PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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PROCEEDINGS

OF THE MARINE SAFETY COUNCIL

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CONTENTS

COVERS

The smouldering hulk of the container vessel *Seawitch* is assisted by a tug the morning following her fiery collision with the tanker *Esso Brussels*. The collision between the fully loaded container vessel and the tanker carrying crude oil left 16 dead and millions of dollars of property damage. The collision, caused by a steering failure aboard the *Seawitch*, was one of the worst marine disasters in the history of busy New York Harbor.

The swift ebb current swept the two vessels, locked together and engulfed in a raging fire, under the Verrazano Narrows Bridge. The fire, fed by oil from the ruptured tanks of the tanker, raged for more than an hour. While the bridge sustained no major structural damage, traffic was halted for several hours.

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maritime sidelights

THE METRICS ARE COMING

The Congress last year, in passing the Metric Conversion Act of 1975, established a national policy aimed at "coordinating and planning the increasing use of the metric system in the United States".

Now the National Research Council, an agency of the National Academy of Sciences, has issued a report recommending a 10-year metric conversion program for the U.S. maritime industry, the first comprehensive plan for metrication of any major U.S. industry.

The report discusses in detail conversion schedules and potential problem areas for five key sectors of the industry: shipyards, vessel owners and operators, marine equipment manufacturers, port authorities, and seafaring unions. Recommendations on the roles that federal agencies and important industry organizations should play are also discussed at length. Other chapters outline the metrication experiences of other countries and the history and status of metric conversion in this country.

The National Academy of Sciences was chartered by the Congress in 1863 as a private organization with a responsibility for examining questions of science and technology at the request of the Federal Government. The National Research Council was organized in 1916 in order to provide for broader participation by American scientists and engineers in the work of the Academy. The Panel on Metrication in the U.S. Maritime Industry which prepared the report was comprised of representatives of federal agencies and the major sectors of the industry mentioned above.

Copies of *Maritime Metrication: A Recommended Metric Conversion Plan for the U.S. Maritime Industry* are available for $5.25 each from the Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Ave. N.W., Washington, D.C. 20418.

SALUTE!

Nine hundred and ten recreational boaters lived to see another day during 1975, thanks to the lifesaving skills of the U.S. Coast Guard Auxiliary on the nation's waters.

In a year-end tribute to "those members of our Coast Guard family in the Coast Guard Auxiliary," Admiral Owen W. Siler, Commandant of the Coast Guard, said:

"You have helped make 1975 a better year for our nation's boaters with your enthusiastic response to my challenge for an increased effort. In some areas you have surpassed my expectations. Your membership has grown, support missions have increased, you have more public education instructors, and most significantly, your courtesy motorboat examination, for the first time, has reached over 300,000 boaters. We in the Coast Guard, as you should be, are proud of your accomplishments, and you have my personal thanks."

A summary of Auxiliary services to the boating public and the Coast Guard shows a significant increase in lives saved by Auxiliarists last year over the 403 "saves" in 1974. This volunteer, civilian component of the parent service now has boosted its accredited lifesaving record over the past 6 years to 2,934 people.

They have assisted distressed vessels with a combined property value of $142,094,600 as compared to $70,683,690 in 1974. In search, rescue and patrol activities, using their own vessels, aircraft and radio facilities, as well as thousands of hours of their own time, they assisted a total of 45,099 persons in 1975, and conducted 13,094 Coast Guard support missions and 30,900 safety and regatta patrols. The Auxiliary made 14,651 member-owned vessels, aircraft and radio stations available to the Coast Guard for day-and-night emergencies and related services at no cost to the parent service or the American taxpayer.

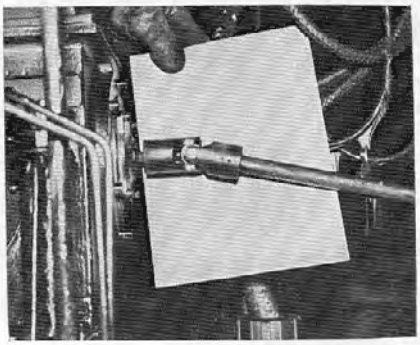
They have enrolled 444,623 students in Auxiliary public classes on boating skills and seamanship, lifting total enrollees over the past 6 years to more than 2 million. With a current staff of 10,000 instructors, the Auxiliary is the Coast Guard's major source in providing boating education throughout the Nation.

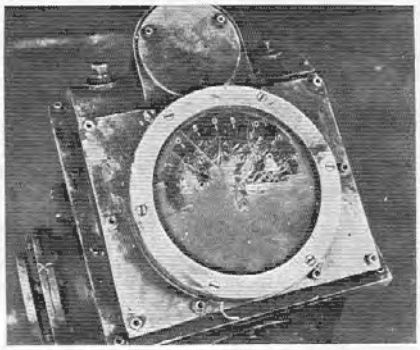
Finally, the 303,755 free Courtesy Motorboat Examinations given in 1975 represent a 21-percent increase over the previous year and set a new annual record.

NEW YORK HARBOR RESTRICTIONS

As we noted in this space in the February issue, more than 250 of the world's two-, three-, and four-masted sailing vessels will parade through New York Harbor on July 4 in observance of the Nation's 200th birthday. "Operation Sail" and the concurrent International Naval Review will require the temporary curtailing of normal harbor operations.

Information concerning the restriction of maritime traffic in New York Harbor on July 3, 4, and 5 is contained in a Local Notice to Mariners to be released this month, and also in the Federal Register dated April 22, 1976, page 16855. Questions concerning the closure should be directed to the Captain of the Port, New York. Phone: (212) 264–8766.





Seawitch

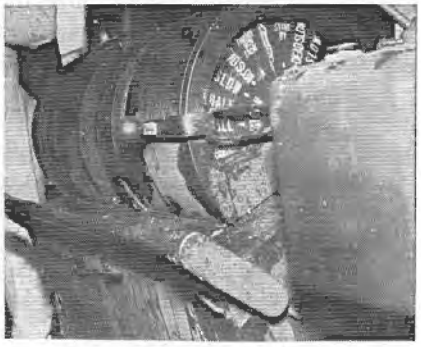
Esso Brussels

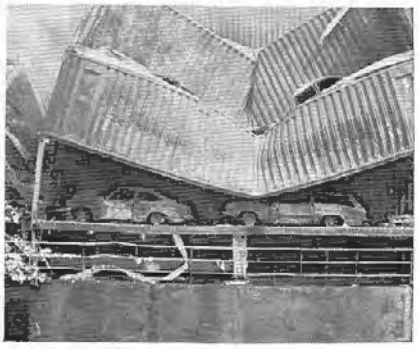
The following narrative account was extracted from the Marine Casualty Report (No. USCG/NTSB-MAR-75-6) released 2 March 1976. Single copies of the complete and detailed report may be obtained without charge by writing to the Commandant (G-MVI-3/83), U.S. Coast Guard, Washington, D.C. 20590. Multiple copies may be purchased by mail from the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22151.

On 2 June 1973, at 0042 EDST, the outbound American Cargo Ship SS C.V. *Sea Witch* experienced a loss of steering control, veered out of the channel, and collided with the laden and anchored Belgian Tankship SS *Esso Brussels* at Federal Anchorage 24, Stapleton, Staten Island, New York. The collision caused major structural damage to the bow of the *Sea Witch*. The rupture of three cargo tanks containing Nigerian crude oil on the *Esso Brussels* resulted in an intense fire that totally engulfed the two ships for about 1 hour. The Master and two crewmembers on the *Sea Witch* died on board during the aftermath following the collision. The Chief Engineer of the *Sea Witch* received severe burns to his hands, arms and face. The Master of the *Esso Brussels* and ten crewmembers died as a result of drowning or burn-related injuries after abandoning ship, one crewmember died on board and one crewmember remains missing.

The *Sea Witch* departed Howland Hook Container Terminal on Staten Island at 2329, 1 June and proceeded to sail around the northern end of Staten Island by way of Kill Van Kull. The vessel was under the control of a Docking Pilot with two tugs in attendance until the vessel reached a point near New Brighton, Staten Island, where the Harbor Pilot relieved the Docking Pilot. The engine was placed on slow ahead, 20 r.p.m. at 0023 to slow the vessel and permit the Docking Pilot to disembark onto one of the assisting tugs. The vessel's speed was increased to half ahead at 0025 and the Harbor Pilot ordered a course of 109° True coming out of Kill Van Kull on Constable Hook range.

