal swing of the submersible's stern to starboard or toward the *Berry*'s stern. Shortly after 0945 the pilot began backing the *Sea Link* away from the fish trap until the submersible abruptly stopped with a jerk.

Various manuevers failed to extricate the *Sea Link* from a steel cable which passed up over the strongback (uppermost member of the hull framework) and disappeared from sight. Slack in the cable enabled the





The *Sea Link* is brought to the surface still connected to the T.V. camera and maneuverable platform which guided the grapnel to the stranded submersible and its four occupants.

Sea Link to move approximately 20 feet and rotate through approximately 270° of arc.

The four occupants of the submersible began to assess their situation and the available options. Communications between the two compartments was by the use of an intercommunication system which permitted the diver's compartment to transmit or receive over the same loudspeaker without any switch changes. The occupants of the pilot's sphere had to switch from the listen mode to the talk mode to initiate any communication. This arrangement provided constant audio monitoring of the diver's compartment except during a pilot's sphere transmission. A sound-powered backup system was available, but the monitoring capability was in effect during the entire 30 hours of Dive 130.

Attempts to free the *Sea Link* by use of its own propulsion motors were abandoned after the crew became concerned that they might become further entangled. At 0953 EDT the surface support vessel was notified that the submersible was entangled. The U.S. Coast Guard Base, Key West, Fla. was alerted by radio that a submarine was entangled in 360 feet of water and desired Navy divers. This radio exchange indicated that the submersible was apparently in "no immediate danger."

The advisability of "locking out" the two occupants of the *Sea Link* diver's compartment was considered jointly by the submersible personnel and support personnel on the *Sea Diver*. An initial proposal, that one man would depart the diver's compartment in an attempt to free the cable, was abandoned because of the potential danger of oxygen toxicity to the compartment occupants. The lock-out evolution would also have limited the bottom time available to the stranded men.

Shortly after the "no lock-out" decision, the submersible experienced a CO_2 build up in the pilot's sphere. The pilot checked the CO_2 scrubber and discovered the unit's only remaining fan motor inoperative. He emptied the Baralyme from the scrubber canister into his shirt, and by holding the Baralyme-laden shirt in front of the air conditioning unit was able to take advantage of the circulating fans. The combination of these fans and the Baralyme caused the CO_2 level to go down. A spare canister was propped up in front of the air conditioning unit to utilize the circulating unit as an installed scrubber. The Baralyme was removed from the shirt and placed in its original canister.

As all principals at the site awaited the arrival of rescue forces, calculations of the submersible's capacity to maintain the CO_2 level within acceptable limits were completed. Calculations based on 70° indicated that an acceptable atmosphere could be maintained for 42 hours in the pilot's sphere and 61 hours in the diver's compartment. These calculations were later revised when it became apparent that the low temperature in the diving compartment was exerting a deleterious influence on the Baralyme.

At approximately noon a small boat from the surface support vessel attempted to get a buoy line down to the *Sea Link*. The line was intended to be a down haul, or descending line, that could be used in bringing Navy divers directly to the submersible. The effort was unsuccessful because the new buoy line became fouled in an existing line, which served as a marking device for the wreck. As the *Sea Diver* made all efforts to assist in the rescue, the Naval Command in Key West requested assistance from U.S. Navy Submarine Development Group One, San Diego, Calif. A diving bell, with necessary support personnel and equipment, was prepared for air delivery to Key West. Shortly before this specialized submarine rescue equipment departed California, the USS *Tringa*, a surface support vessel equipped with hard hat divers, arrived on the scene.

The *Tringa*, upon determining the submersible's approximate location, attempted to effect a four point moor over it. Efforts by surface support, rescue personnel, and the crew of the *Sea Link* to fix the exact position of the submersible were unsuccessful. The *Tringa* lowered lights from the surface so that the crew of the *Sea Link* could determine the position of the surface vessel. The crew of the submersible also blinked their lights to enable the surface crews to determine the position of the *Sea Link*. These two efforts provided a marginal target for rescue dives. During this maneuvering and location process, the Baralyme in the diver compartment became less effective because of the reduced temperature. The temperature of the aluminum diving compartment was near the temperature of the surrounding water, and although the exact temperatures were not obtained, they were reported to be as low as 45° F.

At 2200 EDT the occupants of the diver's compartment reported that the CO_2 absorbent capability of the Baralyme was exhausted. The diver's compartment was now reporting an unexplainable absolute pressure of approximately two atmospheres. At 2225, EDT, the occupants of this compartment shifted to air supplied masks as their sole source of breathing gas. At 2245 EDT a two-man hard hat diving team from the *Tringa* began a descent to the submersible, which by this time was reporting a diver's compartment absolute pressure of approximately three atmospheres. The chamber's air pressure continued to build until it reached an 80-foot depth level. At 2311 the breathing gas supply was changed to a helium-oxygen mixture.

The divers from the *Tringa* reached a depth of approximately 316 feet, where their progress was impeded by the *Berry*'s superstructure. They reported that the *Sea Link* was stuck under the wreckage of the *Berry*, or her mast, and that their descent was stopped by a radar re-

The *Sea Link's* unconventional configuration of assorted appendages was found to be a factor leading to the entanglement.

flector approximately 25 feet in diameter. The divers described the *Sea Link* as being fouled with its beam on a metal whip antenna. They also reported that there were numerous hoses lying over the side of the wreck. Although they did not quantify their evaluation of the water temperature, they emphasized that it was "very cold".

Failing in their attempt to avoid the *Berry*'s superstructure the two *Tringa* divers began their ascent. At this time a lock out of the two men in the diver's compartment was again considered. The men in the after chamber reasserted their desire not to lock out and this decision was agreed to by both the submersible's pilot and personnel on board the surface support vessel. As the *Tringa* divers continued their ascent the rescue vessel began repositioning to provide its divers clear access to the *Sea Link*. The pressure in the diver's compartment continued to build up as the *Tringa* began its preparation to send divers down again. At 0000 EDT on 18 June the diver's compartment was reporting an absolute pressure of approximately ten atmospheres.

At 0015 EDT the bottom hatch of the diver's compartment opened as the compartment had now reached a pressure of approximately twelve atmospheres. A lock out of one of the divers was again considered at 0038. However, by this time both men were too cold to attempt such an operation. In addition to the exposure of their surrounding environment they were also being subjected to a rapid body heat loss precipitated by the helium exhalation. The *Tringa* was attempting to locate directly above the *Berry* by maneuvering southward in response to the submersible's directions. The pilot was relaying instructions to the *Tringa* based on his observation of lights lowered by the surface vessel.

The pilot reported to the surface at 0112 EDT, that the men in the after compartment were suffering convulsions. The men in the pilot's sphere were unable to confirm this conclusion because no audio exchange had taken place after 0030 EDT, nor was any later communication ever established.

The *Tringa* divers began their second descent at 0135 EDT, and reported themselves to be at bottom depth about 8 minutes later. Since the divers were at bottom depth and their lights were not visible, the pilot concluded that the divers were to the north of the *Berry*. The pilot requested that the *Tringa* diver's stage be raised and deposited to the south of the *Berry*, providing the divers a reasonable chance of reaching the entangled submersible. Efforts by the *Tringa* divers to penetrate the *Berry's* superstructure and the cable array extending from the scuttled vessel were unsuccessful. While hard hat divers attempted to reach the *Sea Link*, the diving bell with its support personnel arrived on board the *Tringa* at 0245 EDT, 18 June.

