PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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The Loss of the *Texaco-Oklahoma*

PROCEEDINGS

OF THE

MARINE SAFETY COUNCIL

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COVERS

FRONT COVER: The SS *Texaco-Oklahoma*'s splitting and sinking off Cape Hatteras, N.C., is the subject of this month's feature.

BACK COVER: *Deep River*, one of the underwater work boats built and operated by Perry Oceanographic, Inc., of Riviera Beach, Fla. The future of manned undersea activity seems brighter now than in the past few years. The Coast Guard Underwater Safety Project, established in 1968, is working together with industry and other Government agencies to insure the safe growth of undersea activity. Among its duties are development of future certification procedures and regulations, and planning for search and rescue of submersibles. In a future edition of the *Proceedings* we hope to present a feature article on the Underwater Safety Project.

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Lieutenant (jg) A. W. Vander Meer, Jr., Editor

THE LOSS OF THE *TEXACO-OKLAHOMA*

IN THE EARLY HOURS of Saturday morning, March 27, 1971, some crewmembers of the stern portion of the SS *Texaco-Oklahoma* heard a loud crack followed by a bumping sensation. The vessel had split into two sections in the vicinity of No. 5 tanks, just aft of the forward deckhouse. The men on the stern section, though not aware of exactly what had happened, passed the alarm to the others who were asleep. A group raced to the starboard side to prepare the No. 3 lifeboat for launching where they saw the vessel's forward section, tilted bow up, drifting down on them from ahead. Crewmen saw an apparent signaling by flashlight from the wheelhouse on the bow section, as the starboard bow struck against the starboard side of the stern section. The flashing light was the last sign of life seen on the bow section which rubbed against the side of the stern section destroying No. 3 lifeboat and its davits and generating enough heat to burn paint on the bulkheads of the engineroom. The stern section was successfully backed away from the bow section in order to avoid further damage. The bow of the tankship drifted away and out of sight. Thus with a forward pitch and starboard roll in stormy seas off Cape Hatteras, N.C., began a casualty which claimed 31 lives.

The final voyage of the *Texaco-Oklahoma* began at Port Arthur, Tex., on March 22, 1971, when the vessel completed loading its cargo of 220,000 barrels of fuel oil and departed, manned by a crew of 44, bound for Boston, Mass. For 3 days the voyage was routine as the *Texaco-Oklahoma* followed a normal route at full speed of 93 r.p.m. By March 25 the tankship was heading northerly, off the east coast of Florida and had begun to encounter heavy weather. By the next day wind and sea conditions had intensified. Now the ship's course had to be temporarily changed whenever it was necessary for a crewmember to go out on deck. In the hours between 4 and 8:30 p.m. progressively slower speeds of 75, 65, 60, and finally 50 r.p.m. were ordered due to the heavy seas. The ship had earlier been slowed to 86 r.p.m. so that some of the propulsion steam

The SS Texaco-Oklahoma *prior to her loss with 31 deaths. The approximate location of the fracture is indicated by the arrow.*

could be used to heat the cargo for unloading at Boston. By the time of the last speed reduction the *Texaco-Oklahoma* was in the midst of whole-gale sea conditions: 30- to 40-foot waves washed over her decks and 60- to 65-knot winds blew from the north-east. The tankship was rolling and pitching moderately to heavily.

It was 3:30 Saturday morning when the *Texas-Oklahoma* split in two; 13 men, including the master and the other deck officers were left on the bow section. Remaining on the stern section of the ship were 31 persons. But for a slight trim by the head, the men found the stern section little affected by the casualty. Shortly after 4 a.m. the port boiler was secured due to signs of possible salting and since the starboard boiler supplied all needs for steam. Crewmembers rigged plumb bobs to keep track of any changes in trim and list. In this way they could detect early signs of failures in the cargo tanks forward.

Shortly after the *Texaco-Oklahoma* split, the crew took steps to help effect their own rescue and to prepare to abandon their crippled half-ship should that become necessary.

The stern section was equipped with two lifeboats, one 15-man inflatable liferaft, life preservers, and ring buoys. Prior to the casualty, the port lifeboat had been stripped for maintenance. Placing this boat out of service was permissible under regulations since the remaining operable lifeboats could accommodate all the men aboard (46 CFR 33.25–15). But now two lifeboats had drifted away aboard the bow section and the bow section had destroyed the starboard lifeboat on the stern section, so the crew restored the port lifeboat to an operating condition and made it ready for launching. Meanwhile, other men constructed two rafts—one of three empty oil drums and the other of two oil drums.

Other crewmembers set up the lifeboat emergency radio transmitter, a manually operated Mackay Type 401. In the automatic mode the radio transmits alternate SOS and auto alarm signals on 500 KHz and SOS and direction-finder signals on 8364 KHz. Its optimum range on 500 KHz is estimated at 100 miles. In the manual mode, the unit acts as a receiver on either frequency selected and transmits Morse code when the manual key is operated. An antenna with support halyards, a collapsible mast, a ground wire, instructions and a copy of the Morse code are provided with the unit.

The radio operator who normally serviced and tested the emergency transmitter had been aboard the bow section. None of the men on the stern was familiar with the operation of the unit or knew Morse code. They did read the detailed instructions for rigging and operating the transmitter. The antenna and ground wire were rigged on the poop deck while the transmitter was tuned inside on the mess deck. Survivors could not remember if or how the antenna was attached during tuning. Proper attachment of the antenna and ground wires and proper operation of the tuning dials were critical to the operation of the transmitter. For proper tuning, four controls had to be manipulated in the proper sequence. The unit was equipped with a neon light which flashed with the transmitted signal. Also available were earphones enabling a person to listen to the receiver when operating in the manual mode.

The unit was equipped with an artificial antenna so that when someone was testing it no signals would be sent to activate auto-alarms or to indicate a false distress situation to nearby ships. The transmitter could be stowed without removal of the artificial antenna and the regular antenna could be installed with the artificial antenna still in place. No one is sure whether the artificial antenna was attached at the time of the *Texaco-Oklahoma*'s distress.

Once the transmitter was tuned on the mess deck, it was moved to the poop deck where it was handcranked by pairs of crewmembers in turns. The crew operating the transmitter were unsure about the operation of the neon signal light. Some thought it glowed intermittently, one thought he saw it flicker only once, others thought it glowed for a time but finally went out. The crew continued cranking the transmitter, however, because they reported hearing code signals through the earphone, although they were not designed to function when the set was in the automatic mode. They also heard code signals on a recreational radio receiver and assumed these signals were coming from the emergency transmitter. Later, they heard a news broadcast reporting that a search was underway for a tanker that had broken up at sea. "Our signals have been received," they thought "and help will be here soon." Unknown to them, the news report was related to an alleged distress of a ship with the call sign ZBZE some 600 miles away from the distressed stern section's position. The *Texaco-Oklahoma*'s call sign was KAHM. The Coast Guard conducted an air search and, assisted by a naval aircraft and three merchant ships scoured an 11,250-square-mile area finding no distress. By 8:12 p.m. on March 27 the distress broadcast was canceled and the incident was evaluated as a hoax. The sign ZBZE could not be authenticated.

At about 6 a.m. on Saturday the bow section reappeared and drifted down toward the stern section of the *Texaco-Oklahoma*. This time there were no signs of the 13 men who had been aboard that section when the tankship broke apart. The stern section was once again backed away and visual contact with the bow section was lost. The bow section was never to be seen by anyone again. That section had been equipped with two lifeboats, life preservers, and ring buoys. In addition, one 10-man liferaft had been installed to permit automatic release and inflation in case the ship went down. This raft was never recovered.

At 6:30 a.m. a ship passed within 8 miles of the crippled stern section—by now merely a huge drifting liferaft for the 31 men aboard it. A second ship passed at about 5 p.m. As each ship came within view the crew of the *Texaco-Oklahoma* fired several flares which were apparently not seen. A third vessel, later identified as the MS *Bougainville* was seen by the tankship's crew who sent up more flares, blew their whistle signal repeatedly, and rigged a large red light which they blinked along with some of the white deck lights. The master of the *Bougainville* stated later that due to dangerous sea conditions he could not change course to come closer than 5 miles to the stern section though he did notice the flares and the light signals. He tried to establish communication by radio and by flashing light in response to the observed blinking on the stern section. Neither mode succeeded. The *Bougainville* then communicated with the Coast Guard and asked whether there was any known distress. When the Coast Guard reported that there was none, the *Bougainville* reported that the light signal had changed to red over white (international lights for fishing vessels) and that now nothing appeared wrong. Checking with the Navy, the Coast Guard found that the service was not conducting any special operations in the area and told the *Bougainville* that they were probably seeing a foreign fishing vessel. After having spent some 2½ hours in the vicinity of the stern section, the *Bougainville* sailed away.

During the evening hours on Saturday, the men on the stern section, still in heavy weather with pounding seas, began to find themselves in deeper trouble. At about 8:30 the seas carried away the port lifeboat which had been swung out and made ready for launching. At some undetermined moment, between 12 and 24 hours after the crew had begun working the emergency transmitter, one of the two crank handles on the unit broke and the shaft seized. During the period while the transmitter was being cranked some 18 to 30 ships were within 120 miles of the stern section's distress. Yet no ship or shore station reported hearing the distress signals. By Saturday midnight the crew's attempts to attract attention to their plight had apparently failed; their lifesaving equipment had been reduced to one inflatable liferaft, the two improvised rafts, and what life preservers and ring buoys there were aboard, and the forward end of the stern section had begun to sink gradually.

By 2:00 Sunday morning, March 28, the engineers had become convinced that the stern section would eventually sink. At 3:30 the trim had reached 30° by the head and the engineers began securing all machinery. At 4:10 a.m. the steam-driven generators kicked out, and the emergency generator picked up the load. Now there was a small amount of water at the forward ends of the passageways in the deckhouse. The engineroom was still dry. At about 5:30 the pitch had increased to 50° and it was decided to abandon ship.

The 31 crewmembers who had been stranded on the stern section assembled aft and donned life preservers. Some also carried ring buoys. The inflatable liferaft and the two improvised rafts were thrown over the side from the poop deck and were held alongside by the painters. A Jacob's ladder was rigged from the poop deck to permit debarkation. The inflatable liferaft inflated properly but the water swept it under the projecting davit arm for the No. 3 lifeboat which collapsed the liferaft's canopy. The first crewmembers to reach the raft could not go inside the raft, therefore, but scrambled on top of the collapsed canopy. About 14 or 15 men had climbed aboard the rubber liferaft, while the remainder, covered with cargo oil and tossed by waves tried vainly to cling to the oil-slicked improvised rafts which repeatedly tossed and flipped over in the rough seas. When all 14 or 15 had boarded the inflatable liferaft, its painter broke. As it and its passengers drifted away, a cargo tank on the stern section suddenly ruptured, releasing a large wave of oil which washed all the men from the raft. Eleven men managed to get back on the inflatable raft; four others grabbed a large board and hung onto it. The remainder of the 31 drifted away, supported in the water by their life preservers. The 11 men on the liferaft, weak and sick from swallow-

THE *TEXACO-OKLAHOMA*

Measuring 632 feet in length, 90.4 feet in breadth, and 45.4 feet in depth, the *Texaco-Oklahoma* was one of a class of 14 tankships built between 1956 and 1959. The ship had a common tank vessel configuration with a deckhouse at the forward one-third point containing the deck officer's quarters, radio room, and navigation bridge. Machinery spaces and living quarters for the remainder of the crew were contained in the after section of the ship.

The propulsion plant consisted of twin boilers driving a 15,000-horsepower steam turbine geared to a single propeller. Thirty individual cargo tanks were formed by two longitudinal and 11 athwartship bulkheads subdividing the main hull. The peak tanks, deep tanks, fuel tanks, feed, and portable water tanks were located forward and aft of the cargo tanks.