At 0029 the vessel's speed was increased to harbor full and, 4 to 5 minutes later, the vessel's course was changed to 167 degrees True to transit the channel towards the Verrazano-Narrows Bridge. Four vessels were observed on the starboard hand in Stapleton Federal Anchorages 23 and 24. The *Esso Brussels* was the last vessel and was anchored nearest to the Verrazano-Narrows Bridge. One tug and tow proceeding outbound was passed on the starboard hand. The Pilot ordered a course change to the left to 158° True and at about 0037 the helmsman reported to the Captain that the ship was not steering. The vessel started drifting very slightly to the right and the Pilot ordered hard left rudder. The Master immediately proceeded to the helm, verified the loss of steering, and was heard to exclaim "that damn steering gear again." He transferred from the starboard to port steering system which had no affect on restoring steering control. The steering power alarm on the bridge had not sounded. The engine was still on full ahead as the right swing accelerated. The *Sea Witch* passed about 150 feet ahead of the Tug *Barbara Moran* with the barge O.D. No. 1 in tow alongside as the vessel cut out of the channel at a point about one-half mile distant from the anchored *Esso Brussels*. The Pilot commenced blowing a series of short rapid blasts on the whistle and then locked the whistle to sound continuously. The bow of the *Sea Witch* first appeared to be heading astern of the *Esso Brussels*. As the heading of the *Sea Witch* lined up with the stern of the *Esso Brussels* the Pilot ordered the engine full astern, the port anchor let go and the general alarm sounded, but the swing continued rapidly to the right and the vessel headed toward the middeck between the forward and after houses of the *Esso Brussels*. The Chief Mate and the Boatswain attempted to let go the port anchor but were unsuccessful due to a jammed pawl. On their own initiative they attempted to release the starboard





anchor. They were able to raise the starboard pawl and release the chain stopper and windless brake, but the starboard anchor did not run; after impact the anchor was found lying on the deck of the *Esso Brussels*.

When the vessel was about 200 feet away from the *Esso Brussels*, the Pilot advised the Master to clear the bridge and get the Mate off the bow. The entire bridge watch ran down the ladder to the next deck below the bridge when the impact of the collision was felt.

At about 0039 the Chief Engineer, while proceeding to his stateroom, heard the ship's whistle and general alarm and immediately ran back to the engineroom. Upon arrival, he saw that the engineroom was answering an astern bell which was logged in the engineroom bell book at 0041. The shaft r.p.m. indicator was observed by the Chief Engineer at 35 to 40 r.p.m. astern and increasing. Shortly thereafter he felt the impact of the collision. The engineroom started to fill up with smoke and he secured the engineroom ventilation supply and exhaust fans and returned to the operating console. About a minute later the Chief Engineer received a telephone call from the Captain who inquired as to the status of the main plant. He advised the Captain that the engine was still at full astern. The Master ordered the engine full ahead and after answering this engine order, the Chief Engineer informed the Captain that the engineroom had to be abandoned because of the smoke rapidly filling the space. The Master then ordered full astern, which was accomplished. The remaining engineering personnel abandoned the engineroom and joined the remainder of the crew in and about the after deckhouse. Prior to abandoning the engineroom the Assistant Engineer started the forward pumproom auxiliary fire pump from the remote operating controls at the main engine control console. Smoke was rapidly being drawn into the engineroom by the negative pressure created by the boilers. The main plant, now on automatic control, was still backing and was lost about 8 or 9 minutes after the collision. The emergency generator automatically cut in, providing electric power for emergency lighting and power for the emergency fire pump. The generator ran for 2 days after the collision.

The entire fo'c'sle and bridge watch ran aft on the port side of the ship with the fire on the surface of the water following rapidly behind them. Other personnel who were berthed in the forward deckhouse were awakened by the ship's whistle and general alarm and also ran aft along the same route. Within minutes fire and smoke engulfed the ship, igniting containers, exterior paint and combustible material. The air was filled with fire-draft-blown debris. A portion of the crew congregated on the port after quarter of the vessel in an attempt to avoid the fire and smoke, but were subsequently forced to take shelter inside the after house.

Upon impact both vessels locked together and began to drift toward the Narrows in the 2.5 knot strong ebb current. Both vessels were being restrained by the port anchor of the *Esso Brussels* which was only partially holding. Oil from the ruptured tanks on the *Esso Brussels* spread on the surface of the water aided by the tide, slight wind, and the astern propeller wash of the *Sea Witch*. The oil caught fire on initial impact and the high flames engulfed both vessels within minutes. Flames from the burning vessels which drifted under the Verrazano-Narrows Bridge extended up into the lower levels of the bridge. Vehicular traffic crossing the bridge at the time of the incident was stopped. Some scorching, discoloration of paint, and damage to lighting fixtures on the bridge structure was experienced; however, no one on the bridge was hurt and no damage to vehicles occurred.

The Chief Engineer and a few crewmembers, after being advised by the Master that they had collided with a tanker, went forward on the port side in an attempt to assess the situation. The group went athwartships between rows of containers, and when they were close to the starboard side a flareup occurred in which the Chief Engineer, who was in the lead, suffered severe burns on the arms, hands, and face. These men, after returning to the after deckhouse, also assisted in firefighting and survival efforts.

The only firefighting equipment utilized was the 1½-inch interior hoses equipped with straight bore nozzles. These hoses were used to direct streams of water to cool exterior doors and to gain a supply of fresh air by sweeping adjacent areas of the weather deck to drive the fire and smoke away from the partially opened doors. They were considered by the crew to be ineffective in providing a protective screen of water. The exterior firehose stations equipped with 2½-inch hoses were all inaccessible due to the heat and flames. The fire mains lost pressure and became ineffective about 10 minutes prior to the crew abandoning ship.

The Boatswain and several crewmembers who were on the after deck went below to the carpenter shop to break out and distribute additional life preservers and take shelter. When the smoke below deck became dense, and upon realizing that there was only one means of escape from the space, they went up to the weather deck and took refuge with the remainder of the crew in the after deckhouse. The Chief Mate cautioned the crew to remain with the ship and not to jump overboard; however, seven crew members, who were wearing life preservers, jumped overboard from the boat deck and upper deck and were subsequently rescued.

Some members of the crew went below to the main deck starboard side passage which connected the fore and aft part of the vessel. Upon opening the partition door to the passageway, flames and smoke were sighted. The emergency gear lockers which contained oxygen-breathing apparatus and spare recharges were located aft in the starboard main deck passage and forward in the port main deck passage. Both lockers were inaccessible because of the smoke and flames. A few crewmembers used water-soaked clothing and towels to filter smoke from the air to assist in breathing as they moved about in the passageways. Lighting provided by normal or emergency power was virtually ineffective for illumination or to indicate exit corridors because of dense smoke. An explosion occurred in the vicinity of the stairway in the after athwartships passageway of the upper deck. The force of the explosion was sufficient to knock down several crewmembers who were in the vicinity of the stairway on both the boat deck and upper deck. The explosion, at first thought to be caused by exploding nitrogen cylinders located in the vicinity, was probably caused by the sudden stress deformation of bulkhead paneling surrounding the stairway. Shortly after the explosions a crewmember was observed lying on the port side of the athwartships passageway on the boat deck.

All personnel on board were assembled in the after house. During some periods portions of the crew were able to go on the weather decks. During the initial stages some of the crew gathered on the port side of the boat deck and when the flames and heat became intense they retreated into the deckhouse. The smoke and heat within the interior of the deckhouse worsened as time passed and the crew eventually congregated on the upper deck as the main deck, boat deck and cabin deck became untenable. The Master was observed to collapse outside of the after deckhouse on the port side of the upper deck and immediate examination detected no sign of life. When rescue craft were observed through the weather doors, crewmembers used flashlights to attract their attention. At about 0145 the Fireboat *Firefighter* while extinguishing flames on the *Sea Witch* was able to clear a path through the smoke and fire and rescued the 31 persons on board.