The bell was lowered from the *Tringa* at 0605 EDT, carrying two divers. The bell descended to 282 feet, and one of the divers left the compartment. The diver encountered a strong current and was unable to continue his descent. The buffeting received by the diver caused him to become fouled in his own gear for nearly 15 minutes. When the diver freed himself, he returned to the bell whereupon it was raised to the surface at 0920 EDT.

It was calculated that the next slack tide would occur at approximately 1200 EDT, 18 June. Plans to lower the bell between 1100 EDT and 1200 EDT the same day were formulated. After the two divers had disembarked the bell it was again lowered with a light attached so that the *Sea Link* could provide positioning instructions to the surface. The downward travel of the bell ceased at about 0951 EDT, when it reached a depth of 300 feet. Influence exerted on the bell by either the current or the *Berry* prevented the *Tringa* from raising or lowering the rescue unit.

The submersible *Perry Cubmarine* (P.C. 8), which had been transported out to the site earlier the same day by the U.S.S. *Amberjack* (SS 525), was launched at 1240 EDT to make an exploratory search of the bottom in the general vicinity of the *Sea Link*. An inoperative sonar on the P.C. 8 reduced its effectiveness and it returned to the surface 1½ hours later. Shortly before the P.C. 8 surfaced the ordnance recovery vessel MV *A. B. Wood II* (O.N. 501922) arrived at the site. On board the salvage vessel was an underwater television camera which could be maneuvered under water by personnel on the surface. Simultaneously with the *Wood's* arrival the occupants in the forward compartment of the *Sea Link* began breathing air from the life support high pressure air system of the submersible. This shift was necessary because the Baralyme in the compartment could not absorb any additional CO_2.

The underwater TV camera and its platform were launched shortly after 1500 EDT on 18 June. The camera descended to a depth where it not only was in sight of the *Sea Link,* but also was providing surface personnel with a view of the entangled submersible. The TV camera and maneuvering platform were raised about 20 minutes later to attach a four-prong grapnel. The grapnel was attached to the TV camera with a 10-foot length of steel cable and the entire apparatus was lowered to the *Sea Link*. The submersible reported at 1641 EDT, that one tine of the suspended grapnel had engaged the *Sea Link*. Twelve minutes later the *Sea Link* was brought to the surface still attached to the TV camera and its maneuverable platform. The grapnel had engaged the submersible's strongback at its juncture with the support column for the three ahead/astern propulsion motors.

At the time the *Sea Link* surfaced the pilot's sphere was at an absolute pressure of approximately two atmospheres and the diver's compartment was at twelve atmospheres. The pilot and observer were transferred to the *Tringa*'s decompression chamber where their decompression was started at 1715 EDT. The *Sea Link* was towed to the surface support vessel and hoisted on board. The surface support vessel then went alongside the *Tringa* to utilize the facilities of the rescue ship. A helium and oxygen mixture, of very low oxygen concentration, was used to force ventilate the diver's compartment. As it was ventilated, hot water was sprayed over the aluminum compartment to raise the internal temperature. Although the two occupants were visible through the compartment's view ports there was no evidence of vital signs.

A period of 14 hours had elapsed with no signs of life in the diver's compartment. Doctors in attendance concluded that both men in the compartment were dead and therefore the ventilation and hot water spray operations were secured. At 1000 EDT, 19 June, depressurization of the *Sea Link* was commenced with a one atmosphere pressure programmed for 2100 EDT the same day.

The *Sea Link* arrived in its home port of Fort Pierce, Fla., on 28 June. During the course of a hull examination, certain sections of the *Sea Link* displayed evidence of cable scraping. In the general area where the cable was observed to pass up over the stern of the *Sea Link* were a number of structural members that contained scratches and serrations inconsistent with the remainder of its surface. The forward edge of the propeller shroud on the starboard fixed propulsion motor contained deep scratches resembling file marks. Above these abrasions were similar scratches on the plastic cover of a pneumatic valve.

Immediately above this plastic cover is an aluminum pad that is welded to a support member of the starboard surface buoyancy tank. Bolted through a hole in this pad is a steel hook which is used to attach guide lines during retrieval of the submersible but is not used as a lifting hook. The hook is approximately 1½ inches in diameter and 5 inches long with a 2-inch opening. The opening is guarded by a spring-loaded mousing device. Both the pad and the hook displayed evidence of chafing by a hard object capable of producing a serrated effect. In addition to the scoring of the hook, the spring-loaded mousing device was wrenched from its normally closed position.

The Marine Board of Investigation concluded that the primary cause of the *Johnson Sea Link* entanglement in or near the wreckage of the sunken USS *Fred T. Berry* was a result of the submersible pilot's failure to ensure that the intended maneuvering area of the *Johnson Sea Link* was free from obstruction. It was also concluded that a contributing factor to the entanglement was the vessel's hull shape. The submersible's modular construction of irregular shapes, projections, and appendages provided an excellent configuration for being snared by almost any type of obstruction. Shielding or faired guards over as many of these appurtenances as possible, or relocation thereof, would materially reduce the possibility of a similar casualty.

The Board also concluded that the pilot and the occupants of the diver's compartment did not display sufficient care in their preparations for the dive, considering the inherent hazards of their operation. The pilot's reliance on his senses in lieu of a standard measuring device to detect an unsafe buildup of CO_2 in the pilot's sphere is inconsistent with the known effects of CO_2 on a person's faculties.

The Board determined that the source of the *Sea Link*'s entanglement was located at, or very close to, the aftermost reference marker flag pole which was identified as the *Berry*'s aftermast. The cable which was observed passing over the after end of the *Sea Link* most probably was restrained by the starboard side motor propeller shroud and the retrieval guide hook located above the motor.

The Marine Board of Investigation further concluded that the lives of the two decedents might have been saved if the *Sea Link* diver's compartment contained some means of elevating the ambient temperature of the Baralyme. The Board finally concluded that the lives of the two decedents might have been saved if the TV camera and its manueuverable platform had arrived at the diving site on 17 June or if a similar air-deliverable unit, dedicated to search and rescue, had been dispatched to the site at first notice. The ease and rapidity of the rescue contrasts sharply with the difficulties and dangerous conditions encountered by the divers.

Among the recommendations of the Marine Board of Investigation were the following:

1. That the Coast Guard actively seek legislation to regulate the construction and operation of submersibles. Included within these regulations, but not limited thereto, should be the following requirements:

a. A report of the scope and geographic area of intended submersible operations shall be made to the Coast Guard.

b. A life support capability of specified duration.

c. A device on the submersible capable of providing rescue forces with the means of accurately fixing its position.

d. A device on the submersible capable of providing rescue forces with the means of engaging its hull.

2. That, the Coast Guard consider the acquisition, and subsequent dedication to search and rescue, of an air-deliverable TV unit similar to that which was used to locate the *Sea Link*.

The Commandant's Action concurred with the recommendations of the Marine Board of Investigation. Legislation to authorize regulations is presently under consideration in the Congress. Should legislation be enacted to regulate the construction and operation of submersibles, the Coast Guard would direct its initial efforts toward operational regulations.