Design and construction of the *Texaco-Oklahoma* had been approved by the U.S. Coast Guard; her hull and machinery were certificated by the American Bureau of Shipping (ABS) at its highest classification. Except for eight riveted longitudinal shell plating seams and a riveted gunwale plate, the vessel was of all welded steel construction.

ing oil and sea water, watched what was left of the *Texaco-Oklahoma* assume an angle of 90° and sink at 6:05 a.m. Sunday, March 28, 1971.

The men on the liferaft drifted, sighting two passing ships and one aircraft and failing to attract attention to themselves. Finally they were able to erect the canopy and move inside its shelter where they found the equipment kit, used some of the food and water it contained, and set aside the flares for use at night. There they remained until they heard a ship's whistle. It was the Liberian tankship *Sasstown*, which by chance, had sighted the raft. After several passes, the *Sasstown* was able to throw a line to the raft and rescue the 11 survivors, bringing them aboard by way of a Jacob's ladder at about 5:00 Sunday afternoon. The survivors had been adrift on the raft for 11 hours.

The *Sasstown* immediately reported the rescue and her position to the Coast Guard at Portsmouth, Va.—giving the first notice that the *Texaco-Oklahoma* had been sunk. This information spurred an extensive air and surface search for other survivors by the Coast Guard, the Navy, and the Marine Corps, and by six Texaco ships. The *Texaco-Nebraska* found and rescued one survivor, afloat in a life preserver in the 74° water at about 1:20 p.m. Monday and another—also afloat in his life preserver—about 2 hours later. The search continued until the afternoon of April 3. Two bodies without life preservers were sighted but not recovered. An oil slick and some debris were found, but the search resulted in no other survivors and no evidence of either the bow section or its inflatable liferaft being found. Of the 44 crewmembers who sailed aboard the *Texaco-Oklahoma*, 31, including the 13 on the how section and 18 others, are presumed dead. Thirteen men survived.

After the tankship split, the stern section had remained afloat some 26½ hours. It was about 11 more hours before notice of the casualty reached anyone ashore. The routine coastwise voyages made by the *Texaco-Oklahoma* normally took 5 to 7 days from Port Arthur to northeast coast ports. Following company procedure, on departure from Port Arthur on its last voyage, the *Texaco-Oklahoma* filed an estimated time of arrival (ETA) of 6 a.m. Sunday, March 28, with its Boston marine superintendent. The vessel was required, under the same procedure, to send another ETA 72 hours before arrival. Thereafter revisions were required between 24 and 48 hours before arrival (but only if a change in excess of 2 hours in the ETA was expected) and within 24 hours before arrival (but only if a change in excess of 1 hour was expected). When, between 8 and 9 a.m. on Sunday the Boston Texaco marine superintendent was notified that the *Texaco-Oklahoma* had not arrived to pick up her pilot as scheduled, he attempted unsuccessfully to contact the vessel through commercial marine radio. He then inquired of the Coast Guard in Boston whether there had been any communication from or about the *Texaco-Oklahoma*. Informed there had been none, at about 9 a.m. he notified the Texaco operations office at Port Arthur, Tex., of the situation. At 3 p.m. this information was received by Texaco's fleet superintendent who decided to request a search for the overdue vessel. His attempts to contact the Coast Guard Rescue Coordination Center at New York failed due to long-distance telephone circuit difficulties, so at 3:30 p.m. he called Coast Guard Station, Sabine Pass, Tex., to ask that his request for a search be relayed. The coordinated aerial and surface search was initiated in the area indicated by the report of the sinking and pickup of survivors by the *Sasstown*. A Coast Guard search plane was en route at 5:25 p.m. and was on scene by 6:00.

Subsequent to the casualty, a Coast Guard Marine Board of Investigation was convened to investigate the circumstances surrounding the loss of the *Texaco-Oklahoma*. In addition, the National Transportation Safety Board (NTSB) studied the casualty report to determine the probable cause and to make recommendations to prevent future casualties.

As a precautionary measure, the Commandant of the Coast Guard ordered that all vessels in the same class as the *Texaco-Oklahoma* be inspected internally as soon as practicable. All 14 vessels of the class, plus several other tankships of like construction under U.S. flag were inspected and examined internally. Although minor defects and structural failures were found in some vessels, the inspections have revealed no hazardous conditions or any major defects of a type common to the class which can be directly related to the *Texaco-Oklahoma* casualty.

The Coast Guard Office of Merchant Marine Safety, Merchant Marine Technical Division headquarters made a study of the longitudinal bending moments and the resultant stresses which would have been induced in the *Texaco-Oklahoma*'s hull if subjected to the various arbitrarily sized waves usually employed to evaluate a ship's structure. For this purpose they used the lines plan of the vessel, the lightship weight curve furnished by the builder, the actual distribution of the deadweight at the time of the casualty, and the vessel's midship section plan. The results of this study are summarized in the Marine Casualty Report on the casualty (see note at end of this article). For more details on the *Texaco-Oklahoma*, its construction and loading controls, see box on page 197.

The Coast Guard Marine Board of Investigation concluded as follows:

> 1. The cause of the casualty to the extent determinable was a massive structural failure due to stresses imposed on the hull girder as the ship labored in extremely heavy seas. The failure occurred in way of the No. 5 cargo tank within 50 to 60 feet of the midpoint of the vessel. This is an area where maximum bending stresses are anticipated. The actual stress ex-

perienced was undoubtedly a summation of several stresses. In addition to bending these included torsion, hydrostatic loading, and impact loading. It is probable that, due to the extreme sea conditions, an unusual combination of these factors occurred which overstressed the vessel and caused the structural failure. It is probable, also that the effect of this extraordinary stress was intensified by the general deterioration which would be expected in a vessel of this age and, possibly, by some previously undetected defect such as minor cracks in the structural members. There was no evidence that the fracture of the vessel was caused by an explosion or a collision with any object or that faulty material construction, or repairs contributed to the casualty.

2. Although there is no evidence whatever to indicate that the *Texaco-Oklahoma* was excessively deteriorated or had structural defects the possibility remains that the vessel might have had recent internal damage which may have been detected by internal examination of the cargo tanks. During the last drydock examination in July 1970, Nos. 5 and 8 P and S, and Nos. 1, 3, and 5 C tanks, which were not gas-free, were not examined by the owner's inspector and none of the tanks were examined internally by the Coast Guard inspector. At the last biennial inspection in April 1969, only representative tanks were examined internally and tanks Nos. 1, 2, 5, 7, 9, and 10 P; 1, 4, 6, 8, 9, and 10 S; and 1, 2, 4, 6, 8, 9, and 10 C, were not examined by the Coast Guard inspector. The cargo tanks were not gas-free and accessible for internal examination at the midperiod inspection in June 1970. The requirements in the Merchant Marine Safety Manual were not followed explicitly at the biennial inspection and the drydock examination. In March 1970, it had become apparent to Coast Guard Headquarters that in some cases cargo tank internal examinations conducted in the field were limited to scope and instructions were prepared to emphasize the importance of thorough and frequent internal examinations. These instructions, promulgated as an amendment to the Merchant Marine Safety Manual which was furnished to marine inspection offices in December 1970, emphasize that all cargo tanks must be inspected internally at least once every 2 years and that, in addition, all gas-free tanks must be examined internally at the time of the vessel's drydocking, during inspection for certification, and at the midperiod inspection.

It is possible, also, that if the Coast Guard had better procedures for collecting and analyzing inspection and repair records there might have been a timely indication of a deficiency or condition the repair of which may have prevented the casualty. At present the Coast Guard's analysis of operational experience receives its input mainly from the reports of casualties (form CG 2692) and the records of boards of investigation. These deal only with the more significant casualties. The extensive experience derived from routine inspections and general shipyard overhauls is contained in the records of individual marine inspection offices. It is not centrally collected, correlated, and analyzed. Consequently, it is not generally available to make inspection procedures more effective by identifying areas which may require special attention.

3. The loss of life resulting from this casualty may have been significantly reduced if the portable lifeboat radio transmitter had been effective in alerting shore stations and nearby ships of the *Texaco-Oklahoma*'s distress. There was ample time for rescue and more than adequate resources to carry it out but the distress message was never received. This may have been due to the atmospherics incident to the storm but, more probably, it was caused by the equipment being incorrectly rigged and/or improperly tuned. Without the expertise of the radio officer who was lost with the bow section and under the crisis conditions prevailing on the stern section, it was unlikely that the crewmembers could follow each and every instruction precisely. The neglect of any single detail would result in improper operation and the failure of the equipment to function effectively would not be clearly apparent except to someone knowledgeable in radio transmission.

More lives may have been saved if the available 15-man inflatable liferaft had been utilized to its authorized capacity. Although the liferaft was full before the occupants were washed out by a wave created by oil from the ship's tanks, it was effective in saving the lives of only 11 men. More lives may have been saved if the painter had not parted and the raft had remained alongside for sufficient time to enable these and other crewmembers to get into or hold onto the inflatable raft.

4. There is no evidence that any act of misconduct, negligence, inattention to duty or incompetence on the part of licensed or certificated personnel caused or contributed to the casualty. The loading and the distribution of the cargo is considered to have been proper and in accordance with instructions. The vessel was loaded so as not to submerge her loadline marks and the cargo and consumables were distributed so as not to exceed her allowable stress numeral.

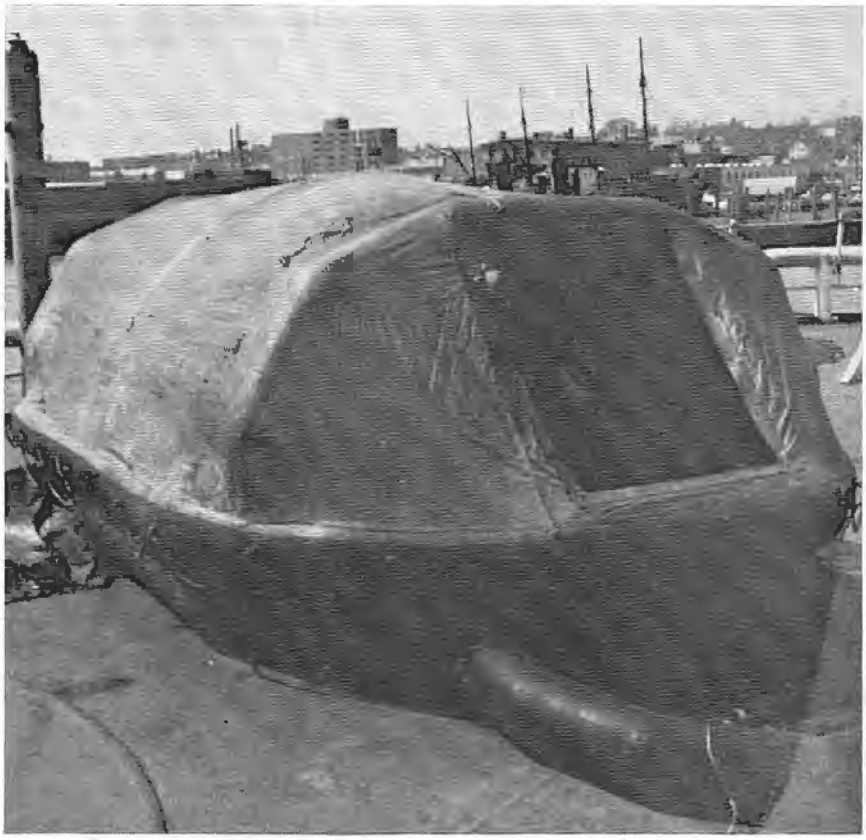
Although the vessel was laboring in a manner described as "shuddering" by some of the survivors the vessel's speed had been substantially reduced by the master. A reduction in speed from a maximum of 93 propeller r.p.m. during the early part of the voyage to 50 r.p.m. at the time of the casualty is well established by the evidence. After a decrease of this magnitude there is no reason to suspect that the master operated the vessel above the optimum safe speed set in accordance with his best judgment in order to meet a sailing schedule.