Rescue craft consisting of commercial tugs, New York City Fireboats, New York City Police Launches, the U.S. Army Corps of Engineers Patrolboat, Coast Guard floating units, and three Coast Guard helicopters rushed to the scene upon receiving notification on radio telephone Channel 13 (bridge to bridge), Channel 16 (disaster and calling, intership and ship to shore) or commercial frequencies used between tugs and dispatchers. The police launches used separate FM communications, and the New York City Fireboat utilized Channel 13 and five special municipal frequencies. On-scene communications between ships were, in the main, conducted on Channel 13. The communications on Channel 13 were heavily burdened by conversational traffic between tugs maneuvering to pick up survivors or to position themselves for firefighting and passing of general information relative to maneuvering in the area of the disaster. Some voice traffic exchanging marine bridge to bridge information between vessels in other parts of the harbor was heard. Radio communications on Channel 13 during the disaster were not controlled.

Upon receiving first telephone notification of the casualty, the USCG Captain of the Port Duty Officer, Governors Island, dispatched a 40-foot patrol boat to the scene which arrived at about 0120. Other units, including Coast Guard harbor tugs were alerted and dispatched. The Acting Captain of the Port was notified and proceeded to the site of the casualty, assuming on-scene commander duties upon arrival about 0140. About 0215 a safety broadcast was made by the Captain of the Port closing the main channel to traffic. At about 0400 a representative of American Export Lines, Inc., delivered cargo manifests to the on-scene commander who, after reviewing the dangerous cargo manifests, determined that the *Sea Witch* did not contain any extremely hazardous materials but did have a large quantity of flammable cargo on board. The New York City Fire Chief on scene was advised and later a decision was reached with the fire department officials that no attempt to separate the vessels should be made before dawn. The vessels were separated at about 0630 and the cargo tank fire on the *Esso Brussels* in way of the collision damage was easily extinguished, but the fire in the deckhouses continued to burn. The main channel was opened to one-way traffic about 0700 under supervision of patroling Coast Guard Cutters. A Coast Guard security zone was subsequently set up around both vessels, which had grounded in Gravesend Bay, while firefighting efforts continued.

The *Sea Witch* developed a port list after the vessels were separated. The starboard anchor of the *Sea Witch* was lying on the deck of the *Esso Brussels* and slipped into the water as the vessels were separated. The *Sea Witch* was towed stern first toward Gravesend Bay until the starboard anchor became taut. The anchor chain was severed and the vessel was beached. An anchor from the *Esso Brussels* was attached to the remaining anchor chain of the *Sea Witch* to provide an efficient anchoring arrangement. A decision was reached the next day between fire department officials and the Captain of the Port, New York to limit the amount of water introduced into the

Sea Witch to preclude the possibility of capsizing, as a port list of 18–20 degrees had developed. This decision limited the fire-fighting effort to extinguishing flareups in deck containers and cooling the exterior of the hull.

Coast Guard and commercial tugs with fire monitoring equipment lined up alongside the *Sea Witch* in an attempt to extinguish the container fire. The capacity of the combined monitors was relatively ineffective. The most effect fighting of the container fire was accomplished by the New York City Fireboats fitted with several high pressure monitors. The container fire aboard the *Sea Witch* continued to burn for about 2 weeks following the casualty. The fire within the No. 2 cargo hold was extinguished by CO2 flooding. Examination of the cargo holds after the fire was extinguished revealed considerable flooding water.

Subsequent to the collision, and after extinguishment of the major fires aboard the *Sea Witch,* boarding parties from the New York City Fire Department and the Coast Guard located two bodies aboard the vessel. The body of a Wiper was found lying in a prone position in the after athwartship boat deck passageway of the after superstructure. The body of the Third Mate was found lying in a prone position near the foot of the ladder on the main deck level in the vicinity of the carpenter shop.

On the night of the collision, the *Esso Brussels* was displaying prescribed anchor lights, and lights on the forward and after superstructures provided illumination on the decks. The deck anchor watch after midnight consisted of a Mate and Able Seaman. The vessel was lying approximately parallel to the Staten Island shoreline and swinging about 10° each side of a 330° True heading. The vessel's position was being periodically checked by radar ranges of nearby fixed structures and the shoreline. After midnight no cargo was being transferred, and all tank and ullage openings were secured. About 2 minutes prior to the collision, the Mate, who was on the bridge, heard a whistle signal from the approaching *Sea Witch.* The Able Seaman on watch on the port wing of the bridge heard the whistle, sighted the approaching ship, and advised the Mate on watch. Nearly the entire crew, except for the watch standers, were asleep or in their rooms preparing to go to bed.

The Mate, upon first sighting the *Sea Witch* and hearing her whistle, thought the vessel would pass astern; however, the *Sea Witch* continued to veer and upon realizing that a collision was imminent, he sounded the general alarm to alert the crew. The Mate proceeded to the port bridge wing as the collision occurred. The Mate described hearing the sound of impact followed by a rushing of air, then he saw flames rapidly engulfing the area of the collision. Immediately he and the seaman on watch left the bridge and prepared the forward port lifeboat for lowering. Fire which was advancing along the starboard side rounded the port bow and rapidly spread on the water under this lifeboat. They abandoned the attempt to lower the lifeboat and both ran aft outboard of the handrail on the port side.

The remainder of the crew had already started lowering the port after lifeboat. A large portion of the crew was in the lifeboat with the Master supervising the lowering operation. After the boat was waterborne some difficulty was experienced in releasing the boat and the falls had to be overhauled by hand to provide sufficient slack to release the falls. As the fire on the water approached, an engineer attempted to start the lifeboat's diesel engine. This engine was of the hand starting type and required manual release of compression while being cranked to obtain sufficient momentum of the flywheel. Due to overcrowding around the engine, difficulty in hand cranking was experienced and the engine could not be started. The crew then attempted to push the boat away from the vessel with oars, but this too was unsuccessful due to the current and wind which was holding the boat against the side of the vessel. As flames started to engulf the lifeboat some of the crew jumped overboard to get away from the flames and burning oil, and attempted to swim to the Staten Island side of the Verrazano-Narrows Bridge abutment.

The Tug *Grace McAllister* after arriving on the scene rescued 11 of these survivors who had drifted with the curent under the center span of the bridge. The remaining 15 survivors were picked up by other tugs, fireboats aud police boats who were searching the area.

The impact of the collision caused the stem of the *Sea Witch* to shear horizontally about 21 feet aft on both sides, about 10 feet above the load water line and some plating below this point to be driven aft about the same distance into the fore peak tank. One longitudinal and one transverse welded seam on the side shell fractured due to heat in the area of No. 3 cargo hold.

Cargo in containers on the weather deck was consumed or severely damaged by the fire. The shell frame of some of these containers and remnants of cargo was all that remained. Light exterior sheathing of these deck containers burned away exposing their contents to the fire. Wooden floors of the containers ignited and provided additional combustible material. Containers sheathed with plastic laminated wooden sides offered little resistance to the spread of fire and were consumed. Aluminum aud steel sheathed containers also eventually collapsed and burned from the intense heat which developed. The skeleton structures of many con-

tainers remained stacked with deck lashings in place after the fire was extinguished.

The containers stowed below deck, especially those in holds Nos. 2 and 3, were the most damaged by the fire. In the other cargo holds, damage from smoldering caused by the effects of the radiant heat through the hatch covers and the side shell was evident on containers stowed adjacent to these boundaries. The containers located on the starboard side showed the more severe effects of radiant heat. A vertical progression of fire through a tier of containers without affecting adjacent tiers was noted.

Paint on the exterior of the after superstructure was burned. Both lifeboats which were located aft were distorted, buckled and nearly consumed by fire. The engine spaces were free of fire damage, but both the engine spaces and the interior of the after superstructure suffered heavy smoke damage.

Port lights, although crazed in the main, were all intact. Staterooms along the starboard side of the deckhouses suffered fire damage which extended several feet inboard. The remainder of the interior suffered light to heavy smoke damage. The damage was most pronounced on the starboard side of the upper deck staterooms and storerooms in way of the side shell on the main deck level. There is evidence that draperies in the staterooms forward and to the starboard caught fire, but the flames did not spread. The exposed paint on the interior of the hull girder was burned on the starboard side and blistered on the port side. Heavy smoke damage occurred on the lower deck levels of the forward superstructure.