Participation in voluntary operations reporting by submersibles has increased since the *Johnson Sea Link* accident. Reporting procedures are under revision to reflect the experience gained in the *Sea Link* case.

The Coast Guard will consider the acquisition of an air-deliverable TV unit similar to that used to locate the *Sea Link*.

The National Transportation Safety Board recommended:

1. The owners of the *Johnson Sea Link* utilize system safety techniques to establish operational guidelines to prevent the entanglement of the *Johnson Sea Link*. These guidelines should be incorporated in the *Johnson Sea Link* operations manual.

2. The U.S. Coast Guard actively collect information concerning worldwide submersible search and rescue capabilities so that the most effective equipment needed for use in future underwater emergencies can expeditiously be made available.

3. The U.S. Coast Guard acquire as soon as possible an underwater television unit capable of being delivered by air and of providing a descending line to a submerged vessel.

4. The U.S. Coast Guard and the U.S. Navy collaborate in a research and development program to develop the capability for civilian submersible rescue operations within the Coast Guard.

NOTE.—*This article is based on the Marine Casualty Report of the incident, comprised of the U.S. Coast Guard Marine Board of Investigation Report and Commandant's Action and the action of the National Transportation Safety Board. Copies of the complete report may be obtained by writing Commandant (G–MVI–3), U.S. Coast Guard, Washington, D.C. 20590.* ⚓

About the Vessels Involved

The *Sea Link* consists of two separate pressure hulls attached to the aluminum frame, providing space for five people. In the foremost section of the network is a transparent sphere five and one half feet in diameter. This compartment is constructed of four-inch thick acrylic and provides space for the submersible's pilot and one other person. This sphere resembles a helicopter "bubble" and provides nearly unrestricted visablity for its occupants. This forward section is provided with a single entrance hatch which is not designed to be opened while the *Sea Link* is submerged. Immediately aft of this sphere is an eight foot long cylindrically shaped aluminum diver's compartment. The aft compartment is approximately five feet in diameter with hemispherical heads welded thereto. The compartment is provided with a view port in the forward end and on both port and starboard sides. The side ports allow persons inside to observe their underwater surroundings, while the forward view port provides some degree of visual contact with the pilot's sphere. Although the divers compartment contains a single hatch, it is provided with two hatch covers (inside and outside) which can be "dogged" or "undogged" independent of one another and thus provide the divers with a capability to "lock-out" of the compartment. The term "lock-out" means that the diver's compartment can be pressurized to the ambient pressure of the surrounding water in order that the divers can exit or enter the compartment without it's flooding.

Navigation of the submersible was accomplished by installed navigational equipment and was supplemented by sonar information provided by a surface support vessel. The *Sea Link* equipment included both a sophisticated computerized navigational system (Doppler Sonar Navigation) and more conventional fathometer and magnetic compass. However, at the time of its entanglement, the vehicle's maneuvering was being controlled mainly by visual observation.

On the morning of 17 June the *Sea Link* was transported from Key West, Fla., to American Shoal preparatory to a dive down to the fish trap at the *Berry*. The submersible was carried on the stern of the *Sea Diver* which contains special handling equipment for launching and retrieving the *Sea Link*. In addition to providing transport to and from a dive site, the *Sea Diver* also serves as a surface tender for the submersible. The surface vessel serves as an operations and communications center for the submersible as well as providing a haven for the subsurface craft in the event of any sudden deterioration of weather. Normal surface communications between the *Sea Diver* and *Sea Link* is an FM transceiver which provides line of sight communications only. Subsurface communication between the submersible and the support vessel is accomplished by an underwater telephone. The equipment can be used for either CW or voice communications. This underwater telephone was the communications mode being utilized during the entire ill-fated dive of the *Sea Link*.

COAST GUARD RULEMAKING
(Status as of 1 June 1975)

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
1972 PUBLIC HEARING							
Tailshaft inspection and drawing (67–71, 4–71)	3–1–72	3–27–72	4–3–72	×			
ANCHORAGE REGULATIONS							
Los Angeles & Long Beach Harbors, CA (CGD 75–022)	2–4–75		3–7–75	×			
BOATING SAFETY							
Lifesaving devices on white water canoes & kayaks (CGD 74–159) comment period extended 4–22–75	2–4–75		5–31–75				
Safe loading and safe powering standards (CGD 73–250)	3–6–75		4–21–75				
Inboard safe loading standard (CGD 74–83)	3–6–75		4–21–75				
BRIDGE REGULATIONS							
Sacramento R; et al., CA (CGD 73–142)	5–24–74		7–2–74	×			
Cheesequake Ck., NJ (CGD 73–162)	8–10–73		9–11–73	×			
AIWW, Mile 342, Lauderdale By The Sea, FL (CGD 74–180)	8–7–74		9–6–74			5–5–75	6–9–75
Stony Ck., MD (CGD 73–242)	10–12–73		11–20–73	×			
San Joaquin River, Georgiana Slough, Sacramento River, CA (CGD 73–142)	5–24–74		7–2–74			4–1–75	5–5–75
AIWW, Hillsboro Inlet, FL (CGD 74–22)	1–25–74		3–1–74	×			
Chesapeake & Del. Canal, Del. (CGD 74–72)	3–29–74		4–30–74			5–5–75	6–2–75
New River, FL (CGD 74–114)	4–22–74		5–20–74				
Chicago River, IL (CGD 74–137)	6–3–74		7–16–74	×			
Bayou Dularge, LA (CGD 74–234)	10–9–74		11–12–74	×			
AIWW, Hallandale, FL (CGD 74–257)	11–5–74		12–5–74	×			
North Miami Beach, FL (CGD 75–013)	1–21–75		2–21–75			5–13–75	6–16–75
Coney Island Creek, NY (CGD 74–300)	1–29–75		3–4–75	×			
Matanzas River, FL (CGD 75–024)	1–29–75		3–4–75	×			
Fox River, WI (CGD 75–035)	2–6–75		3–7–75	×			
Oklawaha River, FL (CGD 75–062)	3–27–75		4–29–75	×			
Mystic River, MA (CGD 75–053)	3–27–75		4–29–75	×			
West Palm Beach Canal, FL (CGD 75–070)	3–27–75		4–29–75	×			
Illinois River, IL (CGD 75–060)	4–1–75		5–6–75	×			
Kent Narrows, MD (CGD 75–081)	4–1–75		5–6–75	×			
Passaic River, NJ (CGD 75–052)	4–4–75		5–6–75	×			
Back Bay of Biloxi, MS (CGD 75–088)	4–30–75		6–10–75				
Lake Okeechobee, FL (CGD 75–076)	4–30–75		5–29–75	×			
Peace River, FL (CGD 75–086)	4–30–75		6–3–75				
Snake R. & Clearwater R., Lewiston ID & Clarkston, WA (CGD 75–099)	4–30–75		6–10–75				
Coosaw R., FL (CGD 75–087)	5–5–75		6–9–75				
Duwamish Waterway, WA (CGD 75–097)	5–13–75		6–30–75				
HAZARDOUS MATERIALS							
Miscellaneous Dangerous Cargoes (CGD 72–182)	11–11–72	12–12–72	12–29–72	×			
Dangerous Cargo Regulations, miscellaneous (CGD 73–249)	1–16–74		3–4–74	×			
Sodium sulfide solution and sulfur dioxide (CGD 73–275)	7–16–74 Corrected 9–5–74		12–5–74	×			
Vinyl chloride (CGD 74–167); supplementary notice 9–19–74	7–23–74	8–15–74	9–6–74			4–16–75	7–16–75
Unmanned barges carrying certain bulk dangerous cargoes (CGD 74–275)	1–15–75		2–28–75			5–20–75	8–18–75
Unslaked lime in bulk (CGD 74–225)	1–29–75	2–25–75	3–17–75	×			