In view of the change already made in the ships schedule it is also probable that the best course, in the judgment of the master for the conditions prevailing, was steered although the heading of the vessel at the time of the casualty could not be determined due to the loss of all bridge personnel.

5. The efforts of the ships and aircraft participating in the exhaustive search for survivors are considered to be most commendable and in the best traditions of the sea. The MS *Sasstown* and the SS *Texaco-Nebraska* are especially commended for their praiseworthy efforts in successfully rescuing the 13 survivors from the sea.

These conclusions gave rise to the following recommendations by the Marine Board:

1. It is recommended that the regulations or directives relating to the inspection of ocean and coastwise tankships be revised to include specific requirements for a special examination to be made of the internals in way of the cargo tanks and the ballast tanks and for gagings to be taken of the shell and deck plating at a certain point in the life of the vessel. It is suggested that for tankships with uncoated or partially coated tanks, this special inspection be made in the year of the fifth biennial inspection. For tankships with fully coated tanks, the examination



This 15-man inflatable liferaft helped save the lives of 11 of the 13 survivors of the casualty.

would be required in the year of the seventh biennial inspection. The inspection would differ from the examination normally made at each drydocking or biennial inspection in that it would require, regardless of any other considerations, that all tanks in the midships four-tenths length of the ship be gas-freed and otherwise prepared so that all internal structure is directly and safely accessible for close examination. Additionally, it would be required that the deck and shell plating be gaged at this time in not less than two complete girths; the gagings to be taken in the presence of, and in locations selected by a Coast Guard marine inspector.

2. It is recommended that a centralized management information system, utilizing modern communications and data processing techniques, be set up within the Office of Merchant Marine Safety to collect, correlate, analyze, and disseminate inspection information. Such a system, if it is to improve the effectiveness of Coast Guard marine inspection, should be capable of absorbing the inspection and repair records from all marine inspection offices and integrating this data with the information obtained from the present casualty analysis program so as to identify trends and direct attention to possible trouble spots. It should be capable, also, of getting this information relative to a particular ship into the hands of the Coast Guard inspector before he boards that ship for any inspection purpose in any port.

3. It is recommended that the specification for the painter presently required as part of the equipment of the U.S. Coast Guard-approved inflatable liferaft be revised so as to provide greater strength.

4. It is recommended that a copy of the report of this board of investigation be furnished to the Federal Communications Commission and that the agency consider the following proposals pertaining to the Mackay Type 410A portable lifeboat radio transmitter:

a. That the operating crank be reexamined to ascertain the adequacy of its design.

b. That the antenna tuning light be relocated to a position on the equipment where it will be readily visible to the operators at all times while the transmitter is being used.

c. That the operating instructions attached to the cover of the equipment be rewritten so as to be capable of being understood and followed by a person unskilled in radio operation and completely unfamiliar with this equipment.

The Commandant's action on the recommendations of the Coast Guard Marine Board of Investigation consisted of the following:

1. The recommendation that regulations or directives relating to the inspection of ocean and coastwise tankships be revised is being acted upon at this time and appropriate changes to existing regulations will be proposed for consideration.

2. The recommendation that a central management information system be utilized to disseminate inspection information is presently being incorporated as a part of the Office of Merchant Marine Safety's new Information and Analysis Staff.

3. The recommendation that the specification for the painter required as a part of the inflatable liferaft equipment be revised to provide greater strength has already been acted upon as a result of information from previous casualties. At the public hearing in March 1971, the proposal was adopted and will be published as regulation shortly, providing for greater strength in this painter and changing the location of the weak point from the point of attachment to the raft to the point of attachment on board the ship.[1]

4. The recommendation that a copy of the report of the board of investigation be furnished to the Federal Communications Commission has been acted upon. In addition, a navigation and vessel inspection circular recommending shipboard training of personnel in the proper operation of the emergency radio transmitter is being drafted.[2]

5. The recommendation that a portable position indicating distress beacon be required on ocean and coastwise vessels is being considered at this time. The Coast Guard is working with other agencies toward

[1] The regulation referred to was promulgated in the Federal Register of August 24, 1972 (37 FR 17036).

[2] The navigation and vessel inspection circular referred to was published as NVIC 3–72 and appears on page 202 of this issue.

the development of standards for a beacon suitable for marine use. When such standards are established regulation changes to require this equipment will be proposed.

6. The conclusion of the board speaking to the commendable efforts of the MS *Sasstown* and SS *Texaco-Nebraska* will be acted on by appropriate recognition from the Office of the Commandant.

The NTSB concluded that:

1. Possible structural weakness of the *Texaco-Oklahoma* as a result of corrosion wastage beyond acceptable limits could not be ruled out through recent inspection. However, the available inspection evidence, the type of cargo carried for many years, and the ballast rotation procedure used indicate that excessive corrosion wastage was not a probable factor.

2. The possibility of the existence of significant undetected cracks or other structural damage could not be ruled out because of incomplete periodic inspections and because the inspection procedures cannot assure detection of all significant defects. However, the absence of any pattern of serious crack development in vessels of this class, even when subjected to a special inspection, indicates a low probability that the failure was due to an undetected local defect.

3. The *Texaco-Oklahoma* was designed and built to the requirements of the Coast Guard and the highest classification of ABS. In comparison with similar tankships of the same dimensions built about the same time, the *Texaco-Oklahoma* had lower longitudinal strength as represented by a 7-percent lower section modulus and a 24-percent higher maximum stress when computed by traditional methods.

4. It is apparent that the inspection of sister vessels conducted in this investigation was more complete in scope and closeness of examination than in the supposedly definitive routine inspections of the *Texaco-Oklahoma*. Existing instructions for vessel inspection do not define sufficiently either the details of the inspection, the defects which are required to be ascertainable, or the defects which can be allowed to remain unrepaired.

The fact that cracks and defects can occur between inspections and can be undetected during inspection requires sufficient structural strength margin to assure that the ship will not be jeopardized. Present design methods, requirements of the Coast Guard, and the classification system of American Bureau of Shipping do not provide any definition of such a margin, so that a gap exists in the logic of safety control.

5. The post-accident study of wave-induced loads on the *Texaco-Oklahoma* indicated that the tactic of reducing longitudinal bending stresses by reducing ship speed is ineffective below about 5 knots. However, changing course to accept maximum roll in lieu of maximum pitch would have significantly reduced the stresses which produced the failure. The master lacked this information on predictive hull stress selection which was determined after the casualty. He also lacked information of the measurable actual stresses being produced in his vessel. Therefore, the master did not know the magnitude of the danger to the ship and lacked the means to experiment to find the least hazardous mode of operations. These information deficiencies are potentially correctible by performing computer studies in advance of such hazardous situations and by the permanent installation of strain gages and associated instruments to show selected ship stresses. The National Transportation Safety Board has pointed out the lack of such information in its 1968 report on the loss of the cargo ship *Daniel J. Morrell*.

6. This was a nonsurvival accident for the crew asleep on the first two levels of the forward deckhouse. This will be true also for any similar future failure to a loaded tankship of this class.

7. The increase in loadline in 1967 increased the incidence of larger static and dynamic loads on the *Texaco-Oklahoma* and thereby increased the probability of exceeding the failure stress of the ship.

8. The *Texaco-Oklahoma* was also subjected to larger static and dynamic loads during winter voyages off the U.S. east coast because reductions in cargo load are not required in that area despite increased sea conditions during the winter months. Although the relative risks in the frequent winter storms off Cape Hatteras appear high, this area is classified as a year-round summer zone for all ships.

9. The type of emergency radio transmitter carried aboard the *Texaco-Oklahoma* was unreliable under the circumstances. The more suitable and reliable equipment presently available has not been adopted due to procedural delays.

The NTSB found the causes of the casualty:

The National Transportation Safety Board determines that the probable cause of the *Texaco-Oklahoma* hull fracture was the high stresses produced by heavy seas and other forces on the relatively lightly constructed, fully loaded ship. The design, maintenance, and operating standards inherently contained risk levels which were excessive for vessels of this type transiting the seas off Cape Hatteras in winter storms.

The following are considered to be contributing causal factors:

1. The use of a section modulus (a measure used in evaluating longitudinal strength) which results in a relative stress near the upper end of the "acceptable" limit and, therefore, a relatively high-risk level.

2. The increase in the loadline of the *Texaco-Oklahoma* in 1967, without change in section modulus thereby increasing the loaded sagging stresses and the wave-induced loads, with the consequent increase in risk level.

3. The year-round designation of seas off Cape Hatteras as a "summer zone" for the loadline purposes without knowledge of measured sea conditions in the winter storms that frequent that area.

4. The low probability with the techniques used during annual drydock and biennial inspections, of detecting all cracks and assuring that steel wastage for all portions of tank interiors has not exceeded permissible limits.

The following contributed to the loss of life subsequent to the splitting of the *Texaco-Oklahoma:*

1. Failure of the lifeboat radio transmitter to broadcast a distress signal.

2. Lack of sufficient rubber liferafts to accommodate the remaining 31 crewmembers after both lifeboats were lost.

3. Failure of the crew to make an S O S signal by flashing light after they attracted a passing ship.

4. Lack of an effective alerting and appraising procedure for an overdue ship.

Finally the NTSB recommended that:

1. The Coast Guard, with the assistance of ABS, reevaluate the structural adequacy of the *Texaco-Oklahoma* class of tankships with a view towards strengthening these vessels to reduce their long-term risk levels.

2. The Coast Guard, with the assistance of the National Oceanic and Atmospheric Agency, developed a program to obtain sea spectra data for winter storms off Cape Hatteras to be used as a rational basis for determining wave-induced loads and probabilities of exceeding any given bending moment values.

3. The Coast Guard require all ship owners of this class tankship to install a hull-stress monitor capable of indicating hull bending stresses at the most critical region of the ship. A means should also be provided for making short-term predictions of the probable maximum bending moments to enable the master to make evasive ship maneuvers or to allow the crew sufficient warning to vacate the lower two levels of the forward deckhouse.

4. The Federal Communications Commission (FCC) require modification to lifeboat radio transmitters on all ships where necessary to insure that the artificial antenna cannot remain installed when the transmitting antenna is installed. In the interim, written notices should be provided for attachment to all such equipment warning of the need to remove the artificial antenna before connecting the transmitting antenna. We concur with the Coast Guard, in their forthcoming recommendations to the ship owners, to provide their crews with training in the proper operation of the lifeboat radio transmitter.

5. The Coast Guard, with the assistance of FCC, proceed without delay with a mandatory program for a U.S. alerting, identifying, and locating system (EPIRB), unless it can determine now that an international system will be operational within the next year. In the absence of such a determination, proceed to have such a national system operational within 1 year.

6. The American Petroleum Institute assist the tanker industry to devise and implement a ship position reporting system which will effectively alert operating personnel when a ship becomes overdue. This system should become operational without delay and remain effective until an operational EPIRB system is established. The need for an improved position reporting system was also demonstrated in the loss of the "*Marine Sulfur Queen*" somewhere between Beaumont, Tex., and Norfolk, Va., in February 1963. In that case the ship was not missed for nearly 4 days after its probable time of sinking. Similarly, in the case of the *Daniel J. Morrell* lost in Lake Huron in 1966, NTSB commented on the lapse of 1½ days before the sinking was discovered.

7. The Coast Guard require another inflatable liferaft to be installed on the after section of tankships either in addition to or in lieu of one of the lifeboats now required.