The containers on deck and in Nos. 2 and 3 holds continued to burn for many days after the casualty and the ship's supply of CO_2 was used by the New York City Fire Department to extinguish the last fire in No. 2 hold. After all fires were extinguished the containers on deck and containers within the holds were offloaded and surveyed. A systematic documentation of the location, extent of damage, structural details, effects of the fire and identification of cargo within the containers was undertaken by a joint group including owners, underwriters, Coast Guard, and MARAD representatives.

The bow of the *Sea Witch* penetrated the side shell in way of Nos. 7 and 8 starboard tanks severing No. 8 cargo tank top and the starboard king post of the *Esso Brussels*. The athwartships bulkhead separating Nos. 7 and 8 starboard tanks collapsed. The longitudinal bulkhead separating No. 8 starboard tank and No. 8 center tank was penetrated approximately 15 feet by the bow of the *Sea Witch*, allowing cargo from that tank to have free communication to the sea. The rupture of Nos. 7 and 8 starboard tanks and No. 8 center tank allowed approximately 31,000 U.S. barrels of cargo to be spilled and provided the initial fuel for the resulting fire. In addition approximately 1,000 U.S. barrels of cargo from the remaining cargo tanks were consumed in the fire.

Flames from the burning oil on the water ignited exterior paint and exterior combustibles. The resultant heat from the fire ruptured piping, melted brass components in ventlines and steam smothering lines, burned tank fitting gaskets which permitted the rapidly expanding vapors to escape and ignite contributing to the severity of the deck fire. The interior of both deckhouses was paneled with a pressed wood panel board which offered little resistance to the spread of fire. The engineroom and lower levels of the pumproom did not burn. The fire effectively consumed nearly all combustibles on and above the weather deck level and caused severe fire damage to those areas of the after deckhouse which were subjected to the intense heat.

After the fire was extinguished, asbestos material was used to seal tank tops and ullage and tank cleaning openings where gasket material had burned out. Flame screening material was used over severed and burned away piping to insure flame tightness of cargo tank boundaries. Wooden plugs were used to seal other pipe openings not required for tank venting. Offloading of the remaining cargo was accomplished through the vessel's existing piping by the use of a steam-driven stripping pump located in the pump room. An undamaged pump room cargo riser was used to transfer the cargo to the main deck level where cargo hoses were used to offload the cargo to barges alongside. The ability to use the stubs of the burned off valve stems protruding from the packing glands to open and close valves made possible the use of the vessel's internal cargo piping for the cargo transfer. Upon completion of the offloading the *Esso Brussels* was gas freed and a preliminary damage survey was started.

The bulk of oil spilled from the *Esso Brussels* was consumed in the fire which pocketed between the vessels as they drifted down the channel under the Verrazano-Narrows Bridge. Pollution from the residue of the cargo was recovered from Staten Island, Coney Island, Manhattan, and Jones Beaches, Sandy Hook and Nortons Point areas.

Conclusions

The primary cause of the casualty was the loss of steering control aboard the *Sea Witch*. The resulting collision, fire, and loss of life were caused by the high rate of speed—approximately 13 knots—at which the *Sea Witch* was proceeding. The engine was not backed or slowed as soon as the difficulty was determined and the full astern order just prior to the impact

was ineffective in reducing headway. The severity of the structural damage, the impaling of the vessels, and the ignition of the oil cargo may not have occurred had the force of impact been reduced. Without the fire there would have been no loss of life.

The cause of the loss of steering control was a failure of the universal coupling connection in the shaft between the hydraulic rotary power receiver units and the differential gear mechanism in the steering engine room. The three-sixteenths inch square key connecting the after half of the universal coupling to the differential gear mechanism stub shaft loosened, wore, and slipped out of the keyway and into the jaws of the universal. The Allen set screw, 90 degrees from the keyway in the hub of the universal also loosened allowing the input shaft from the hydraulic rotary power units to rotate the control shaft without transmitting this rotation to the differential gear mechanism. The backing out of the key at the moment of the casualty was due to the shaft torque, induced axial movement, and vibration while the vessel was proceeding at full ahead.

The control shaft was originally designed to allow axial motion through a feather key arrangement in the universal hub at the rotary hydraulic power unit end where it connects to the control shaft. The positive restraint imposed by the improper installation of a set screw at this hub probably caused axial thrust through components of the control shaft which resulted in abnormal stress on control shaft components and damage to gear tooth surfaces in the differential gear mechanism. This restraint caused the key in the differential gear mechanism stub shaft to loosen, wear, and slip out of position prior to the casualty.

This same restraint, in all probability, also had caused the wear in the original Woodruff key and keyway which had necessitated repairs in April 1973. The modification to the differential gear mechanism stub shaft and connecting universal conducted at that time, approximately 6 weeks prior to the collision, was improper. The milling of the stub shaft for the fitting of a square key to replace the originally designed captured or locked-in Woodruff key without a provision for securing the key allowed the new square key to slip out of position and permit free rotation of the shaft.

A redundancy of the steering gear control system in the linkage between the rotary hydraulic power units and the differential gear mechanism would have prevented this casualty. The absence of a secondary independent steering connection in that area placed undue reliance on the single control shaft linkage. The in-service reliability of this single linkage was poor as evidenced by the number of steering failures the vessel had experienced since being built in 1968. Had independent control shafts been installed between each rotary hydraulic power unit and the differential gear mechanism, with cross-over control provided on the bridge, transfer to the unaffected linkage could have been accomplished and steering control restored.

Despite the failure of the control shaft connection, the trick wheel connected to the differential gear mechanism could have been effectively used to position the rudder and steer the vessel. The absence of any emergency steering procedures whereby crewmembers would immediately man the after steering controls or provision to have persons standing by the trick wheel while transiting pilot waters precluded any timely shifting of the steering gear control to the after steering station in time to prevent the casualty.

The extensive loss of life of the crew on the *Esso Brussels* may not have occurred or may have been greatly reduced had there been no delay in releasing the lifeboat falls and had the hand-cranked lifeboat engine immediately started. A lifeboat engine equipped with an adequate hydraulic, electrical, or inertia starting system, could have provided rapid availability of propulsion power to get away from the burning oil which was encircling the lifeboat and the vessel.

The use of lights attached to the life preservers and retroreflective materials may have substantially assisted in locating survivors who drifted away from the vessels in the ebb current. The use of searchlights to pick up the international orange life preservers was minimally successful and almost totally ineffective where the life preservers were darkened by oil stains. An oil resistant covering on life preservers which prevents or reduces discoloration and the use of retroreflective material could provide improved detection. The recovery of all but one survivor from both vessels who attempted to swim to safety can be attributed to the wearing of life preservers. The use of whistles provided on the life preservers may have contributed to the reduction of the loss of life of the crew of the *Esso Brussels* by attracting the attention of rescuing vessels. Whether crewmembers used the whistle provided or if some limitation developed in the effectiveness of the whistles in the oily water environment was not determined.

The brass and bronze fittings on deck of the *Esso Brussels* associated with cargo tank venting and piping afforded little resistance to the fire and most burned away permitting vapors from the tanks and piping systems to add fuel to the deck fire.

The deckhouse interior furnishings and construction of the *Esso Brussels* which were primarily made of combustible materials were almost completely consumed by the fire. The complete and rapid spread of the fire through the living spaces of both deckhouses emphasized the absence of

structural fire protection aboard the vessel. Although the crewmembers departure from the vessel in a lifeboat was not successful, had they sought shelter aboard they probably would have perished in the deckhouse fire. The hazards of combustible construction within the accommodations of a tank vessel, prohibited by the recent IMCO Resolution A.213 (VII)., was clearly demonstrated in this casualty.

The ability of the crew of the *Sea Witch* to survive in the after deckhouse for a period of about 1 hour and the electrician for about 2 hours can be attributed to the structural fire resistance of the interior paneling and furnishings of the *Sea Witch*.