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
MARINE ENVIRONMENT AND SYSTEMS (GENERAL)							
Boundary Lines of Inland Waters (CGD 73–241)	4–8–74 Corrected 5–8–74	....	5–26–74	...	....	4–16–75 Corrected 4–26–75	5–16–75
Pipelines, lights to be displayed (CGD 73–216)	9–19–74 Corrected 10–18–74	10–21–74	11–4–74	×	....	....	....
Oil and hazardous substance liability (CGD 73–185)	12–4–74	....	1–16–75	×	....	....	....
Mooring barges on the Mississippi (CGD 74–185)	2–4–75	2–19–75 New Orleans	3–17–75	×	....	....	....
Security zone, New London Harbor, CT (CGD 74–188)	3–12–75	....	4–14–75	×	....	....	....
Great Lakes radiotelephone exemption (CGD 74–304)	3–25–75	4–9–75 Cleveland	4–24–75	×	....	....	....
Deepwater ports (CGD 75–002); corrected 5–19–75	5–7–75	6–6–75	6–23–75	...	....	....	....
MERCHANT MARINE SAFETY (GENERAL)							
Oceanographic vessels, fire main systems (CGFR 72–20)	2–4–72	....	3–19–72	×	....	....	....
Tank vessel electrical installation (CGD 74–118)	8–26–74	....	10–10–74	...	....	4–22–75	5–22–75
Unmanned Platforms (CGD 73–177)	1–8–74 Corrected 1–29–74	....	2–25–74	×	....	....	....
Bulk Dangerous Cargoes, Inspection of Barges (CGD 73–271)	3–11–74	4–15–74	4–30–74	×	....	....	....
First Aid Certificates (CGD 73–272)	4–2–74	....	6–15–74	×	....	....	....
CO_2 Fixed Fire Extinguishing Systems (CGD 74–100)	5–8–74	....	6–24–74	...	....	2–10–75	5–15–75
Carriage of Solid Hazardous Materials in Bulk (CGD 74–13)	5–15–74	7–16–74	8–31–74	×	....	....	....
Tank vessels in domestic trade (CGD 74–32)	6–28–74 Corrected 7–23–74	7–23–74 Seattle 7–30–74 Wash. D.C.	8–19–74	×	....	....	....
Welding and brazing; adoption of ASME Code (CGD 74–102)	9–26–74 Corrected 11–1–74	....	11–11–74	×	....	....	....
Load line regulations, rail height adjustment (CGD 74–164)	10–4–74	....	11–15–74	×	....	....	....
Construction and equipment of tank vessels (CGD 74–127); advance notice 9–5–74	4–21–75	5–21–75	6–5–75	...	....	....	....
Great Lakes pilotage (CGD 74–233)	11–5–74	11–20–74	11–26–74	×	....	....	....
Manning of nautical school ships (CGD 74–201)	1–21–75	....	3–6–75	×	....	....	....
Licensing and certificating; apprentice mate endorsement (CGD 74–226); Comment period extended 3–7–75	1–23–75	....	4–9–75	×	....	....	....
Marine engineering systems and components; miscellaneous amendments (CGD 73–254); corrected 5–6–75	4–3–75	5–7–75	5–15–75	×	....	....	....
Bulk grain cargoes; intact stability requirements (CGD 74–182)	4–17–75	....	5–31–75	...	....	....	....

NOTE: This table which will be continued in future issues of the Proceedings is designed to provide the maritime public with better information on the status of changes to the Code of Federal Regulations made under authority granted the Coast Guard. Only those proposals which have appeared in the Federal Register as Notices of Proposed Rulemaking, and as rules will be recorded. Proposed changes which have not been placed formally before the public will not be included.

IMCO URGES TRIAL USE OF STANDARD MARINE NAVIGATION VOCABULARY

Although new lines of electronic communication between vessels have been opened in recent years, these technical advances have not surmounted the last obstacle to effective ship-to-ship communication: the language barrier that exists between ships of differing nationalities. Recognizing that voice communications systems cannot be effective until all parties speak and understand the same "language," the Maritime Safety Committee of the International Maritime Consultative Organization (IMCO) has developed a standard marine navigation vocabulary for use on a trial basis.

This vocabulary is the product of a Maritime Safety Committee working group composed of representatives of the Federal Republic of Germany, Finland, Greece, Liberia, Union of Soviet Socialist Republics, and the United Kingdom. After concluding that the English language is the closest to a universal tongue among the world's mariners, the working group drafted a glossary of standard nautical terms and phrases in English to be used in all ship to ship communications. It is hoped that by using a standard phraseology between English-speaking ships, clarity of communications will be improved and fewer repetitions required, especially under conditions of poor radio reception. The use of a standard vocabulary will also allow non-English-speaking watchstanders to communicate phonetically, if necessary, and to utilize the voice communication network more fully.

IMCO has asked all member governments to conduct trials of the vocabulary, a portion of which is reprinted below. This portion concludes a series which was begun in the May issue of the *Proceedings*. Keep this vocabulary handy for reference on the bridge of your vessel. U.S. ships are requested to use the words and phrases as often as possible, both in conversation with foreign-flag vessels and with English-speaking vessels. Comments on the use of the vocabulary are welcomed and may be directed to Commandant (G–WLE–4), U.S. Coast Guard, Washington, D.C. 20590.

Note.—Only the letter spelling table as contained in Chapter X of the International Code of Signals and in the radio regulations is to be used on any occasion when spelling is necessary.

These phrases are not intended to supplant or contradict the International Regulations for Preventing Collisions at Sea or special local Rules or Recommendations made by IMCO concerning ships' routing schemes. Neither are they intended to supersede the International Code of Signals and the Radio Regulations nor to supplant normal Radiotelephone practices as set out in the ITU Regulations.

It is not intended that use of the vocabulary shall be mandatory, but rather through constant repetition in ships and in training establishments ashore, that the phrases and terms used will become those normally accepted and commonplace among seamen. Use of the contents of the vocabulary should be made as often as possible in preference to other wording of similar meaning.

In this way it is intended to become an acceptable "language," using the English tongue, for the interchange of intelligence between indivdiuals of all maritime nations on the many and varied occasions when precise meanings and translations are in doubt, increasingly evident under modern conditions at sea.

The typographical conventions used throughout most of this vocabulary are as follows:

> [ ] *brackets indicate that the part of the message enclosed within the brackets may be added where it is relevant.*
>
> / *oblique stroke indicates that the items on either side of the stroke are alternatives.*
>
> – – – *indicate that the relevant information is to be filled in where the leaders occur.*

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11 RADAR—SHIP TO SHIP/SHORE TO SHIP/ SHIP TO SHORE

11.1 Is your radar working?

11.2 My radar is/is not working.

11.3 I have no radar.

11.4 I have located you on my radar, (------------ bearing and distance ------------ from ------------).

Note.—This message may only be used when the vessel is positively identified.