NOTE.—The above article is based upon 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 by National Transportation Safety Board released July 26, 1972. Copies of the full Marine Casualty Report may be obtained by writing U.S. Coast Guard (GMVI–3/83) 400 Seventh Street SW., Washington, D.C. 20590. ⚓

NAVIGATION AND VESSEL INSPECTION CIRCULAR 3–72

March 23, 1972

Subject: Portable Radio Apparatus, Training in use of

PURPOSE

This circular is intended to alert the masters of vessels, which are equipped with Portable Radio Apparatus, of the desirability for all hands to receive training in the use of the Portable Radio Equipment.

DISCUSSION

(a) The Code of Federal Regulations requires that all vessels on an international voyage shall be provided with a Portable Radio Apparatus unless at least one lifeboat on each side of the vessel is fitted with a fixed radio installation.

(b) In a recent casualty, heavy loss of life was incurred when an American vessel broke in two and sank in heavy seas. The casualty occurred in heavily traveled sea lanes, and much loss of life might have been prevented if vessels in the vicinity had been aware of the casualty. The stern section, with most of the crew on board, remained afloat more than 24 hours. During this period, efforts were made by the crew to attract passing vessels with visual signals. In addition, the Portable Radio Transmitter was rigged and cranked continuously for more than 12 hours. The visual signals were not sighted by passing vessels, no S O S signal was received by any ship or shore station and no auto-alarm signals were actuated. The investigation of this casualty indicates that the antenna and ground wire of the Portable Radio Transmitter may have been improperly rigged so that no signal was ever transmitted.

ACTION

It is recommended that masters of vessels, equipped with Portable Radio Apparatus, have instruction given in the proper method of rigging and using this apparatus, particularly transmitters. Such instruction could be given by the radio officer to all hands in conjunction with the regularly scheduled ship's drills. In addition, Coast Guard marine inspectors will discuss with the master the feasibility and desirability of conducting this special drill, in addition to the required drills, at the time of biennial or midperiod inspections. Notation of such instruction, if conducted, could be included in the log book record of such drills.

MORE DETAIL ON THE HAZARDS OF LIQUEFIED NATURAL GAS IN MARINE TRANSPORTATION

By LtCmdr H. D. Williams, USCG

The views expressed in the following article are those of the author, and are in no way to be interpreted as those of the Commandant or of the Coast Guard generally.

CURRENT SITUATION—WHY ALL THE FUSS?

The Federal Power Commission (FPC) recently issued its second Natural Gas Supply and Demand Report which contains serious implications for all who have an interest in this vital energy source. The Bureau of Natural Gas within the FPC predicts a U.S. gas supply deficit of 9 trillion cubic feet by 1980 and 17 trillion by 1990. Contrasted with projected demands of 34.5 and 46.4 trillion cubic feet, deficits of 26.1 and 36.6 percent respectively are predicted. Satisfaction of this deficit demand will involve alternative energy sources, production of synthetic gas, increased domestic exporation and production, and increased imports of United States (Alaskan) and foreign gas via pipelines and vessels designed to carry liquefied natural gas (LNG). The Bureau of Natural Gas estimates that annual marine importation of LGN will total 4 trillion cubic feet by 1990, or 8.6 percent of the total U.S. gas demand. This estimate includes consideration of all alternative energy sources and projected increases in U.S. reserves and production.

Large scale importation of LNG will require many new tank vessels to provide the required capacity. Economics of scale dictate utilization of tankers which approach very large crude carriers in dimensions. Estimates of the number of such vessels that may be required range from 60 to 100 before the end of the decade. Currently, approximately 37 LNG vessels are on order with an aggregate of 1,456,315 tons d.w. This is about equal to 1,200,000 cubic meters capacity or the equivalent of 10 LNG ships of the size envisioned as a future standard. Actually, vessels of 165,000 cubic meters have been ordered recently which indicates that a maximum vessel size for LNG has not been reached.

Concurrent with contracts for vessel construction is the planning and construction of new marine terminal facilities to receive the LNG. Terminals exist or are planned in Everett, Mass.; Staten Island, N.Y.; Cove Point, Md.; Savannah, Ga., and other east and west coast locations yet to be selected. Terminal locations must be accessible to distribution pipelines and also be located in areas which facilitate rapid vessel turnaround and navigation. Unfortunately, such locations are desirable for other purposes also and, in many cases, are heavily industrialized locations of high marine traffic density.

Thus the future holds the prospect of very large LNG vessels traversing in congested U.S. waters to transfer a cryogenic cargo which prior to 1968 was not imported to the U.S. via the marine mode.

HISTORY OF LNG HAZARD RESEARCH PERTAINING TO MARINE TRANSPORT

In the late 1950's and early 1960's researches discovered that LNG, when released, did not immediately vaporize, warm up and rise, as would be expected with a gas which is less dense than air. Considering the imminent large scale importation of LNG to the United States, the Coast Guard issued a contract to the Bureau of Mines (Bumines) in 1968 to study the consequences resulting from the release of LNG on water. Obviously the results of a massive spill on water would be different than that observed on land due to: (1) Unconfined spreading of the LNG on water which increases the vaporization rate and (2) the difference in topography between the flat water surface and land masses affecting the persistence of a vapor cloud and plume length.

Bumines confirmed the suspected differences between water and land spills and, in addition, discovered that under certain conditions, a sudden spill of LNG on water could result in a violent vaporization which was termed a flameless explosion. Following the release of the Bumines study [1] results to the media, industrial and academic researchers began programs to investigate the findings of Bumines, particularly those which pertained to the violent vaporization observed and the dispersion of cold vapor downwind. Since the initial Bumines study was based on small quantities of LNG, the Coast Guard issued a subsequent contract to Bumines to investigate the effects of

[1] Available for $3 from National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Va. 22151 (No. AD 705078)

larger releases, up to the quantity which could be spilled from a 120,000 m³ LNG tanker. Industrial activity was divided between Shell Pipeline Corp. (vaporization) and ESSO (vapor dispersion). In addition, the American Gas Association is currently conducting an investigation of LNG vaporization, dispersion and fire radiation from LNG release into diked land areas. The academic researchers who have published articles on LNG hazards include: Dr.'s Reid (MIT), Katz (University of Michigan), Sliepcevich (University of Oklahoma), Witte (University of Houston) and Cox (University of Houston). Thus much investigative effort has been and continues to be expended toward developing an understanding of all the hazards pertaining to LNG releases.

HAZARD PROFILE

The best approach to use in describing an LNG hazard profile is to trace the effects following spillage in the order anticipated. A large scale release from a vessel's tanks requires the rupture of a double hull plus the secondary and primary tank barriers (assuming a membrane tank system). Such a rupture could occur as a result of a collision or a hard grounding. A collision would probably create an ignition source which would ignite the LNG as it poured from the vessel's tanks. A possibility also exists that vapor in the tank dome, a confined space, could explode. Ignition of methane vapor does not preclude the flow of liquid from the tank and the subsequent spreading on the water. The radiant energy of the flame impinging on the LNG liquid will increase the rate of vaporization but will not result in an instantaneous change of phase. One concern regarding the release of LNG is the effect of the liquid if it contacts the vessel's outer hull. Minor spills of cryogenic liquids on deck plating have caused brittle fractures. Since LNG vaporization, whether enhanced by burning or occurring naturally, is not instantaneous, the possibility of contact does exist, particularly if the release occurs on the lee side (the wind effect on the vessel's high freeboard will cause the ship to drift down on the LNG). An explosion within the confined tank vapor space may cause the rupture of adjacent tanks. Therefore, the possibility of multiple tank releases must be considered if ignition occurs. Considering the insulation provided on LNG vessels, the impingement of radiant energy from a burning pool of methane on the vessel's side should not result in rapid temperature rise in the adjacent tanks. The only effect expected here might be the lifting of safety reliefs and venting of larger quantities of boiloff vapor. If this boiloff were to ignite, a flare would result but a flashback to the unruptured tanks would not be expected. The cross sectional area covered by the released LNG from a 24,000 m³ tank is considerable—it may cover most of the channel. Therefore, ignition sources such as other vessels could be present.

The Shell Pipeline research effort reveals that violent vaporization should not occur upon release under normal circumstances. The propensity of LNG to violently vaporize when spilled on water appears to be indirectly related to the methane concentration present in the LNG. Normally, LNG contains above 80-percent methane. After weathering for an extensive period, in excess of any anticipated voyage durations, the concentration of the more volatile constituents of the LNG is reduced. Shell states that violent vaporization can not occur at a methane concentration exceeding 40 percent or a propane-to-ethane ratio of 1 to 3 or greater. Comparing the required weathering period with current voyage durations leads to the conclusion that this phenomenon is not a hazard to be anticipated. And if a vessel's LNG had weathered sufficiently, as a result of an inordinate delay, the violence of the vaporization is not sufficient to cause significant damage to the vessel's hull.

Without ignition, the vapor evolved from the spreading LNG will travel in the form of a cold plume downwind. It has been observed that the initial vapor does not immediately rise, as does warmer methane gas. Due to the higher density of the cold vapor, the plume will remain at the surface for a considerable distance downwind, depending upon the atmospheric conditions and the topography. The Bumines, in the second Coast Guard sponsored study, found that the downwind hazard for a 25,000 m³ spill (one tank of a 120,000 m³ vessel) could equal or exceed the dimensions previously published in the September 1971 issue of the *PROCEEDINGS* and reproduced as figure 1. Downwind hazard alludes to the consequences which might result if a vapor plume were to reach a source of ignition vs. the consequences of the plume's passage over a particular location. Methane is not an air pollutant, is odorless, colorless, and does not present any health hazard to animal life other than the denial of oxygen if encountered in large quantities. However, if a plume were ignited, the resulting flashback could cause severe damage or injury to objects in the path.

COPING WITH THE HAZARDS—PERSONAL OBSERVATIONS

Marine transportation of any commodity requires three basic operations: (1) Loading, (2) transport and (3) discharging. The hazards of LNG in marine transportation are not limited to just one of these operations. The gas reserves discovered on the North Slope, plus existing loading facilities in Alaska, establish the fact that although there is a need to import LNG, large U.S. loading terminal facilities are in operation and more will be constructed. As stated previously, the great demand for LNG will require many marine receiving facilities. Therefore, to cope with the hazards of LNG, consideration must be given to the three basic operations involved.