The rapid spread of smoke through the engineroom and after quarters complicated the survival efforts of the crew of the *Sea Witch*. The early abandonment of the engineroom because of the dense smoke, although it made little significant change in the outcome of this casualty, could have been a significant factor under different circumstances where positive steps to combat the fire or maneuver the vessel had to be taken by the crew. The securing of the engine ventilation fans did not preclude the introduction of smoke into the engineroom mainly because of the air being drawn into the engineroom by the forced draft fans supplying the boilers which were still being automatically fired. The inaccessibility of oxygen-breathing apparatus because of isolation by fire and smoke precluded any constructive efforts to activate engineroom systems or equipment. The stowage of the oxygen-breathing apparatus in a more accessible location in the after deckhouse could have permitted remanning of the smoke-filled engineroom.

The firefighting and survival efforts aboard the *Sea Witch* subsequent to the casualty were hampered by the limitations of the straight bore nozzles at the interior firehose stations. The subequent loss of emergency fire main pressure, about 10 minutes prior to the abandonment of the vessel, can be attributed to the many hoses left open, some without nozzles to restrain or reduce the flow. The lack of crew training in proper firefighting techniques is evident by the manner in which the hoses and the fire stations were left open thereby depriving the crew of firefighting capability prior to rescue. The proper use of combination type nozzles capable of solid stream, fog, and cut-off in one unit would have been more effective and prevented the loss of fire main pressure.

The deck cargo containers on the side of the vessel were first affected by the flames and heat surrounding the *Sea Witch*. The contents of those containers affected by the radiant heat, once they reached ignition temperatures, only required a source of oxygen to erupt into flames. The minor explosions heard on deck were most probably due to the rupture of containers and their contents from internal pressure of gases generated within the heated containers. Once the container ruptured the contents caught fire and spread inboard progressing from container to container. The fire accelerated as containers ruptured or were consumed exposing additional fuel to the fire. The spread of fire in a vertical plane between containers was probably accelerated by the ignition of the wooden floors of containers. The progress of the deck fire was uninhibited either by the small separation space between bays or the boundaries provided by the containers. The absence of an effective fire stop or separation of the deck containers, stewed three high across the vessel, essentially made the whole mass of containers react as a single unit to the fire situation. Although this fire started from a source external to the vessel it appears likely that a spread of a deck container fire from any source would progress through the mass of a comparable deck cargo in a similar manner. The absence of any effective fire stops to separate the deck cargo mass some 30 feet high over 320 feet in length and extending across the width of the vessel compounded the problem of fire containment.

The actions of many of the crewmembers of the vessels involved in assisting their shipmates, and of the numerous persons on the several tugboats, New York City Fireboats, New York City Police Launches, U.S. Corps of Engineers Patrol Boat, pleasure boats and Coast Guard units that were engaged in the rescue of survivors or firefighting were heroic and in a large measure minimized the loss of life and therefore are considered worthy of special recognition.

The suddenness and complexity of the disaster taxed the available resources of the Captain of the Port, New York. There was minimal coordination during the initial stages of the rescue effort and coordination of the on-scene forces developed after much time had lapsed. The search for survivors may have been more effective had a prearranged plan of disaster recovery heen formulated. Although no two disasters can be expected to present the same conditions, the general principles of coordination are basic. The lessons learned from this casualty along with an appreciation of the mutual interdependence and capability of the civic and private resources available, can be of immense mutual benefit to all sectors of the community in preparing for future emergencies. The immediate availability of New York City Fireboats in the harbor minimized the property loss and was directly responsible for the saving of the 32 persons who had taken shelter in the after deckhouse of the *Sea Witch*. Although there was a high loss of life and property as a result of this casualty, the loss from the same incident could have been multiplied many times had the

collision occurred under different prevailing weather and current conditions. Had the current been flooding rather than ebbing and had the wind been easterly rather than westerly, the two ships and the burning oil would have drifted toward the Staten Island shore and directly affected the other vessels occupying Federal Anchorages 23 and 24.

The availability of a common radiotelephone frequency Channel 13 (bridge to bridge) on which most vessels on scene communicated contributed to the effectiveness of rescue of survivors. The use of Channel 13 for port disaster communications, although effective in this instance, could be disruptive to vessels requiring this frequency for bridge to bridge navigational communications. The lack of a common communications channel between all forces on scene in a large part reduced the effectiveness of the searches for survivors.

The hull of both vessels remained intact after being subjected to intense heat, and this substantiates the suitability of steel as a structural material. The extensive damage sustained by the nonferrous fittings on the *Esso Brussels* and aluminum containers on deck of the *Sea Witch* also substantiate the suitability of steel as a structural component which can withstand disintegration due to shipboard fire.

Speed of vessels in New York Harbor is presently unregulated except for a regulation pertaining to vessels transiting an anchorage in the vicinity of moored vessels. The use of the word "moored" appears to be ambiguous since it is being interpreted as applying to vessels tied to mooring buoys and not applicable to vessels anchored within the anchorage area. The use of New York Harbor by increasingly larger vessels and the use of the general anchorage areas for lightering of deeply loaded tankers with the risk attendant with cargo transfer appears to require a harbor speed control in this area. Speed control would provide a margin of safety for reaction in event of a mishap to vessels entering and leaving port in the main channel which borders on the anchorages in New York Harbor. The common practice of using reduced maneuvering harbor speed by vessels recognizes the need for special precautions in congested waters where instantaneous maneuvering may be required. The practice followed by many large vessels when transiting the Kill Van Kull and Arthur Kill of having one or more tugs alongside or in immediate proximity to assist in the event of difficulty is prudent and recognizes the possibility of unexpected situations. Had a tug or tugs accompanied the *Sea Witch* until she cleared the anchorage this disaster may have been prevented or the results minimized.

The inservice reliability of the steering gear on this relatively new vessel was extremely poor. Vessel designers, operators, and regulatory agencies appear to devote insufficient attention to construction details of steering gear and steering control systems. Recordkeeping concerning maintenance, past difficulties, and repair was inadequate. If reports had been prepared and properly evaluated, corrective alterations or repairs might have been accomplished and the casualty prevented. Inservice tests during periodic inspections and prior to getting underway mainly check on the performance of the steering gear. Shipboard records of machinery history were not routinely kept and information about repairs and malfunctions were not passed on in a positive way between relieving engineers.

The oil spill into the waters of New York Harbor on the morning of 2 June 1973, was in violation of the Federal Water Pollution Control Act of 1972 and was caused by the release of oil from the ruptured tanks of the *Esso Brussels*.

The inability to drop the port anchor of the *Sea Witch,* when ordered about a minute before the collision, contributed to the high impact of the collision. Had the port anchor been able to be let go when ordered by the bridge the headway or heading of the *Sea Witch* may have been altered sufficiently to reduce the effects of the collision. There is evidence of negligence on the part of the Chief Mate, in that he wrongfully failed to check or have the freedom of the riding pawl checked on the port anchor chain to insure that the anchor was ready for letting go.

The failure of the Master and the Pilot to take timely action to stop the *Sea Witch* after the steering casualty was first reported was a contributing factor in both the cause and the severity of the effects of this casualty. Although harbor speeds of 13.5 knots and greater are considered common practice in this section of New York Harbor by experienced pilots, this speed of advance leaves little reaction time for vessels which may experience steering or engine difficulties as evidenced by this casualty and the grounding of the *Sea Witch* in the New York Harbor in 1969.

The investigation of this accident was hampered by the unfortunate loss of the Masters of both vessels and the officer on the bridge of the *Sea Witch* at the time of the collision. Vital information and bridge records on the *Sea Witch* which could, if available, shed light and provide valuable information on the steering and engine maneuvers were lost in the aftermath of the collision.

Commandant's Action

Recommendation: That the control shaft arrangement on vessels in service fitted with similar steering gear be specifically examined to ensure that the conditions which were

the primary cause of this casualty do not exist.

Action: U.S. vessels having similar steering gear were identified and the owners were notified on 13 June 1973, of the possibility of defects in the control shaft assembly. Also, on the same date, all Coast Guard Marine Inspection Units were notified by ALDIST 161. The American Bureau of Shipping was notified and the information was also published in Notice to Mariners releases. Subsequently, the steering gear of all the vessels was examined by Coast Guard marine inspection personnel.

Recommendation: That the Commandant initiate a review of current approved design and construction standards of steering gear control systems to determine if the single system of linkage aft of the rotary hydraulic power units in the steering engine room, as was installed aboard the *Sea Witch,* meets the intent of duplicity of steering gear control.