11.5 I cannot locate you on my radar.

11.6 You must change course/speed for identification.

11.7 I have changed course to ------------/speed to ------------ for identification.

11.8 I have lost radar contact.

11.9 Have you changed your course?

11.10 Report your position to assist identification.
11.11 Ship ahead of you is on the same course.
11.12 You are getting closer to the ship(s) ahead.
11.13 Your position is ____________.
11.14 My position is ____________.
11.15 What range scale are you using?
11.16 I am using ____________ miles range scale.
11.17 Advise you change to larger/smaller range scale.
11.18 I require shore base radar assistance.
11.19 Is shore based radar assistance available?
11.20 Is shore based radar ready to assist me in navigating in restricted visibility?
11.21 Shore based radar assistance is/is not available.
11.22 I am at way point/reporting point/C.I.P. ____________, course ____________, speed ____________.
11.23 I will stop at position ____________ at ____________ hrs.
11.24 You are in the fairway.
11.25 Ship on opposite course passing your starboard/port side.
11.26 Ship is ____________ miles/metres ahead on starboard/port bow.
11.27 Ship ahead of you is on opposite course.
11.28 Ship following will overtake you on starboard/port side.
11.29 You are leaving my screen; change to radio channel frequency.

12 RADIO NAVIGATIONAL WARNINGS

12.1 There is a dangerous wreck/rock/shoal in position ____________ (marked by ____________ showing ____________).
12.2 There is a drifting mine reported in position ____________.
12.3 There is a gas leakage from fractured pipeline in position ____________.
12.4 There are pipelaying operations in position ______.
12.5 There are salvage operations in position ______.
12.6 There are tankers transferring fuel in position ____________.
12.7 There are current meters/oceanographic instruments moored in position ____________.
12.8 There is a derelict adrift in position ____________ at ____________ hrs.
12.9 There is a vessel with a difficult tow on passage from ____________ to ____________.
12.10 There is a drilling rig ____________ (name) established in position ____________.
12.11 There is a ____________ buoy in position ____________ unlit/off station.
12.12 There is a ____________ buoy (showing ______ ______) established in position ____________.
12.13 There is a ____________ light/buoy in position ____________ now showing ____________.
12.14 There is a vessel carrying out hydrographic/seismic survey in position/area ____________.
12.15 Abnormally low tides expected in ____________ at/around ____________ hrs.
12.16 Decca Chain ____________ red/green/purple transmissions interrupted at ____________ check all lane numbers.
12.17 Vessels must keep clear/avoid this area.
12.18 Vessels are advised to keep clear/avoid this area.
12.19 Vessels must navigate with caution.
12.20 There is a vessel not under command in position/area ____________.
12.21 There is a vessel restricted in her ability to manoeuvre in position/area ____________.
12.22 Radio Beacon service ____________ has been discontinued.
12.23 Advise you keep clear of sea area ____________ search and rescue in operation.
12.24 Route/traffic lane ____________ has been suspended/discontinued/diverted.

13 ROUTING

13.1 Is it clear for me to enter traffic lane/route?
13.2 It is/is not clear for you to enter traffic lane/route.
13.3 You may enter traffic lane/route at position ____________ at ____________ hrs.
13.4 I will enter traffic lane/route ____________ at ____________ hrs.
13.5 You are not complying with traffic regulations.
13.6 You are not keeping to your correct traffic lane.
13.7 There is a vessel in position ____________ on course ____________ and speed ____________ which is not complying with traffic regulations.
13.8 There is a vessel anchored ahead of you in position ____________.
13.9 There is a vessel ahead obstructing your movements.
13.10 There is a hampered vessel in position ______ ______ on course ____________ and speed ____________.
13.11 You will meet crossing traffic at ____________.
13.12 There is a vessel crossing your traffic lane on course ____________ and speed ____________ in position ____________.
13.13 There are many fishing vessels at ____________.

14 SPEED

14.1 What is your present/full speed?
14.2 My present/full speed is ____________ knots.
14.3 What is your full maneuvering speed?
14.4 My full maneuvering speed is ____________ knots.
14.5 You are proceeding at a dangerous speed.

14.6 Fairway speed is ____________ knots.
14.7 You must reduce speed.
14.8 You must increase speed.
14.9 I am increasing speed.
14.10 I am reducing speed.
14.11 I cannot increase speed.
14.12 You must keep your present speed.
14.13 I am keeping present speed.
14.14 What speed do you advise?
14.15 Advise speed ____________ knots.

15 TIDE AND DEPTH

15.1 What is the tide/tidal stream doing?
15.2 The tide is rising (it is ____________ hours before high water/after low water).
15.3 The tide is rising (it is ____________ metres/feet below high/above low water).
15.4 The tide is falling (it is ____________ hours after high water/before low water).
15.5 The tide is falling (it is ____________ metres/feet below high/above low water).
15.6 The tide is slack/with you/against you.
15.7 Present height of tide above datum is __________ metres/feet at position ____________________.
15.8 Tide is (____________ metres/feet) above/below prediction.
15.9 The tide/current is ____________ knots at ____________________________________.
15.10 Tide is setting in direction __________________.
15.11 In your present position you will be aground at low water.
15.12 Is there sufficient depth of water?
15.13 There is/is not sufficient depth of water.
15.14 My draught is ____________ metres. When can I enter/pass ______________________________?
15.15 Charted depths are decreased by ____________ metres/feet due to sea state/winds.

16 TROPICAL STORMS

16.1 What is your latest tropical storm warning information?
16.2 Tropical storm centre (name) reported in______.
16.3 What is the atmospheric pressure (and its change)/(at position/your position)?
16.4 The atmosphere pressure is ____________ and its change is _________ (at position _________).
16.5 What is the position, direction and speed of the tropical storm centre (name)?
16.6 The tropical storm centre (name) is in position ____________ moving ____________ at ____________ knots.
16.7 Tropical storm (name) at __________ hours was moving in direction __________ at __________ knots with maximum winds force/speed _____.

17 TUGS

17.1 I require a tug/____________ tugs.
17.2 Is tug assistance compulsory?
17.3 How many tugs must be taken by my ship?
17.4 You must take ____________ tugs.
17.5 Indicate where tugs will meet me.
17.6 Tugs will meet you at point ____________/near ____________ (at ____________ hrs.).

18 WAY POINTS/REPORTING POINTS/C.I.P.

18.1 (Vessel indicated) I am at/approaching Way Point/reporting point/C.I.P.
18.2 (Vessel indicated) you are approaching Way Point/reporting point/C.I.P.
18.3 Report at next Way Point/reporting point/C.I.P. or at position ____________________________.
18.4 Vessel ____________ has reported at __________.
18.5 You must arrive at ___________ at ___________ hrs.