Marine transfer facilities may be generally described by some good

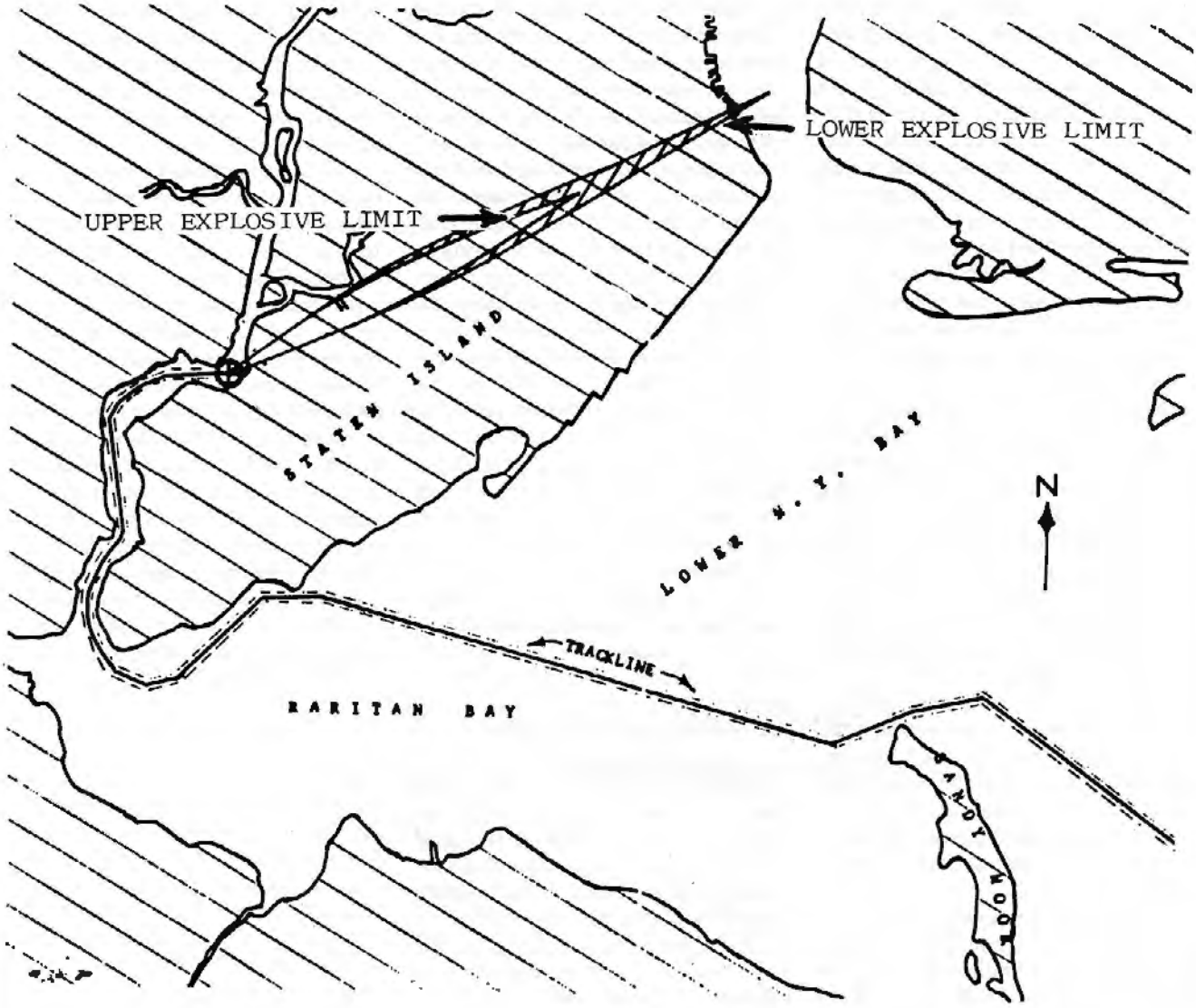


Figure 1

news and some bad news. First the good news: they don't move. Now the bad news: they all incorporate large bulk storage tanks of LNG adjacent to navigable waterways, plus long runs of transfer piping from the pier. The potential for a large scale release of LNG on water from a terminal exists and therefore requires consideration by the Coast Guard's Captain of the Port in contingency planning for port safety. The Coast Guard participates where possible in the development of the standards which are used to construct LNG facilities and marine terminals. Participation may consist of membership on the standard drafting committee or attendance at such committee meetings as nonvoting interested parties. However, standards do not replace regulations. Thus the port safety regulations, particularly those governing designated waterfront facilities, must be reviewed in light of the impending LNG importation programs of the gas industry. The regulations should be sufficiently broad that they establish the parameters within which industry can develop standards. Comparing the appropriate existing requirements in Title 33 CFR with various industry standards indicates a needed reappraisal today.

The intermediate operation, i.e., transport of LNG, presents the greatest challenge to cope with hazards. Obviously, the cargo containment portion of LNG vessels must continue to be built to the highest design and construction standards. This is particularly important with the cargo tanks. Currently there are so many different tank designs that one is forced to

generalize in describing them: pressure vs. membrane or gravity systems. The extremely high costs of LNG vessels ($60–$90 million) can only be attributed to the cargo containment system for hull and machinery costs are somewhat standardized. Thus there will continue to be new and innovative containment systems developed to reduce the existing high costs. Great care and caution are necessary on the part of classification societies and national administrations in reviewing and accepting these systems. Currently, an Intergovernmental Maritime Consultative Organization (IMCO) working group is drafting a code for the construction of gas ships, and a Chemical Transportation Industry Advisory Committee working group is drafting proposed revisions to Title 46 CFR Part 38 of the Tank Vessel Regulations in order to more adequately prescribe minimum design standards. Carriage of LNG was the impetus for the revision of existing design criteria. In summary, to cope with transport hazards, the LNG vessels must incorporate the highest design and construction standards, as well as sophisticated instrumentation, to preclude noncatastrophic cargo release.

As any vessel enters port, it must reduce speed. A reduction in speed is accomplished indirectly by a reduction in boiler fuel. Since these vessels utilize methane boiloff as a fuel supplement, a reduced speed creates an excess of boiloff which must be disposed of. The Coast Guard considers venting of boiloff in port an unsatisfactory disposal provision. It has been permitted, at a methane-air ratio below the lower explosive limit, as an interim solution for certain existing vessels. In 1974, venting will no longer be permitted, and boiloff will either be reliquefied or consumed in the boiler (excess steam dumped) or some separate combustion unit. One other alternative is the provision of some minimum holding period which would be sufficient to preclude venting during the longest foreseeable in port delay. Membrane systems, relying solely upon insulation are not capable of providing the holding period envisioned. Although methane is not considered an air pollutant per se, venting of boiloff is not desirable due to the increased fire hazard it creates. Those designers advocating venting of boiloff support their argument by stressing that: (1) The methane is vented below the explosive limit, (2) the methane is preheated to a density less than air and (3) venting is not to be anticipated since some holding period is provided. Counter arguments are: (1) Dilution of boiloff is achieved by mixing with forced air, drawn into the vent stack by large fans. Since venting is only necessary at the conclusion of a voyage and after some delay, the fans are not in constant operation and, therefore, may not always be functional, (2) although warm methane will rise under unstable atmospheric conditions, it may not rise when an inversion exists and (3) the holding period has been observed to be far less than that calculated due to localized heating of cargo tank domes, piping, etc., and nonequilibrium temperature distributions in the bulk LNG. The concern regarding vented boiloff is not limited to the effect of a flashback on the LNG tanker but also to the effect on adjacent property, vessels and facilities. Therefore, routine discharge of methane should not be permitted in order to remove one foreseeable hazard, i.e., that of fire.

Studies of the violent vaporization of LNG on water revealed that weathering was necessary to achieve repetitive effects. This is not the case, however, if LNG is spilled on heavier hydrocarbons such as butane. This means that the loading of a tank which contains a heel of butane with LNG could result in a pressure shock of sufficient force to rupture the tank. Therefore, precautions to remove the possibility of violent vaporization must be required under such circumstances. Two such precautions are the removal of any previous liquid cargo or cooling of the tank space and liquid residue down to −260° F. to remove the required temperature difference for violent vaporization.

The basic method of preventing the hazards associated with a catastrophic release is reducing the odds of a catastrophe. This could mean movement control of not only the LNG vessel but other vessels underway which could cause a collision. Movement control of LNG vessels is not a new consideration. In 1964, the British required LNG tankers delivering cargo to the Canvey Island terminal to berth and commence offloading during daylight hours. Currently the Japanese require not only daylight entry but also escort vessels. The degree of movement or navigational control of the LNG vessel should be directly related to the traffic, population density, and navigational hazards of the port to be entered. Remote

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Lieutenant Commander Williams is a 1960 graduate of the Coast Guard Academy. After service on board the Coast Guard Cutter Yakutat *and a tour of loran duty in Italy, he was assigned as an instructor at the USCG Officer Candidate School. From 1966 to 1968 he was a postgraduate student at the University of Maryland where he was awarded a Master of Science Degree in Chemical Engineering. Following postgraduate training he was assigned to the Chemical Engineering Branch within the Cargo and Hazardous Materials Division in the Office of Merchant Marine Safety. In May 1972, he obtained a Master of Science Degree in Administration (specialty area—international commerce) from George Washington University. Lieutenant Commander Williams is a member of the American Institute of Chemical Engineers and serves on two panels dealing with safety in the handling and transportation of liquefied natural gas.*

ports with little or no navigational or traffic impediments may not necessitate the same degree of control as many congested east coast ports. For restricted ports, controls envisioned might include:

(1) entry during daylight and clear visibility
(2) favorable wind and sea conditions
(3) most remote trackline (where two channels are available)
(4) maximum speed limitation
(5) escort by tug, Coast Guard patrol vessel or helicopter
(6) harbor pilot on board
(7) tugs utilized during pier approach.

To facilitate the application of vessel controls a prearrival notice to the Coast Guard Captain of the Port, in excess of the mandatory 24 hours, may be required.

The phrase, "The best laid plans of mice and men. . . . ," serves as a reminder that you can never remove all the possibilities of failure. A severe grounding or collision sufficient to puncture a cargo tank of one large LNG vessel would release a great qnantity of LNG on the water. If the wind was offshore, the resulting plume would not hazard the populace. Vessels in the vicinity should proceed up wind while closing all doors and hatches leading to ignition sources. Ideally, the plume would dissipate before ignition, removing the possibility of a flashback to the ruptured tank and subsequent tank explosion.

In light of all the recent skyjackings and bombings, one must also consider the possibility of intentional sabotage of LNG vessels. Is there not a possibility that a dissident nationalist might choose to destroy one of these ships? Not all the recent skyjackings and bombings have been privately motivated, and, through the media, great publicity has been achieved. The most logical place for such an action would be at the terminal, where even greater damage could result. Perhaps more attention to the security of waterfront facilities is necessary, particularly when such vessels are along side.

CONCLUSION

Research reveals that the hazards of LNG are generally representative of all liquefied flammable gases. However, the quantities to be carried and the frequencies of delivery magnify the hazards to a degree not envisioned in the past. The new LNG vessels must be designed, constructed and operated with the utmost care in order that the odds of a catastrophic casualty will be minimized. Operational controls may be necessary in certain ports to achieve the safety level desired. ⚓

MERCHANT MARINE PERSONNEL STATISTICS

MERCHANT MARINE OFFICER LICENSES ISSUED

FISCAL YEAR ENDING JUNE 30, 1972

DECK

Grade	July through September (1971)		October through December (1971)		January through March (1972)		April through June (1972)	
	Original	Renewal	Original	Renewal	Original	Renewal	Original	Renewal
Master:								
Ocean	57	358	60	315	43	399	55	444
Coastwise	8	19	7	22	7	21	19	33
Great Lakes		9	1	91	18	105	3	29
B.S. & L	9	52	7	49	6	74	18	59
Rivers	6	20	3	41	6	47	9	51
Radio Officer Licenses issued	9	98	8	109	5	114	4	121
Chief Mate:								
Ocean	50	62	36	56	34	77	26	99
Coastwise			2	1	1	1		1
Great Lakes						2		
B.S. & L		1	1	7				
Rivers	1			1				2
2d Mate:								
Ocean	62	76	53	88	53	92	55	118
Coastwise		2						
3d Mate:								
Ocean	44	90	18	79	16	93	88	187
Coastwise		2	1			5		
Pilots:								
Great Lakes	10	19	14	18	33	41	27	35
B.S. & L	105	83	90	74	163	175	113	148
Rivers	56	118	60	101	45	162	49	152
Master: Uninspected vessels	37	22	27	43	33	38	27	20
Mate: Uninspected vessels	2	3	9	7	12	3	12	17
Motorboat operators	584	545	389	466	590	690	938	890
Total	1,040	1,579	786	1,568	1,065	2,139	1,443	2,415
Grand total	2,619		2,354		3,204		3,858	
Original licenses issued	4,334							
Renewals issued	7,701							
Total deck licenses issued	12,035							