Action: The steering gear system as installed aboard the *Sea Witch* meets the requirements of duplicity as required by 46 CFR 58.25–25. However, the importance of steering gear reliability is recognized and research is being started into possible requirements which may include additional reliability factors in steering systems.

Recommendation: That the Commandant amend applicable regulations to require that approved combination firehose nozzles providing straight stream, high velocity fog and shutoff capability be installed at all fire stations.

Action: Concur. Action has been initiated to amend the regulations to require combination solid stream and water spray firehose nozzles at all firehose stations.

Recommendation: That in view of the inability to start the *Esso Brussels'* lifeboat engine the Commandant review the requirements and the suitability of lifeboat engines that only have hand crank starting capability.

Action: Concur. The matter of the means of starting lifeboat engines is under study and various methods and test results are being evaluated.

Recommendation: That a survey of the cargo, location of containers, hazardous cargo, and other container or cargo characteristics on board the *Sea Witch* be conducted to document the condition of the containers and cargo after the fire. The information obtained can be used to check the adequacy of existing container construction standards, sufficiency of container identification, cargo identification and possible need for additional shipboard fire protection standards in view of the rapid spread of fire through the containers during the fire.

Action: All containers on deck and within the holds were surveyed and a systematic documentation of their location and contents and the condition of the containers and their contents was made. Research into general container safety requirements is currently being conducted under a Coast Guard contract. Container fire tests are being conducted at the U.S. Coast Guard Fire and Safety Test Facility, Mobile, Alabama.

Recommendation: That speed control of vessels transiting the main channel of New York Harbor be initiated. A requirement for vessels to proceed at a speed sufficient for safe navigation and yet to provide a margin of safety, to maneuver or take corrective action to prevent or reduce the effects of a casualty in the event of difficulty warrants urgent consideration. This is particularly urgent since vessels using New York Harbor must pass though or adjacent to anchorages where large bulk carriers are anchored and at times off-loading hazardous materials into barges alongside.

Action: Coast Guard Captain of the Port, New York, has forwarded recommendations to Coast Guard Headquarters concerning speed limits in New York Harbor. The matter is being considered. Also under review are proposed changes to the regulations concerning the anchorages in the area.

Recommendation: That further study be conducted to develop methods whereby the spread of smoke within the interior of burning vessels could be prevented. Ventilation systems should be designed to provide manual or automatic means to not only prevent the spread of fire but also the spread of smoke.

Action: The applicable regulations (46 CFR 92.15–10(a)) do require a means to close off all vents and ventilators. The U.S. Coast Guard is monitoring a U.S. Navy study being conducted at the Navy Research Laboratory concerning the propagation of smoke through shipboard spaces. One method under consideration is the establishment of zones in which the atmosphere is maintained at an elevated pressure thereby excluding smoke.

Recommendation: That the applicable regulations for all vessels in ocean and coastwise service be amended to require that each life preserver be equipped with a waterproof battery-powered light and that retroreflective material be required on all life preservers.

Action: The Coast Guard will propose regulations, subject to rulemaking procedures, to require lights on all life preservers aboard inspected vessels.

The Maritime Safety Committee of the Intergovernmental Maritime Consultative Organization (IMCO) has proposed a recommendation that governments should encourage owners of all vessels to fit retroreflective material on lifesaving appliances and to report on any experiences. The Coast Guard has advised

the manufacturers of approved lifesaving equipment that they may use retroreflective material on the equipment. The Coast Guard has conducted tests using persons in water wearing life preservers fitted with retroreflective tape. These test observations, reports by other governments, and experiences in the use of other methods of improving detectability are being evaluated.

Recommendation: That the Commandant initiate efforts through the International Convention for the Safety of Life at Sea to require that all lifeboats for vessels in ocean or coastwise service be equipped with mechanical disengaging apparatus which will simultaneously release both boat falls from the boat when under tension.

Action: Chapter III of the International Convention for the Safety of Life at Sea, 1960, is being considered for complete revision by the Subcommittee on Lifesaving Appliances of IMCO and the matter of disengaging apparatus for lifeboats will be one of the areas under consideration. Mechanical disengaging apparatus for lifeboats is required for U.S. vessels.

Recommendation: The stowage location of the oxygen-breathing apparatus and emergency equipment should be carefully considered. Emergency equipment should be stowed above weather decks in the interior of the forward and after superstructures where they may not be isolated by collision, fire, or smoke and will be accessible from several avenues.

Action: An amendment to the International Convention for the Safety of Life at Sea, 1960, requiring fireman's outfits which include oxygen-breathing apparatus and other emergency equipment to be stowed convenient for use in widely separated accessible locations has been made. This was supported by the United States. Draft regulations have been prepared and are being considered within the regulatory rulemaking procedure.

Recommendation: That the District Commander with officials representing local, Federal governmental, and marine commerce review the adequacy of contingency plans to effectively coordinate all resources to minimize effects of large catastrophies that may occur in New York Harbor.

Action: Concur. The use of conferences, seminars and critiques for this purpose is described in section 0615 of the Coast Guard Addendum to the National Search and Rescue Manual (CG–308).

Recommendation: That the Commandant should consider the feasibility of a requirement for merchant vessels for a recording device, similar to that installed on commercial aircraft, that will preserve vital information subsequent to fire or submergence.

Action: The primary purpose of a flight recorder is to reconstruct events in the case of a nonsurvivor crash. Unlike the aircraft accident, very seldom are there vessel casualties that kill everyone immediately concerned or those persons that are witnesses to the accident.

It is agreed that in certain incidents a record of courses and speed changes and certain other operational functions would provide facts which would assist in determining the cause of the casualty. However, the number of incidents where such information would lead to improved vessel safety is not considered sufficient to justify the cost of providing and maintaining the equipment necessary to record and protect the information.

Recommendation: That further investigation under the Suspension and Revocation Proceedings be initiated in the case of the Chief Mate, in that he failed to have the port anchor clear for letting go.

Action: This matter was forwarded to the appropriate Officer in Charge, Marine Inspection, and action was initiated.

Recommendation: That a copy of this report be forwarded by the Commandant to the State pilot commission for further action on their part against the State license of the Pilot, in accordance with the agreement with the American Pilots' Association, since the *Sea Witch* was sailing under registry at the time of the casualty and the pilot was serving under the authority of his State license.

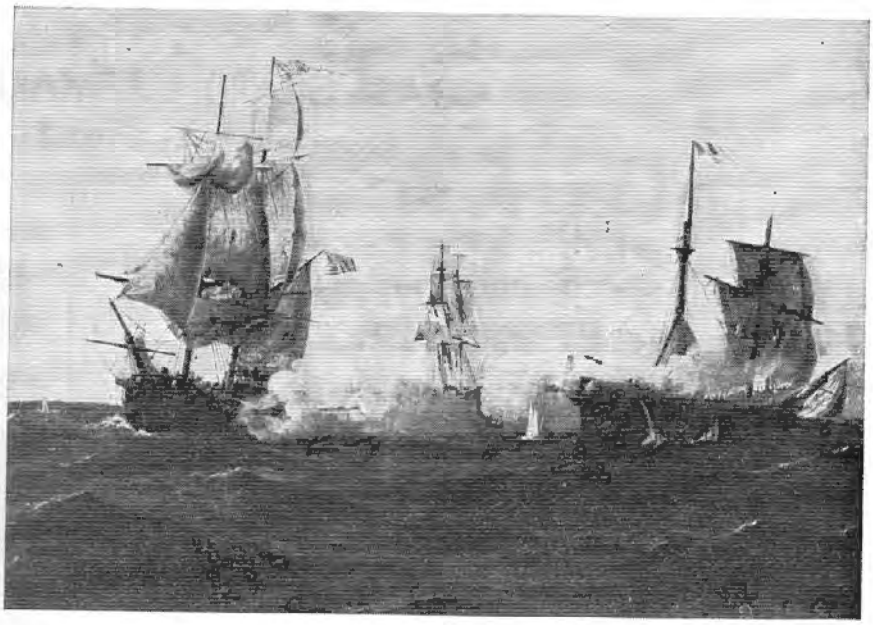
Action: A copy of the report was forwarded to the State pilot commission for their information. It should be noted that the Coast Guard agreement with the American Pilots' Association has been abrogated.