19 WEATHER

19.1 What is the weather forecast?
19.2 What is the wind direction and force/speed?
19.3 Wind direction and force/speed at ____________ is ______________________________________.
19.4 Is the wind expected to change?
19.5 The wind is backing/veering and increasing/decreasing.
19.6 What is the visibility at ____________________?
19.7 Visibility at ____________ is ____________ metres/miles.
19.8 Visibility is reduced by fog/rain/snow/dust____.
19.9 Is visibility expected to change?
19.10 Visibility is expected to improve/decrease to ___________ metres/miles in/by ___________ hours.
19.11 What is the state of the sea at _______________?
19.12 There is a sea/swell of height ____________ metres/feet from ________________________.
19.13 Are sea conditions expected to change within the next ____________ hours?
19.14 Sea/swell is expected to increase/decrease during the next ____________ hours.
19.15 Can icing be expected at ____________________?
19.16 Icing may be expected to form slightly/moderately/severely/very severely at ____________.
19.17 Icing should not be experienced at ____________.
19.18 Are there any warnings in operation for _______?
19.19 A warning of gales/storms was issued at ____________ hours starting _______________.
19.20 What is the latest information about storm ____?
19.21 Is the wind force/speed expected to increase at ____________________________________?
19.22 The wind at ____________ will increase/decrease to force/speed ____________ within the next ____________ hours.

20 FISHING

20.1 Navigate with caution small fishing boats are within ____________ miles of me.
20.2 Is there fishing gear ahead of me?
20.3 You are heading towards fishing gear.
20.4 There are nets with buoys in this area.
20.5 Fishing gear has fouled my propeller.
20.6 You have caught my fishing gear.
20.7 Advise you recover your fishing gear.
20.8 Fishing in this area is prohibited.
20.9 You are approaching a prohibited fishing area.

21 HELICOPTERS

21.1 Vessel ____________ ready for helicopter.
21.2 (Vessel ____________) helicopter now proceeding to you.
21.3 My course and speed is ___________ at __ knots.
21.4 Identify yourself (by method indicated).
21.5 (Vessel ____________) I am now making identification signal.
21.6 You are identified.
21.7 Present relative wind direction and force is_____
21.8 Keep the wind on starboard/port bow/quarter.
21.9 Indicate landing/contact point.
21.10 Request permission to land on deck.
21.11 You may land on deck.
21.12 Do not land on deck.
21.13 Operation will be carried out using hoist.
21.14 Landing party ready to receive you.
21.15 I am landing/commencing operation.
21.16 Do not make fast hoist.

22 ICE BREAKERS

To be developed and circulated later. In the meantime, refer to appropriate part of the International Code of Signals.

THE COMMANDANT'S SPEECH TO THE HUNTINGTON PROPELLER CLUB

On May 15, 1975, the Commandant joined with members of the Huntington, West Virginia, Propeller Club in observing National Maritime Day.

It's a special pleasure to participate in a program that celebrates the involvement of young people in the Maritime Industries. If our Merchant Marine in general and inland commerce in particular are to remain healthy, we must continue to look to youth for the new directions and innovations in maritime transport.

It is the economic health of the nation, and the vital role inland maritime commerce plays in it, that I would like to discuss with you tonight. Such an examination is especially appropriate in the Port of Huntington, for I remember this as an extremely active locale during my tour of duty as District Commander.

I understand that it now handles more tonnage annually than any inland port in the country, and as such it typifies the importance of inland maritime commerce. Waterways such as the Ohio River system are the vital links that connect petroleum refineries with energy hungry consumers of metropolitan centers. Through this port, for example, passes a large percentage of the coal used to fuel essential power and industrial plants of the upper midwest. Critically needed foodstuffs from the heartlands of Mid-America are moved by barge on their way to the dinner tables of this country and the world. And record tonnages of a wide variety of essential chemicals will reach their destinations safely, quickly, and economically by water this year.

This recognition of the vital nature of inland maritime commerce makes our observance of National Maritime Day here especially meaningful, and the economic strength of the port of Huntington makes today's activities especially pleasurable. Commander Burns, the local Officer-in-Charge, Marine Inspection, informs me that tonnage through the port is up again this year. The increased interest in transportation at Marshall University and the chartering of the Propeller Club's student port are further evidence of the vitality of the marine industry.

Needless to say, it's encouraging to see these visible manifestations of economic progress in the midst of some pretty trying times. The question now remains, what can we do to keep it healthy? The answer to that question must naturally come in two parts, as both the Federal Government and the private sector must contribute to an operating environment that will promote the steady growth of this extremely important element in the Nation's transportation system.

First, the Federal Government can play an active role in the facilitation of maritime commerce. The Coast Guard, while it does have a primary responsibility to implement the marine and environmental safety legislation mandated by Congress, is continually seeking new ways to improve systems of inland navigation. One of the most exciting recent developments toward a goal of facilitating maritime commerce has been the work of a study group tasked to examine our present system of aids to navigation.

Early this spring legislation was introduced in both Houses of Congress which, if adopted, will implement the 1972 International Rules of the Road for U.S. Vessels on International waters. At the present time the Coast Guard is in the process of developing a set of inland rules which will conform as closely as practicable to those implemented for ocean operators. This effort is being coordinated with the Industry Advisory Committee on Rules of Road, a group of experts representing virtually every sector of the maritime community, in order to insure that the new rules will be user oriented. If there is any doubt, the Advisory Committee does include the president of an inland company who is qualified as a Captain.

A third important aspect in the facilitation of maritime commerce is the implementation of vessel traffic systems. One such system has been in operation for the past three years in the vicinity of the McAlpine Dam at Louisville. Initiated in 1973 as a result of my recommendations, this VTS was developed in consultation with vessel owners and operators familiar with the area's particular navigational problems during times of critically high waters. The operational record since its inception has been remarkable: 3,400 vessels have transited the area while the system was in operation, and there has been only one casualty. It is no wonder that it has earned the respect of its users and others concerned with vessel traffic safety in this once hazardous area.

There is a great deal left to be done, however, and that brings me to the second half of that two-part answer I mentioned earlier—the private sector's role in facilitating maritime commerce. I believe that the greatest progress in any national endeavor results when government and industry work together. As I outlined some of the advances made recently in maritime safety, I emphasized the sizable amount of public participation in each of those governmental programs. This participation is the result of extensive and earnest efforts to involve industry at every level of safety activity. The Towing Industry Advisory Committee, for example, has been extremely helpful over the past two years in identifying a wide variety of areas of common concern. This group, which is composed of industry executives from all over the country, meets regularly with Coast Guard Officers to resolve safety matters ranging from personnel to pollution to publications.

Industry groups, such as the Ohio Valley Improvement Association, the American Waterways Operators, and the Gulf Coast Towing Association also contribute to the Coast Guard's safety effort by providing responsive and responsible comment on proposed regulatory actions. Again, each of the programs I detailed earlier has benefited from the expertise these groups have brought to bear on the matters under consideration.

In addition to this organized association activity, individual companies must continually strive to insure that their men are competently trained and their boats are safely equipped. I know there is a wide variety of industry training programs, and I urge you to participate actively in them. Personnel training not only insures the safety of the men in the towing industry, it protects the considerable investment in capital that every boat and barge represents.

Greater opportunities for training and education in the maritime industries are needed across the board, and I am very enthusiastic about the number and variety of programs available to young people now. A visit to the National River Academy left me extremely impressed with the calibre and scope of training available there, and I know that similar, if less extensive, programs are being developed in high schools, junior colleges, and colleges all over the country.