ENGINEER

Grade	July through September (1971)		October through December (1971)		January through March (1972)		April through June (1972)	
	Original	Renewal	Original	Renewal	Original	Renewal	Original	Renewal
STEAM								
Chief engineer:								
Unlimited	36	361	39	357	33	422	29	323
Limited	1	47	2	40	2	73	----	14
1st Assistant engineer:								
Unlimited	48	131	64	126	55	136	50	135
Limited	3	16	----	11	----	23	----	12
2d Assistant engineer:								
Unlimited	66	170	61	195	67	239	58	174
Limited	1	3	----	1	1	7	2	4
3d Assistant engineer:								
Unlimited	51	314	42	232	42	263	131	284
Limited	----	2	1	1	----	6	----	3
Total	206	1,044	209	963	200	1,169	270	976
MOTOR								
Chief engineer:								
Unlimited	7	79	26	72	26	74	9	72
Limited	22	87	12	101	15	83	12	121
1st Assistant engineer:								
Unlimited	10	23	2	23	8	24	5	27
Limited	7	18	6	31	8	34	2	16
2d Assistant engineer:								
Unlimited	10	20	6	21	15	30	2	20
Limited	3	----	5	3	1	4	1	5
3d Assistant engineer:								
Unlimited	30	304	28	301	14	274	128	321
Limited	6	5	4	8	----	9	----	5
Total	95	536	89	560	87	532	154	596
Chief engineer:								
Uninspected vessels	18	15	27	26	24	25	27	24
Assistant engineer:								
Uninspected vessels	14	1	21	7	12	9	19	9
Total	333	1,596	346	1,556	323	1,735	470	1,605
Originals								1,472
Renewals								6,492
Grand total								7,964

MERCHANT SEAMAN'S DOCUMENTS ISSUED

Type of document	July through September					October through December					January through March					April through June				
	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total
Staff officer	3	1	8	----	12	2	----	7	1	10	----	1	12	1	12	9	3	15	----	27
Merchant mariner's documents	1,085	1,908	824	846	4,753	938	850	948	511	3,247	990	906	874	487	3,257	1,205	982	885	1,048	4,120
AB any waters unlimited	65	51	28	12	156	47	24	35	10	116	40	26	31	13	110	227	104	33	10	374
AB any waters 12 months	39	21	12	27	99	37	22	16	37	112	32	17	27	24	100	22	76	35	36	169
AB Great Lakes, 18 months	2	----	7	8	17	2	----	6	3	11	1	1	1	1	4	----	----	3	4	7
AB other	2	71	7	2	82	3	74	6	1	84	5	94	21	10	130	37	144	13	2	196
Lifeboatman	122	37	71	19	249	180	27	81	10	298	144	41	62	14	259	205	267	62	12	594
Electrician	46	1	9	3	59	47	2	18	2	69	21	3	14	----	38	14	6	24	1	45
Oiler	72	20	21	23	136	62	14	29	16	121	50	13	35	24	122	79	15	39	19	152
Fireman, water tender	103	22	20	24	178	120	10	27	20	177	56	15	26	37	134	73	8	43	26	150
Other Q.M.E.D. rating	172	87	91	4	354	250	62	108	6	426	158	72	103	14	347	209	67	105	4	387
Tankerman	55	169	11	71	306	42	167	7	96	312	84	165	10	100	359	95	173	15	117	400
Entry	1,181	927	698	881	3,687	1,071	936	838	465	3,310	1,320	1,000	604	470	3,484	1,467	928	783	1,066	4,244
Total	2,947	3,405	1,816	1,920	10,088	2,801	2,188	2,126	1,178	8,293	2,809	2,354	1,910	1,195	8,358	3,642	2,773	2,055	2,345	10,817
Total documents issued																				37,556

COAST GUARD RULEMAKING

(Effective September 1, 1972)

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
1971 PUBLIC HEARING							
PH 8–71 Specification:							
8a. Lifeboat winches	2–24–71	3–29–71	5–15–71	X			
8b. Lifeboats	2–24–71	3–29–71	5–15–71	X			
8c. Line-throwing appliances	2–24–71	3–29–71	5–15–71	X			
8d. Inflatable liferafts	2–24–71	3–29–71	5–15–71	X			
PH 9–71 Fibrous glass-reinforced plastic construction of small passenger vessels	2–24–71	3–29–71	5–15–71				
(Second Notice of Proposed Rulemaking due to revisions of original proposal)	4–6–72	None	5–8–72	X			
1972 PUBLIC HEARING							
Synthetic fiber rope for line-throwing appliances (35–70, 27–71)	3–1–72	3–27–72	4–3–72			8–11–72	11–20–72
Tailshaft inspection and drawing (67–71, 4–71)	3–1–72	3–27–72	4–3–72	X			
Stability-wind heel criteria for cargo and miscellaneous vessels (43–71)	3–1–72	3–27–72	4–3–72	X			
Definition of international voyage (12–70)	3–1–72	3–27–72	4–3–72	X			
Portable foam firefighting equipment—tank vessels (17–71)	3–1–72	3–27–72	4–3–72	X			
Snbchapters D, H, and I, safety factors for cargo gear (20–71)	3–1–72	3–27–72	4–3–72	X			
Visual acuity requirements, original licenses (23–71)	3–1–72	3–27–72	4–3–72	X			
Flashing navigation lights on barges (33–71)	3–1–72	3–27–72	4–3–72			7–7–72	9–1–72
Inspection of bottom bearing mobile offshore drilling and workover units (87–71)	3–1–72	3–27–72	4–3–72		8–3–72		
ANCHORAGE REGULATIONS							
Casco Bay, Maine	6–16–72		7–19–72	X			
Henderson Harbor, N.Y.	6–28–72		8–1–72	X			
Puget Sound Area, Wash. (CGFR 72–13)	2–3–72		3–5–72	X			
St. John's River, Fla. (CGFR 71–162)	12–22–71		1–31–72	X			
St. Marys River, Mich	6–7–72	7–6–72 7–12–72	7–15–72	X			
San Francisco Bay Area (CGD 72–78)	4–28–72	5–24–72 San Francisco	5–27–72	X			
San Juan Harbor, P.R. (CGFR 72–12)	2–1–72		3–4–72	X			
Willington River, Ga. (CGFR 71–153)	11–25–71		12–27–71	X			
BOATING SAFETY (GENERAL)							
Boat safety standards (CGD 72–61)	4–22–72	5–17–72	5–31–72			8–4–72	9–4–72
Boating safety corrections (CGD 72–61R)						8–18–72	8–18–72
Defect notification (CGD 72–55)	4–5–72	5–3–72	5–11–72			8–4–72	11–1–72
Manufacturers requirements (CGD 72–60)	4–22–72	5–17–72	5–31–72			8–4–72	11–1–72
Numbering and casualty reporting (CGD 72–54)	4–19–72	5–17–72	5–31–72	X			

Coast Guard Rulemaking—Continued

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
BRIDGE REGULATIONS							
Bear Creek, Md. (CGFR 72–17)	2–2–72	.....	3–7–72	X	.....	.....	.....
Black Water River, Fla. (CGD 72–87)	5–10–72	.....	6–13–72	X	.....	.....	.....
Chattahoochee River (CGFR 71–166)	12–29–71	1–26–72 Florida	1–27–72	X	.....	.....	.....
Idaho State Memorial Bridge, Clearwater River, Lewiston, Idaho (CGFR 71–169)	12–29–71	2–1–72	2–1–72	X	.....	.....	.....
Interstate I–90 at Lake Washington (CGFR 71–168)	12–21–71	1–27–72 Washington	1–27–72	X	.....	.....	.....
Nanticoke, Del. (CGFR 71–142)	11–24–71	.....	12–24–71	X	.....	.....	.....
Ogden Slip, Chicago, Ill. (CGFR 72–16)	2–2–72	.....	3–7–72	X	.....	.....	.....
Sacramento River, Cal. (CGFR 71–165)	12–29–71	.....	2–7–72	X	.....	.....	.....
Saginaw River, Mich. (CGFR 72–18)	2–2–72	.....	3–7–72	X	.....	.....	.....
Union Pacific RR Co., Columbia River (CGFR 71–167)	12–29–71	2–23–72 Washington	1–27–72	X	.....	.....	.....
Carrabelle River, Fla.	6–24–72	.....	7–28–72	X	.....	.....	.....
Fort Caswell Bridge, N.C.	6–21–72	.....	7–25–72	X	.....	.....	.....
Mare Island, Cal.	6–30–72	.....	8–7–72	X	.....	.....	.....
Ohio River at Huntington	6–10–72	7–13–72	7–27–72	X	.....	.....	.....
Ortega River, Fla.	6–21–72	.....	7–25–72	X	.....	.....	.....
Alabama River, Ala. (CGD 72–159P)	8–22–72	.....	9–26–72	X	.....	.....	.....
Clear Creek, Tex. (CGD 72–165P)	8–26–72	.....	10–3–72	X	.....	.....	.....
New River, Fla. (CGD 72–170P)	8–30–72	.....	10–3–72	X	.....	.....	.....
Pompano Beach, Fla. (CGD 72–158P)	8–22–72	.....	9–26–72	X	.....	.....	.....
Portage River, Ohio (CGD 71–69a)	.....	.....	.....	....	.....	8–26–72	10–1–72
Richardson Bay Channel, Mills Valley, Calif. (CGD 72–30d)	.....	.....	.....	....	.....	8–26–72	2–14–72 through 9–16–72
Root River, Wisc. (CGD 72–166R)	.....	.....	.....	....	.....	8–26–72	8–26–72
Sacramento River, Calif. (CGD 71–165R)	.....	.....	.....	....	.....	8–26–72	10–1–72
St. Lucie River, Fla. (CGD 72–168P)	8–26–72	.....	10–3–72	X	.....	.....	.....
West Palm Beach, Fla. (CGD 72–167P)	8–26–72	.....	10–3–72	X	.....	.....	.....
HAZARDOUS MATERIALS							
Cold compressed gases (CGFR 72–10)	10–16–71	1–11–72	1–18–72	....	.....	.....	.....
	[1] 1–21–72	[1] 2–22–72	[1] 2–29–72	X	.....	.....	.....
Etiologic agents (CGFR 71–170)	1–7–72	3–28–72	4–4–72	X	.....	.....	.....
Radioactive materials (CGFR 71–62)	7–9–71	8–24–71	8–31–71	X	.....	.....	.....
Radioactive materials (CGFR 71–136)	11–20–71	2–22–72	2–29–72	X	.....	.....	.....
Radioactive materials packages (CGD 72–91)	5–24–72	6–20–72	6–27–72	X	.....	.....	.....
Compressed Gas Cylinders (CGD 72–115PH)	8–31–72	9–28–72	10–2–72	X	.....	.....	.....
Dangerous Cargoes—Dichlorobutene (CGD 72–162PH)	8–30–72	10–24–72	10–31–72	X	.....	.....	.....
Etiologic Agents—Supplemental Notice (CGD 72–148PH)	8–9–72	9–5–72	9–12–72	X	.....	.....	.....
MARINE ENVIRONMENT AND SYSTEMS (GENERAL)							
Oil pollution prevention (CGFR 71–160, 161)	12–24–71	2–15–72	4–21–72	X	.....	.....	.....
Atlantic Intracoastal Waterway, Vero Beach, Fla. (CGD 72–155P)	8–16–72	.....	9–19–72	....	.....	.....	.....
Authority to Publish Notices of Security Zones (CGD 72–105R)	.....	.....	.....	....	.....	8–16–72	7–1–72
Security Zone—Sandy Hook Bay, New Jersey (CGD 72–157R)	.....	.....	.....	....	.....	8–18–72	7–1–72

Coast Guard Rulemaking—Continued

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
MERCHANT MARINE SAFETY (GENERAL)							
Buoyant devices, special purpose water safety (CGFR 72–5)	1–29–72	.....	3–15–72	X	.....	.....	.....
Documentation ports (CGFR 72–19)	2–4–72	.....	4–4–72	X	.....	.....	.....
Fire extinguishers, marine type portable (CGFR 72–36)	3–9–72	4–18–72	4–24–72	X	.....	.....	.....
Incombustible materials (CGFR 72–47)	3–9–72	4–18–72	4–24–72	X	.....	.....	.....
Oceanographic vessels, fire main systems (CGFR 72–20)	2–4–72	.....	3–19–72	X	.....	.....	.....
Washroom and toilet facilities (CGFR 72–4)	1–15–72	.....	3–20–72	X	.....	.....	.....
Water lights, floating electric (CGFR 72–48)	3–9–72	4–18–72	4–24–72	X	.....	.....	.....
Great Lakes Maritime Academy, List as a Nautical School-Ship (CGD 72–92P)	8–9–72	.....	9–15–72	X	.....	.....	.....
Lifesaving Equipment Specifications (CGD 72–133R)	.....	.....	.....	....	.....	8–24–72	9–22–72
Non-Sparking Fans: Clarification of Design Characteristics (CGD 72–35CR)	.....	.....	.....	....	.....	8–16–72	8–18–72
Revocation of Fernandina Beach as a Port of Documentation (CGD 72–75P)	8–9–72	.....	9–12–72	X	.....	.....	.....
Ship's Maneuvering Characteristics Data (CGD 72–132PH)	8–22–72	9–28–72	10–13–72	X	.....	.....	.....