It must be borne in mind that the tragic loss of the master and watch officer on the bridge of the *Sea Witch* at the time of the collision seriously hampers any attempt to accurately reconstruct the events and conversations which preceded the collision.

On the basis of the facts as known, it would appear that the pilot's actions in response to the sudden emergency, *i.e.* his blowing of whistle signals (danger), and his orders directing the engine full astern and to drop the anchor were proper and all that would be expected of a pilot in that situation. The apparent tardiness of the action to order the engine reversed is extremely regrettable. However, it is considered that this was an error in judgment rather than a matter of negligence.

The National Transportation Safety Board, in their review of the Coast Guard Board of Investigation report, concurred with the Coast Guard's recommendations. Additionally, by a split three to two vote, the NTSB made a recommendation that the Coast Guard, "initiate research to develop a technical guide for the design of *nonpenetrating* ships' bows [Italics added.]. The scope of protection sought as to vessel types and collision speeds should be determined by risk analysis, but should not be less than that which would protect typical modern tankers in collisions with similar vessels at a speed of 6 knots.".

Heritage



Just 30 years after the conclusion of the revolution the United States was again at war. The continued seizure of U.S. merchant ships by the British fleet which was blockading French ports and the impressing of some 4,000 U.S. merchant seamen into the British navy forced Congress to declare war on June 18, 1812. Once again the swift cutters of the Revenue Marine would play an important role in defending American waters.

On the 16th of October 1814, the cutter *Eagle* under the command of Captain Frederick Lee, prepared to leave New Haven harbor in pursuit of the mail packet *Susan*. The *Susan* had recently been captured by a tender, disguised as a wood sloop, of the British frigate *Pomone*.

Due to the unseasonably calm weather Captain Lee was forced to put two longboats over the side and the *Eagle* was towed from the harbor. Once on the sound the wind freshened and the cutter made her way towards Long Island searching all night for the *Susan*.

The pale light of early morning found the *Eagle* sonth of Falkner Island and faced with a desperate situation. Now, nearly becalmed, Captain Lee found his small vessel within range of a British force composed of the 18-gun brig *Dispatch*, the *Susan*, and a third smaller tender vessel. In a desperate attempt to escape the superior force, Captain Lee ordered the sweeps manned and again put two boats out to tow the *Eagle*. It was not long before it became evident that the two smaller craft of the British fleet would soon overtake the struggling *Eagle*.

As the two vessels closed a withering volley of round shot and grape shot from the *Eagle's* guns forced the two vessels to shear off and await the arrival of the *Dispatch*. This momentary lull allowed Captain Lee to beach the cutter near Negro's Head on the north shore of Long Island and unload her two 4-pound guns and her two 2-pounders. The guns, shot, and powder were dragged up the steep bluff overlooking the beached *Eagle* and made ready.

The *Dispatch*, now in position, began to alternate broadsides between the hillside positions and the helpless *Eagle*. The accuracy and tenacity of the *Eagle's* cannoneers and riflemen prevented repeated attempts to board the *Eagle*. The angry exchange of cannon fire continued throughout the day and night, and into the next morning.

When the *Eagle's* crew ran low on shot, British rounds were dug from the hillside and unceremoniously returned. At one point during the battle the *Eagle's* crew ran low on wadding. Volunteers were sent to the beached vessel to replenish supplies. While they were on board the masts were shot away. The hardy crewmen, in an act of defiance, raised the colors on the stern of the battered vessel. This raised a cheer from the bluff which was quickly answered by a full broadside from the British man-of-war.

The pitched battle continued into the early morning of the second day with the *Eagle's* crew reduced to using the ship's log books for wadding. About midmorning the British, conceding the battle a standoff, sailed off leaving the *Eagle* severly damaged but uncaptured.

A few days later the British were to capture the *Eagle* as she limped along the coast, with a reduced crew and makesift rigging, seeking a safe harbor to repair the damage sustained during the battle off Negro's Head.

The final fate of the *Eagle* is unknown but it is reasonable to assume that the British refitted the swift cutter and pressed her into service. On December 24, 1814, a peace treaty was signed at Ghent that brought the war to a close.

COAST GUARD RULEMAKING

(Status as of 1 April 1976)

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
BOATING SAFETY							
Lifesaving devices on white water canoes & kayaks (CGD 74–159) comment period extended 6–12–75	2– 4–75		7–15–75	X			
Safe loading and safe powering standards (CGD 73–250)	3– 6–75		4–21–75			9–23–75	3–23–76
Boats and associated equipment (CGD 75–110)	9–19–75		11– 5–75			3–18–76 Corrected 3–25–76	9–15–76
BRIDGE REGULATIONS							
Matanzas River, FL (CGD 75–024)	1–29–75		3– 4–75			3–18–76	4–19–76
Fox River, WI (CGD 75–035)	2– 6–75		3– 7–75	X			
Mystic River, MA (CGD 75–053)	3–27–75		4–29–75	X			
West Palm Beach Canal, FL (CGD 75–070)	3–27–75		4–29–75	X			
Illinois River, IL (CGD 75–060)	4– 1–75		5– 6–75			3–18–76	4–19–76
Duwamish Waterway, WA (CGD 75–097)	5–13–75		6–30–75			3–11–76	4–12–76
Tombigbee River, AL (CGD 75–153)	8– 5–75		9– 5–75			2–23–76	3–29–76
Clearwater Pass, FL (CGD 74–299)	8–12–75		9–12–75	X			
Indian River, FL (CGD 75–180)	10–30–75		12– 2–75			2–12–76	3–15–76
Chehalis River, WA (CGD 75–179)	11– 4–75		12– 9–75			2–23–76	3–29–76
Bayou Grosse Tete, LA (CGD 75–215)	11–21–75		12–31–75			2–23–76	3–29–76
Old Fort Bayou, MS (CGD 75–214)	11–21–75		12–31–75			2–23–76	3–29–76
Norwalk River, CT (CGD 75–216)	11–21–75		12–31–75	X			
St. Lucie River, FL (CGD 72–168)	11–21–75		12–31–75	X			
Tacoma Harbor, WA (CGD 75–195)	11–21–75		12–31–75	X			
Lake Champlain, VT (CGD 75–222)	12– 8–75		1– 9–76	X			
Dutch Kills, NY (CGD 75–231)	12–22–75		2– 5–76	X			
Shrewsbury, NJ (CGD 75–241)	2– 2–76		2–20–76	X			
Missouri R. IA (CGD 75–244)	2–26–76		3–12–76				
Mitchell River, MA (CGD 76–014)	2–19–76		4– 5–76				
Old Brazos River, TX (CGD 76–024)	3–11–76		4–12–76				
Housatonic River, CT (CGD 76–034)	3–15–76		4–20–76				
MARINE ENVIRONMENT AND SYSTEMS (GENERAL)							
Pipelines, lights to be displayed (CGD 73–216)	9–19–74 Corrected 10–18–74	10–21–74	11– 4–74	X			
Oil and hazardous substance liability (CGD 73–185)	12– 4–74		1–16–75			3–25–76	4–26–76
Demarcation line, Guayanilla Bay, PR (CGD 73–287)	6–18–75		8– 4–75			2– 5–76	3– 8–76