Thus far we have examined the tremendous potential for progress that exists when the public and private sectors work together. This potential was realized in Philadelphia two weeks ago as government, industry, and academic leaders met at the Coast Guard sponsored Marine Traffic Symposium. By using a workshop format at the three day meeting, all participants were able to express their ideas freely and informally. We went to Philadelphia with the hope of generating the interest and spirit of cooperation needed to set the foundation for future policy. The results, I can assure you, were most satisfying.

This brings us then to perhaps the most important item on tonight's agenda, the presentation of the Harding Memorial Essay Awards to these deserving high school students. Let me say in conclusion, that I feel today's activities were an outstanding example of the way to progress in the maritime community. It is most fitting that we observed National Maritime Day in this bustling inland port. Throughout the day we worked together by exchanging thoughts and ideas on improving our economic strength, and we are capping it by honoring the hope of the future, the young people. Again, I want to thank you for letting us enjoy it with you. ⚓

maritime sidelights

(*Continued from page 95*)

WHAT ARE YOUR CHANCES?

The test of any gambler is the size of the stake he'll place on what he feels is a sure thing. Perhaps the average sailor or boatman is overly optimistic about the odds because he too often sees those who've gambled and won while the Coast Guard statistics reflect those who've gambled and lost. The large percentage of persons lost each year from falling overboard from all classes of vessels and boats indicates that sailors and boatmen fare poorly as gamblers, especially those who are working without a personal flotation device where the risk of falling overboard is high.

Daily, summaries and news accounts tell of rescue efforts performed by the Coast Guard, local police, and rescue squads which attempted to locate persons who were lost overboard from tugs, barges, pleasure craft, docks, and large commercial vessels.

What are your chances of survival if you fall overboard without being seen?

If you are injured or dazed before you fall overboard?

If the water temperature is extreme?

If the time for the rescue forces to reach you takes over a few minutes?

No matter how high the risks under normal conditions, they are surely a great deal higher when you are not wearing a personal flotation device!

We all, at times, have to take a chance on a long shot, but we don't have to bet our lives on it.

A case in point involved the death of a seaman who fell overboard at sea while rigging an accommodation ladder. As the ship was preparing to enter port, the seaman was detailed to release the toggle pins which held the ladder in a horizontal position alongside the vessel. As he bent over, the ship rolled, tossing him into the water. Investigation revealed that the man was not wearing a life preserver or work vest, nor did he have any safety lines rigged.

Subsequent to the tragedy, the steamship company implemented a number of operating procedures designed to prevent a similar casualty. Seamen are now required to wear a life preserver or work vest and to use a safety harness and line when working over the side. In addition, a deck officer supervises the operation and the master is authorized to slow the ship and seek a lee while this evolution takes place.

Professional mariners realize that rigging an accommodation ladder is one of the more hazardous procedures a seaman must routinely face. Virtually all ships are required to rig an accommodation ladder every time they approach a port. To reduce the hazards for your personnel, answer the following questions: Are seamen on my ships required to periodically work over the side? Are procedures followed which insure their safety when they do work over the side? Are Coast Guard approved work vests stowed in an accessible location? Are the work vests in good condition? Are my masters reluctant to slow down when men are working over the side?

If these questions are answered in the interests of personnel safety, the lessons from this casualty will be put to good use.

Electrical Hazards

We recently learned that an electric eel delivers its maximum shock when both its head and tail are touching an enemy's body. This information may be of some value to those of you interested in skin diving. But preferring the time-honored hook over the more direct method of catching fish, this information brought a question to our mind—how much current does it take to kill?

There are many instances where men have survived 30,000 and 40,000 volts while many other cases record death due to contact with voltage under 120. There is no simple answer. One person may escape injury from higher voltages due to dry skin or other factors that prevent efficient contact. Another may be killed by a lower voltage when the circuit is easily completed due to contact with damp skin while the victim stands on a wet deck.

High voltage shocks are usually serious, if not fatal, due to destruction of tissues and nerve centers. Fortunately, most people are aware of the danger of high voltage and stay clear of it.

Other than the organic damage connected with electric shock, a serious hazard of minor shock is the involuntary muscular reaction of the victim. He may jump, jerk, stumble or fall with the result that he may sustain even more serious secondary injuries or injure others.

Although we cannot directly answer our self-imposed question, we can advise that the total effect of electric shock is not dependent on voltage alone but on the conditions surrounding it; such as:

(1) Type of contact.

(2) Skin moisture and effective grounding.

(3) Path of the current through the body and vital organs.

(4) The involuntary physical reaction.

Since a common result in electrical accidents is failure of that part of the nervous system which controls breathing, many victims have been saved by prompt application of artificial respiration. Persons engaged in electrical work should be familiar with resuscitation practices.

Maintain all electrical equipment in good repair. Do not use such equipment when suspect—consult someone who knows. Lock out and tag switches controlling circuits on which men are effecting repairs. Don't take chances on a SHOCKING INJURY.

—*Courtesy National Safety Council*

Nautical Queries

This month's "Nautical Queries" features questions selected from examinations presently in use for deck officers (2d and 3d Mate) and engineers (2d and 3d Assistant). Additional questions of the type presently being used will appear in future issues.

Deck

1. A vessel is steaming in the east longitude on January 25 and crosses the International Date Line on an eastbound course at 0900 zone time. What is the date time at Greenwich when the vessel crosses the line?
   A. January 24 at 0900.
   B. January 24 at 2100.
   C. January 25 at 0900.
   D. January 26 at 0900.

2. On the high seas, a fog signal consisting of one prolonged blast followed by four short blasts would indicate the presence of a—
   A. vessel being towed.
   B. fishing vessel engaged in trawling.
   C. vessel at anchor warning you of her location.
   D. power-driven pilot vessel on station underway.

3. The amount of freeboard affects the—
   I. amount of reserve buoyancy of a vessel.
   II. range of stability of a vessel.
   A. I only.
   B. II only.
   C. Both I and II.
   D. Neither I nor II.

4. While you are on watch at night, the gyro alarm sounds, indicating a power failure. You should immediately—
   I. put the locking latches on to keep the compass from toppling.
   II. direct the helmsman to steer by magnetic compass.
   A. I only.
   B. II only.
   C. Both I and II.
   D. Neither I nor II.

5. On August 30, 1971, evening twilight will be about 1915 zone time for your vessel. The DR for that time is latitude 26°03′ north, longitude 67°19′ west. Considering their location, which group of stars is best suited for evening observation?
   A. Deneb, Antares, Arcturus.
   B. Aldebaran, Diphda, Kochab.
   C. Regulus, Kochab, Antares.
   D. Spica, Regulus, Vega.

Engineering

6. Coast Guard regulations require pressure vessels used to store compressed air for starting diesel engines to be—
   A. hydrostatically tested.
   B. pneumatically tested.
   C. less than 5 cubic feet capacity.
   D. equipped with rupture discs.

7. A diesel engine intake valve is reseated by a—
   A. valve spring.
   B. cam follower.
   C. push rod.
   D. valve tappet.

8. A bridge gauge is used to determine turbine—
   A. rotor radial position.
   B. bearing oil clearance.
   C. diaphragm tip clearance.
   D. blade axial clearance.

9. A pressure-volume indicator measures cylinder pressure and—
   A. brake horsepower.
   B. engine speed.
   C. cylinder volume.
   D. piston travel.