[1] Extension of comment period and second public hearing.

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.

What Licenses Authorize Tankerman Service?

During discussions conducted in the development of proposed regulations to implement the "Federal Water Quality Improvement Act of 1970" questions arose concerning which licenses authorize service as a tankerman. Only certain licenses issued by the U.S. Coast Guard authorizing service on inspected vessels also authorize service as a tankerman.

The law relating to tankermen is codified in Title 46, United States Code 391a(6) (a) and (b). Included in paragraph (6) (a) is the provision that, "In all cases where the certificate of inspection does not require at least two licensed officers, the Coast Guard shall enter in the permit issued to any vessel under the provisions of this section the number of the crew required to be certificated as tankermen." The requirements leading to certification as tankerman are enumerated in paragraph (6) (b).

A certificate of inspection is issued only to inspected vessels and, in the case of tank vessels, requires: (1) A predetermined number of deck and engineering officers possessing licenses issued by the Coast Guard authorizing service on inspected vessels, or (2) a pilot in the case of tank vessels of not more than 150 gross tons, or (3) a predetermined number of certificated tankermen in the case of tank barges. Only those persons holding valid licenses authorizing service on inspected tank vessels or tankermen certificated for the grade of cargo involved may replace personnel employed to meet the requirements of the certificate of inspection.

Licenses authorizing service on uninspected vessels are not valid for service on tank vessels for two reasons. First, each vessel certificated as a tank vessel is inspected; any licensee wishing to serve on such a vessel must, therefore, hold the appropriate documents. Second, the requirements for examination for any uninspected license (listed in subpart 10.15 of Title 46, Code of Federal Regulations) do not include all of the requirements for examination for a license authorizing service on inspected tank vessels. The uninspected license cannot, therefore, be considered as one of the licenses or certificates referred to in 46 U.S.C. 391a(6).

Questions might arise regarding licenses issued by the Coast Guard authorizing service as an ocean operator or operator on other than ocean and coastwise waters. Although these li-

censes do allow service on inspected vessels, they cannot be considered as allowing the holder to serve as a tankerman because the required examinations for these licenses, which may be found in part 187 of Title 46, CFR, do not derive from 46 U.S.C. 391a.

Under Public Law 92–339 the Coast Guard will be issuing a new class of license which will authorize operation of commercial towing vessels in certain broad geographic areas. These vessels are neither inspected nor certificated as tank vessels. In light of those facts and because the authority for the examination for this license will not derive from 46 U.S.C. 391a, this license cannot be considered as one which could be substituted for a certificate as tankerman.

Under regulations to be promulgated to implement the "Federal Water Quality Improvement Act of 1970" the Coast Guard will examine each applicant for certification in a rated capacity and each applicant for any license as to his knowledge of pollution abatement and containment or cleanup procedures. Such an examination should not be construed as a substitute for the examination leading to certification as a tankerman.

The proposed regulations will stipulate, however, that "a license as master, mate, pilot, or engineer authorizing service on inspected vessels is valid for service as tankerman."

Persons now holding or applying for a license authorizing service only on uninspected vessels or authorizing service as an operator should make separate application for endorsement as a tankerman if their duties require service in that capacity. Upon successful completion of the requisite examination, they will be issued a Merchant mariner's document endorsed with the rating of tankerman and the kinds or grades of liquid cargo they are qualified to handle.

American Merchant Marine Seamanship Trophy Awarded

Capt. Carl G. Holmes, left, master of the SS Montana *receives the American Merchant Marine Seamanship Trophy from T. J. Patterson, Jr., Western Region director, Maritime Administration, Department of Commerce.*

In recognition of the extraordinary seamanship he displayed in the rescue of 19 men from a sinking raft, Capt. Carl G. Holmes of the *SS Montana* was presented the Maritime Administration's American Merchant Marine Seamanship Trophy for 1972. Western Region Director T. J. Patterson presented the award to Captain Holmes aboard ship on August 11, 1972.

At the ceremonies, Captain Holmes reviewed the dramatic rescue which ended a 2-day search in gale-whipped mid-Pacific seas. Spotting flares on December 11, the *Montana* approached a slowly sinking liferaft which carried the exhausted survivors from a disabled Danish freighter. Heavy winds and strong currents prevented the ship from getting close enough for a conventional rescue, however, so a lifeboat was lowered into the 24-foot waves. Nineteen men were transported to the safety of the *Montana* as the six-man lifeboat crew battled the heaving seas.

Captain Holmes commended his lifeboat crew at the award ceremony by commenting, "They volunteered without hesitation." Members of the crew were: Donald V. Kayl, Chief Mate; Virgil R. Campbell, Chief Engineer; Seamen Willard C. Smiley, Birger Jeseth, Donald V. Steffens, and James R. Sharp.

The award to Captain Holmes marks the seventh time in the past 11 years that the American Merchant Marine Seamanship Trophy has been presented. Nominees for the honor must be U.S. citizens serving aboard a civilian-manned U.S.-flag vessel. A select committee reviews the nominations to determine the individual who best displays professional competence in the presence of extreme peril to life or property.

Title 46 Changes

TITLE 46—SHIPPING

Chapter I—Coast Guard, Department of Transportation

SUBCHAPTER J—ELECTRICAL ENGINEERS

[CGD 72-35CR]

PART 110—GENERAL PROVISIONS

Nonsparking Fans; Clarification of Design Characteristics

In F.R. Doc. 72-3333 appearing at page 4959 in the Federal Register issue of Wednesday, March 8, 1972, the Coast Guard promulgated amendments to the electrical systems regulations, including a definition of nonsparking fan appearing on page 3961. Included in the definition is the statement, "A combination of an aluminum or magnesium alloy fixed or rotating component regardless of tip clearance is a sparking hazard." Subsequent to the publication of the definition, it was determined by the Coast Guard that the quoted statement, although correct, needed clarification. This document provides a statement that is clarifying in nature.

Since this amendment provides only clarification of a rule that interested persons had an opportunity to participate in the rule making through the submissions of oral and written comments, notice at this time is unnecessary. Since this amendment imposes no additional burden on any person, it may be made effective in less than 30 days.

The complete text of these changes was published in the Federal Register of August 16, 1972.

TITLE 46—SHIPPING

Chapter I—Coast Guard Department of Transportation

[CGD 72-104R]

MISCELLANEOUS AMENDMENTS TO CHAPTER

The purpose of these amendments to the shipping regulations is to correct errors, remove obsolete material, and make minor changes. The amendments are discussed below in the order in which they are set forth following the discussion.

1. Part 58 contains regulations for the design and construction of machinery installed on vessels. Therefore, a requirement in § 58.30-17(e) that components that have been subjected to excess pressure during testing may not be sold is amended to come within the purpose of Part 58, that is, these components may not be installed on vessels to which Part 58 applies. The word "valve" in the last sentence of § 58.30-17(e) has been changed to "component" because the section applies to other components in addition to valves.

2. These amendments revise the sections pertaining to hull markings in Parts 32, 78, 97, 185, and 196 to delete obsolete references to the documentation regulations of the Commissioner of Customs. The documentation of vessels is now a function of the Coast Guard. The sections are revised to properly refer to the marking requirements now in the Coast Guard regulations.

3. Because of the adoption of Subchapter T, which is applicable to small passenger vessels, the applicability of Subchapter H Passenger Vessels, is limited to vessels that are 100 gross tons or more. These amendments delete obsolete language that applies to vessels less than 100 gross tons. The requirements that are deleted now appear in Subchapter T of Title 46, Small Passenger Vessels Under 100 Gross Tons.

4. These amendments revoke § 75.40-90(a)(2), which allows wood floats instead of life preservers on certain vessels. Wood floats are in use on only one inspected vessel. They may be continued in service on that vessel under § 75.40-90(a)(1). The term "Wood floats" is also deleted from the marking requirements in § 78.47-65.

5. Section 78.75-1 is amended to refer to recently adopted requirements relating to motion picture projectors.

6. Section 78.80-11, which pertains to power-operated industrial trucks aboard vessels, is amended to delete an obsolete exception.

7. Section 73.40-20 is amended to correct a reference to a section in Part 55.

8. The restriction against piercing the longitudinal joint of welded pipe in § 56.60-2 is revised to assure this requirement is not overlooked.

9. Section 56.60-25 is amended to correct a reference to another section.

10. The table in § 56.85-10 is amended to state the correct name of material group P-8, which is "High alloy steels, austenitic." "P" groupings are defined in section IX, Welding Qualifications, ASME Boiler and Pressure Vessel Code.

11. Section 136.07-5(a) is revised to remove ambiguity. An "Investigating Officer," as defined in § 136.03, which was revised on April 29, 1970 (FEDERAL REGISTER, Vol. 35, No. 84), is designated by the Commandant, District Commander, or Officer in Charge, Marine Inspection. But § 136.07-5, which was not revised when § 136.03 was revised, refers to an investigating officer designated by the Commandant or District Commander. Because the designation of investigating officers is covered in the definition, the reference to the desig-

nation in § 136.07–5(a) is unnecessary and is deleted by this amendment.

Because each of these amendments is minor or deletes obsolete requirements or references or corrects errors and imposes no burden on any person, I find that public procedure thereon is unnecessary and that these amendments may be made effective in less than 30 days.

In consideration of the foregoing, Title 46 of the Code of Federal Regulations is amended effective July 17, 1972, as follows:

1. By amending Part 58 by revising the second sentence of § 58.30–17(e) to read as follows:

§ 58.30–17 Procedure for impact shock test of hydraulic cast iron and cast aluminum products.

* * * * *

(e) * * * Components that have been subjected to a hydrostatic proof test in excess of twice the pressure rating marked on the component shall not be installed on vessels to which this part applies.

2. By amending Parts 32, 78, 97, 185, and 196 as follows:

§§ 32.05–10 and 32.05–15 [Amended]

(a) By deleteing the words "not documented by the Commissioner of Customs" in the first sentence of § 32.05–10.

(b) By deleting the words "not documented by the Commissioner of Customs" in the first sentence of § 32.05–15.

(c) By revising § 78.50–5 to read as follows:

§ 78.50–5 Hull markings.

Vessels shall be marked as required by Parts 67 and 69 of this chapter.

(d) By revising § 97.40–5 to read as follows:

§ 97.40–5 Hull markings.

Vessels shall be marked as required by Parts 67 and 69 of this chapter.

(e) By revising § 185.30 to read as follows:

§ 185.30 Hull markings.

Vessels shall be marked as required by Parts 67 and 69 of this chapter.

(f) By revising § 196.40 to read as follows:

§ 196.40 Hull markings.

Vessels shall be marked as required by Parts 67 and 69 of this chapter.

3. By amending Parts 71, 72, 74, 75, as follows:

(a) By revising § 71.01–5 to read as follows:

§ 71.01–5 Posting.

The certificate of inspection shall be displayed under glass in a conspicuous place where observation by the passengers is likely.