Coast Guard Rulemaking—Continued

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
MARINE ENIVIRONMENT AND SYSTEMS (GENERAL)—Continued							
Demarcation line, San Carlos Bay, FL (CGD 75–235)	1– 2–76	.....	2–18–76	....	.....	3– 1–76	3– 1–76
Visual identification of tank barges (CGD 75–039)	2– 5–76	.....	3–16–76	....	.....	.....	.....
	Corrected 2–23–76						
Anchorages, Port of New York (CGD 74–194)	3– 1–76	.....	4–15–76	....	.....	.....	.....
Anchorages, Boston Harbor, MA (CGD 76–40)	3–29–76	.....	5–14–76	....	.....	.....	.....
MERCHANT MARINE SAFETY (GENERAL)							
Bulk Dangerous Cargoes, Inspection of Barges (CGD 73–271)	3–11–74	4–15–74	4–30–74	X	.....	.....	.....
First Aid Certificates (CGD 73–272)	4– 2–74	.....	6–15–74	....	.....	.....	.....
	Supp. Notice 12– 1–75	.....	1–16–76	X	.....	.....	.....
Carriage of Solid Hazardous Materials in Bulk (CGD 74–13)	5–15–74	7–16–74	8–31–74	X	.....	.....	.....
Licensing and certificating; apprentice mate endorsement (CGD 74–226); Comment period extended 3–7–75	1–23–75	.....	4– 9–75	X	.....	.....	.....
Metal borings, shavings, turnings, and cuttings (CGD 75–133)	8– 1–75	.....	9–15–75	X	.....	.....	.....
Marine occupational safety and health standards (CGD 75–101); Advance notice; comment deadline extended 12–11–75	8–11–75	.....	1–15–76	X	.....	.....	.....
Tank vessels; air compressors, cargo handling room bilges (CGD 75–017)	8–13–75	.....	9–29–75	X	.....	.....	.....
Civil penalty procedures (CGD 75–123)	9–11–75	.....	10–27–75	....	2–19–76	.....	.....
Vessel inspection regulations (CGD 75–074)	9–16–75	.....	10–31–75	X	.....	.....	.....
Fire hydrants and hose (CGD 74–60)	9–23–75	.....	11–10–75	X	.....	.....	.....
Electrical cable splicing (CGD 74–305)	10– 8–75	.....	11–24–75	X	.....	.....	.....
Great Lakes pilotage rates (CGD 75–175)	10–31–75	.....	12– 1–75	....	.....	3– 1–76	4– 1–7
Fire and boat drills on passenger vessels (CGD 75–009)	12–17–75	.....	1–26–76	X	.....	.....	.....
Structural fire protection (CGD 75–032)	12–22–75	.....	2– 5–76	X	.....	.....	.....
Unmanned barges carrying certain bulk dangerous cargoes (CGD 75–226)	3–15–76	.....	4–29–76	....	.....	.....	.....

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 will be recorded. Proposed changes which have not been placed formally before the public will not be included.

Nautical Queries

The following items are examples of questions to be included in the new Chief Engineer and Master multiple choice examinations which are expected to be in use by September 1976.

Deck

1. Which great circle is always needed to form the astronomical triangle?
   A. Celestial Equator
   B. Longitude
   C. Celestial Meridian
   D. Prime Vertical Circle

2. For vessels fitted with cargo gear, an initial test of the units under a proof load shall be conducted, followed by complete dismantling and thorough examination of the gear and its parts. Subsequent tests and exams of the same nature shall be carried out at what time interval?
   A. 1 year
   B. 3 years
   C. 4 years
   D. 5 years

3. The most important figure in the calculation of free surface for a tank carrying liquids is:
   A. depth.
   B. length.
   C. displacement.
   D. breadth.

4. The quantity of fuel required to be carried in a motor lifeboat is
   A. such quantity as is required for 24 hours continous operation.
   B. such quantity as is required for 48 hours continuous operation.
   C. 55 gallons of fuel.
   D. 90 gallons.

5. You are steaming at a speed of 10.5 knots and consuming 7 barrels of fuel per hour. If you increase speed to 11 knots, what will be your new consumption?
   A. 7.3 bbls.
   B. 7.7 bbls.
   C. 8.0 bbls.
   D. 9.1 bbls.

Engineers

1. In the converging hydrodynamic wedge formed in the oil film within a rotating journal bearing, the pressure is greatest at the
   A. top of the bearing.
   B. bottom of the bearing.
   C. trailing edge of the wedge.
   D. leading edge of the wedge.

2. Increasing the journal load or unit pressure in a rotating journal bearing tends to
   A. decrease the minimum fluid film thickness.
   B. increase the fluid film velocity.
   C. decrease the journal eccentricity.
   D. increase fluid film turbulence.

3. A small capacitor can be tested using a megohmmeter. What indication should the meter give when connected to a capacitor having poor insulation?
   A. The meter pointer should immediately swing to the maximum resistance value for the insulation.
   B. The meter pointer should swing to zero then gradually climb the scale with slight pointer movements back downscale.
   C. The meter pointer should first swing quickly to zero then move rapidly up the scale.
   D. The meter pointer should swing to a high reading then gradually decrease.

4. Which malfunction in the engineroom propulsion control console could cause excessive shaft r.p.m. when the autorotation circuit is energized during maneuvering?
   A. A weak signal from the autorotation gate
   B. A malfunction in the revolution counter scaler
   C. A faulty "shaft stopped" alarm
   D. A faulty timing counter in the throttle command circuit

5. Voltage gain is achieved in a transistor circuit because the
   A. collector to base current is high.
   B. low load resistance is reverse biased.
   C. emitter to base resistance is low.
   D. high load resistance is forward biased.

Answers

Deck
1. C 2. C 3. D 4. A 5. C
Engineers
1. C. 2. A 3. B 4. D 5. 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 $50 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, 6–18–75.
115	Marine Engineering Regulations (6–1–73). F.R. 6–29–73, 3–8–74, 5–30–74, 6–25–74, 8–26–74, 6–30–75.
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, 6–11–75, 8–20–75, 9–2–75, 10–14–75, 12–17–75, 1–21–76, 1–26–76, 2–2–76.
169	Rules of the Road—International—Inland (8–1–72). F.R. 9–12–72, 3–29–74, 6–3–74, 11–27–74, 4–28–75, 10–22—75, 2–5–76, 3–1–76.
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, 4–16–75, 4–28–75, 10–22–75, 2–5–76.
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids.
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, 10–14–75, 12–8–75, 1–8–76.
182	Specimen Examinations for Merchant Marine Engineer Licenses (Chief Engineer and First Assistant.) (1–1–74).
182–1	Specimen Examinations for Merchant Marine Engineer Licenses (2d and 3d Assistant) (4–1–75).
184	Rules of the Road—Western Rivers (8–1–72). F.R. 9–12–72, 12–28–72, 3–8–74, 3–29–74, 6–3–74, 11–27–74, 4–16–75, 4–28–75, 10–22–75, 2–5–76, 3–1–76.
190	Equipment List (8–1–72). F.R. 8–9–72, 8–11–72, 8–31–72, 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, 4–12–73, 4–26–73, 6–1–73, 8–1–73, 9–18–73, 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, 2–19–75, 3–18–75, 3–19–75, 4–9–75, 4–16–75, 5–1–75, 5–7–75, 6–2–75, 6–25–75, 7–22–75, 7–24–75, 8–1–75, 8–20–75, 9–23–75, 10–8–75, 11–21–75, 12–11–75, 12–15–75, 2–5–76, 2–23–76, 3–18–76.
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, 9–26–74, 3–27–75, 6–2–75, 7–24–75, 8–13–75, 12–11–75.
*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, 3–27–75, 7–28–75, 8–20–75, 12–11–75.
227	Laws Governing Marine Inspection (7–1–75).
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, 1–6–75, 1–29–75, 4–22–75, 7–2–75, 7–7–75, 7–24–75, 10–1–75, 10–8–75.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (4–1–73). F.R. 12–22–72, 6–28–73, 6–29–73, 8–1–73, 10–24–73, 12–5–73, 3–18–74, 5–30–74, 6–24–74, 1–15–75, 2–10–75, 8–20–75, 12–17–75.
258	Rules and Regulations for Uninspected Vessels (5–1–70). F.R. 1–8–73, 3–2–73, 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, 4–22–75.
*266	Rules and Regulations for Bulk Grain Cargoes (5–1–68). F.R. 12–4–69, 8–20–75.
268	Rules and Regulations for Manning of Vessels (12–1–73).
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, 2–10–75, 12–17–75.
329	Fire Fighting Manual for Tank Vessels (1–1–74).
439	Bridge-to-Bridge Radiotelephone Communications (12–1–72). F.R. 12–28–72, 3–8–74, 5–5–75.
467	Specimen Examinations for Uninspected Towing Vessel Operators (10–1–74).

CHANGES PUBLISHED DURING MARCH 1976

CG–169 & 184, Federal Register of March 1.

CG–190, Federal Register of March 18.

*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 on availability and prices.