10. Panting in an oil-fired marine boiler could be caused by—
   A. excessive combustion air supply.
   B. low fuel oil temperature.
   C. fouled burner sprayer plates.
   D. insufficient combustion air supply.

11. Scale prevention in boiler water is accomplished by adding treatment chemical that—
   A. precipitate scale forming salts as sludge.
   B. solidify the scale as a powder.
   C. increase boiler water acidity.
   D. cause the water to be neutral.

12. Which condition could cause a boiler feed pump to lose suction?
   A. Increased suction head pressure.
   B. Decreased feed water temperature.
   C. Pump recirculating line being open too much.
   D. Excessive feedwater temperature.

13. A diesel engine piston ring face is in direct contact with the—
   A. top of the ring groove.
   B. cylinder liner oil film.
   C. bottom of the ring groove.
   D. back of the ring groove.

14. If electrical power to the steering gear motor fails the rudder may be moved using—
   I. hand pump steering.
   II. trick wheel steering.
   A. I only.
   B. II only.
   C. Both I and II.
   D. Neither I nor II.

15. Plugged spray holes in a diesel engine fuel injector will cause excessive—
   I. smoking at idle.
   II. smoking under load.
   A. I only.
   B. II only.
   C. Both I and II.
   D. Neither I nor II.

Answers

Deck

1. B 2. D 3. C 4. B 5. A

Engineering

6. B 7. A 8. A 9. D 10. D
11. A 12. D 13. B 14. A 15. C

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications of marine safety rules and regulations may be obtained from the nearest marine inspection office of the U.S. Coast Guard.* Because changes to the rules and regulations are made from time to time, these publications, between revisions, must be kept current by the individual consulting the latest applicable Federal Register. (Official changes to all Federal rules and regulations are published in the Federal Register, printed daily except Saturday, Sunday, and holidays.) The date of each Coast Guard publication in the table below is indicated in parentheses following its title. The dates of the Federal Registers affecting each publication are noted after the date of each edition.

The Federal Register will be furnished by mail to subscribers, free of postage, for $5.00 per month or $45 per year, payable in advance. The charge for individual copies is 75 cents for each issue, or 75 cents for each group of pages as actually bound. Remit check or money order, made payable to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

CG No.	TITLE OF PUBLICATION
101	Specimen Examinations for Merchant Marine Deck Officers (Chief Mate and Master) (1–1–74).
101–1	Specimen Examinations for Merchant Marine Deck Officers (2d and 3d mate) (10–1–73).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (4–1–72). F.R. 7–21–72, 12–1–72, 11–14–74.
115	Marine Engineering Regulations (6–1–73). F.R. 6–29–73, 3–8–74, 5–30–74, 6–25–74, 8–26–74.
123	Rules and Regulations for Tank Vessels (1–1–73). F.R. 8–24–73, 10–3–73, 10–24–73, 2–28–74, 3–18–74, 5–30–74, 6–25–74, 1–15–75, 2–10–75, 4–16–75, 4–22–75, 5–20–75.
129	Proceedings of the Marine Safety Council (Monthly).
169	Rules of the Road—International—Inland (8–1–72). F.R. 9–12–72, 3–29–74, 6–3–74, 11–27–74.
172	Rules of the Road—Great Lakes (7–1–72). F.R. 10–6–72, 11–4–72, 1–16–73, 1–29–73, 5–8–73, 3–29–74, 6–3–74, 11–27–74.
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (3–2–64).
*175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3–1–73).
*176	Load Line Regulations (2–1–71). F.R. 10–1–71, 5–10–73, 7–10–74.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
182–1	Specimen Examinations for Merchant Marine Engineer Licenses (2d and 3d Assistant) (10–1–73).
184	Rules of the Road—Western Rivers (8–1–72). F.R. 9–12–72, 5–8–73, 6–27–73, 6–28–73, 3–29–74, 6–3–74, 11–27–74.
190	Equipment List (8–1–72). F.R. 8–9–72, 8–11–72, 8–21–72, 9–14–72, 10–19–72, 11–8–72, 12–5–72, 1–15–73, 2–6–73, 2–26–73, 3–27–73, 4–3–73, 4–26–73, 6–1–73, 8–1–73, 10–5–73, 11–26–73, 1–17–74, 2–28–74, 3–25–74, 4–17–74, 7–2–74, 7–17–74, 9–5–74, 10–22–74, 11–27–74, 12–3–74, 12–30–74, 1–15–75, 1–21–75, 2–13–75, 2–10–75, 3–18–75, 3–19–75, 4–9–75, 4–16–75, 5–1–75, 5–7–75.
191	Rules and Regulations for Licensing and Certification of Merchant Marine Personnel (6–1–72). F.R. 12–21–72, 3–2–73, 3–5–73, 5–8–73, 5–11–73, 5–24–73, 8–24–73, 10–24–73, 5–22–74, 26–74.
*200	Marine Investigation Regulations and Suspension and Revocation Proceedings (5–1–67). F.R. 3–30–68, 4–30–70, 10–20–70, 7–18–72, 4–24–73, 11–26–73, 12–17–73, 9–17–74.
*227	Laws Governing Marine Inspection (3–1–65).
239	Security of Vessels and Waterfront Facilities (5–1–74). F.R. 5–15–74, 5–24–74, 8–15–74, 9–5–74, 9–9–74, 12–3–74.
*256	Rules and Regulations for Passenger Vessels (5–1–69). F.R. 10–29–69, 2–25–70, 4–30–70, 6–17–70, 10–31–70, 12–30–70, 3–9–72, 7–18–72, 10–4–72, 10–14–72, 12–21–72, 4–10–73, 8–1–73, 10–24–73, 12–5–73, 3–18–74, 5–30–74, 6–25–74, 9–20–74.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (4–1–73). F.R. 6–28–73, 6–29–73, 8–1–73, 10–24–73, 3–18–74, 5–30–74, 6–25–74.
*258	Rules and Regulations for Uninspected Vessels (5–1–70). F.R. 1–8–73, 3–28–73, 1–25–74, 3–7–74.
*259	Electrical Engineering Regulations (6–1–71). F.R. 3–8–72, 3–9–72, 8–16–72, 8–24–73, 11–29–73.
*266	Rules and Regulations for Bulk Grain Cargoes (5–1–68). F.R. 12–4–69.
268	Rules and Regulations for Manning of Vessels (10–1–71). F.R. 1–13–72, 3–2–73.
293	Miscellaneous Electrical Equipment List (7–2–73).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (7–1–72). F.R. 7–8–72.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (9–1–73). F.R. 1–25–74, 3–18–74, 9–20–74.
329	Fire Fighting Manual for Tank Vessels (1–1–74).
439	Bridge-to-Bridge Radiotelephone Communications (12–1–72), 12–28–72, 5–5–75.

CHANGES PUBLISHED DURING MAY 1975

The following have been modified by Federal Registers:

CG–123, Federal Register of May 20, 1975.

CG–190, Federal Registers of May 1 & 7, 1975.

CG–439, Federal Register of May 20, 1975.

*Due to budget constraints or major revision projects, publications marked with an asterisk are out of print. Most of these pamphlets reprint portions of Titles 33 and 46, Code of Federal Regulations, which are available from the Superintendent of Documents. Consult your local Marine Inspection Office for information or availability and prices.


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