(b) By revising the third sentence of § 72.10–5(a) to read as follows:

§ 72.10–5 Two means required.

(a) * * * For stairway continuity and general requirements for stairways see § 72.05–20.

* * * * *

(c) By revising § 72.15–5 to read as follows:

§ 72.15–5 Structural fire protection.

See § 72.05–50 for ventilation requirements pertaining to structural fire protection.

(d) By revising § 72.20–1 to read as follows:

§ 72.20–1 Application.

The provisions of this subchapter, except § 72.20–90, apply to all vessels contracted for after November 18, 1952. Vessels contracted for before November 19, 1952 shall meet the requirements of § 72.20–90.

§ 72.20–90 [Amended]

(e) By deleting paragraph (a) of § 72.20–90.

(f) By revising § 74.01–5 to read as follows:

§ 74.01–1 General.

The provisions in this part, except those in Subpart 74.90, apply to vessels contracted for after May 25, 1965. The provisions of Subpart 74.90 apply to vessels contracted for before May 26, 1965.

§§ 75.10–20, 75.90–5 and 78.50–10 [Amended]

(g) By deleting subparagraph (1) of paragraph (a) and subparagraphs (2) of paragraph (b) of § 75.10–20.

(h) By deleting paragraph (b) of § 75.90–5.

(i) By deleting the words "50 gross tons and over, under the jurisdiction of the U.S. Coast Guard," in the first sentence of § 78.50–10(a).

4. Parts 75 and 78 are amended as follows:

§§ 75.40–90 and 78.47–65 [Amended]

(a) By revoking § 75.40–90(a)(2).

(b) By deleting the words "wood floats" in § 78.47–65 and in the catch line for that section.

5. Part 78 is amended by revising § 78.75–1(b) to read as follows:

§ 78.57–1 Type required.

* * * * *

(b) Projectors must meet the requirements in § 111.80–30 of this title.

6. By amending Part 78 by revising § 78.80–1(a) to read as follows:

§ 78.80–1 Application.

(a) *Power - operated industrial trucks.* This subpart applies to—

(1) Power - operated industrial trucks carried on board vessels as part of the vessel's equipment for handling materials of any kind; and

(2) Power - operated industrial trucks placed on board a vessel for handling materials of any kind when the vessel is within the navigable waters of the United States, its territories, or its possessions. This subparagraph does not apply in the Panama Canal Zone.

* * * * *

§ 73.40–20 [Amended]

7. By amending Part 73 by striking out the section reference "55.10–70" in § 73.40–20 and inserting the section reference "56.50–95" in place thereof.

8. By amending Part 56 as follows:

(a) By revising paragraph (b) of § 56.60–2 to read as follows:

§ 56.60–2 Limitations on materials.

* * * * *

(b) *Welded pipe and tubing.* The following restrictions apply to the use of welded pipe and tubing specifications when utilized in piping systems, and not when utilized in heat

exchanger, boiler, pressure vessel, or similar components:

(1) *Longitudinal joint.* Wherever possible, the longitudinal joint of a welded pipe shall not be pierced with holes for branch connections or other purposes.

(2) *Class II.* Use unlimited except as restricted by maximum temperature or pressure specified in Table 56.60–1(a).

(3) *Class I.* (i) For those specifications in which a filler metal is used, the following applies to the material as furnished prior to any fabrication:

(*a*) For use in service above 800° F. full welding procedure qualifications by the Coast Guard are required. See Part 57 of this subchapter.

(*b*) Ultrasonic examination as required by item S–6 in ASTM A–376 shall be certified as having been met in all applications except where 100 percent radiography is a requirement of the particular material specification.

(ii) For those specifications in which no filler metal is used in the welding process, the following applies:

(*a*) Ultrasonic examination as required by item S–6 in ASTM A–376 shall be certified as having been met for service above 800° F.

NOTE: There are additional requirements for nuclear and low temperature piping systems in this subchapter.

§§ 56.60–25 and 56.85–10 [Amended]

9. Part 56 is amended by striking out the words and numbers "See § 56.90–59" in parenthesis in subparagraph (a)(5) of § 56.60–25 and inserting the words and numbers "See § 56.50–95(f)" in place thereof.

10. Part 56 is amended by striking out the symbol "do" in item P–8 in the table in § 56.85–10 and inserting the words "High-alloy steels, austenitic" in place thereof.

11. By amending Part 136 by revising § 136.07–5(a) to

§ 136.07–5 Investigating officers, powers of.

(a) An investigating officer investigates each marine casualty or accident reported under §§ 136.05–1 and 136.05–10.

* * * * *

(R.S. 4405, as amended, R.S. 4462, as amended, sec. 633, 63 Stat. 545; sec. 6(b)(1), 80 Stat. 937; 46 CFR 375, 416, 14 U.S.C. 633, 49 CFR 1655(b)(1); 49 CFR 1.46(b))

Dated: July 10, 1972.

C. R. BENDER,
Admiral, U.S. Coast Guard
Commandant.

(Federal Register of July 18, 1972)

TITLE 46—SHIPPING

Chapter I—Coast Guard, Department of Transportation

SUBCHAPTER N—DANGEROUS CARGOES

[CGD 71–12a]

PART 146—TRANSPORTATION OR STORAGE OF EXPLOSIVES OR OTHER DANGEROUS ARTICLES OR SUBSTANCES, AND COMBUSTIBLE LIQUIDS ON BOARD VESSELS

PART 147—REGULATIONS GOVERNING USE OF DANGEROUS ARTICLES AS SHIPS' STORES AND SUPPLIES ON BOARD VESSELS

Miscellaneous Amendments

The amendment to Title 46 Code of Federal Regulations:

(1) Adds ethylene dibromide and toulene diisocyanate to Hazardous Articles classification.

(2) Clarifies the fact that Coast Guard classes for military explosives in addition to Classes I and II may be carried in containers upon approval of the Commandant.

(3) Defines "accessible" in the military explosives regulation (§ 146.29).

(4) Clarifies the prohibition against handling drafts of military explosives over explosives or other dangerous cargo which have been placed on deck.

(5) Redesignates § 146.29–25(g)(4) as § 146.29–59(i) since radioactive materials are no longer a class of poisons.

(6) Adds to § 146.06–12 a requirement for the dangerous cargo manifest to be kept in a holder located on or near the bridge. Also, requires that all special permits dealing with the transport of dangerous cargoes be kept in that holder.

(7) Clarifies what articles must be certified as a ships' store.

(8) Changes the title of Subpart 147.03 to "Use of ships' stores and supplies of a dangerous nature aboard ship."

(9) Adds to § 147.03–4 the detailed information required to be on labels or articles of ships' stores and supplies.

In the March 20, 1971, Federal Register a notice of proposed rule making (CGFR 71–12) was published which contained these items. A public hearing was held on June 3, 1971, for this notice. Two written and one oral comment were received on that notice.

All three comments dealt with the regulations proposed for toluene diisocyanate. They stated that the name should be spelled Toluene Diisocyanate and not Tolylene Diisocyanate because the latter is outdated. This comment is adopted. Two commentors also objected to the packaging proposed because it restricted packages to "stainless" steel drums thereby eliminating use of "carbon" steel drums which experience showed is an acceptable package. Therefore, the comment is adopted and all types of steel drums are allowed. One commentor requested that DOT–51 portable tanks be allowed for toluene diisocyanate. This proposal will be considered in a future rule making on this product.

This amendment is part of the notice of proposed rule making (CGFR 71–12). The remaining portions will be republished in a larger notice of proposed rule making to be issued later this year except for two topics still under study by the Coast Guard. These topics are the proposals on motor vehicles in containers and on gas tight holds for flammable liquid stowage.

The complete text of these changes was published in the Federal Register of July 21, 1972.

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter I—Coast Guard, Department of Transportation

SUBCHAPTER D—NAVIGATION REQUIREMENTS FOR CERTAIN INLAND WATERS

[CGD 72-136R]

PART 82—BOUNDARY LINES OF INLAND WATERS

Atlantic Coast, Gulf Coast, Pacific Coast, Puerto Rico and Virgin Islands

The Coast Guard is amending the descriptions of the lines of demarcation of inland waters at St. Marys Entrance, Ga.; Miami Entrance, Fla.; Freeport Entrance, Tex.; Aransas Pass, Tex.; Tomales Point, Calif.; San Pedro, Calif.; Santa Barbara, Calif.; Port Hueneme, Calif.; Redondo Harbor, Calif.; Newport Bay, Calif.; and Bahia de Mayaguez, P.R.

The purpose of these amendments to the regulations is to make editorial corrections which reflect changes in aids to navigation descriptions in the various locations affected. These changes in aid descriptions do not alter the established lines of demarcation between inland and international waters.

St. Marys Entrance Lighted Whistle Buoy "1STM" has been renamed St. Marys Entrance Lighted Whistle Buoy "STM". Miami Lighted Whistle Buoy 2 has been changed from red to black and white vertical stripes and renamed Miami Lighted Whistle Buoy "M". Freeport Entrance Lighted Bell Buoy 1 has been replaced by Lighted Whistle Buoy 1 in the same location. Aransas Pass Lighted Whistle Buoy 1 has been renamed Aransas Pass Lighted Whistle Buoy "AP". Tomales Point Lighted Whistle Buoy 2 has been replaced by Lighted Horn Buoy 2 in the same location. Los Angeles Harbor Light has been renamed Los Angeles Light. Long Beach Breakwater East End Light has been established on the eastern end of the Long Beach breakwater. Stearns Wharf Light has been numbered Stearns Wharf Light 4. Port Hueneme West Jetty Light has been numbered Port Hueneme West Jetty Light 1. Redondo Beach East Jetty Light has been numbered Redondo Beach East Jetty Light 2. Redondo Beach West Jetty Light has been numbered Redondo Beach West Jetty Light 3. Newport Bay East Jetty Light has been numbered Newport Bay East Jetty Light 4. Newport Bay West Jetty Light has been numbered Newport Bay West Jetty Light 3. Manchas Interiores Lighted Buoy 3 has been renamed Bahia de Mayaguez Entrance Lighted Buoy 3. Manchas Grandes Lighted Buoy 2 has been renamed and renumbered Bahia de Mayaguez Entrance Lighted Buoy 4.

In consideration of the foregoing, Part 82 of Title 33 of the Code of Federal Regulations is amended by revising §§ 82.45, 82.55, 82.111, 82.116, 82.131, 82.145, 82.147, 82.149, 82.153, 82.155, and 82.210 to read as follows:

§ 82.45 St. Simons Sound, St. Andrew Sound, and Cumberland Sound.

A line drawn from the tower located 1,700 yards bearing 068° true from St. Simons Light to St. Simons Lighted Whistle Buoy St. S; thence to St. Andrew Sound Outer Entrance Buoy; thence to St. Marys Entrance Lighted Whistle Buoy STM; thence to Amelia Island Light.

§ 82.55 Florida Reefs and Keys from Miami to Marquesas Keys.

A line drawn from the east end of the north jetty at the entrance to Miami Harbor, to Miami Lighted Whistle Buoy M; thence to Fowey Rocks Light; thence to Pacific Reef Light; thence to Carysfort Reef Light; thence to Molasses Reef Light; thence to Alligator Reef Light; thence to Tennessee Reef Light; thence to Sombrero Key Light; thence to American Shoal Light: thence to Key West Entrance Lighted Whistle Buoy; thence to Sand Key Light; thence to Cosgrove Shoal Light; thence to the westernmost extremity of Marquesas Keys.

§ 82.111 Galveston, Tex., to Brazos River., Tex.

A line drawn from Galveston Bay Entrance Channel Lighted Whistle Buoy 1 to Freeport Entrance Lighted Whistle Buoy 1.

§ 82.116 Brazos River, Tex., to the Rio Grande, Tex.

A line drawn from Freeport Entrance Lighted Whistle Buoy 1 to a point 4,350 yards, 118° true, from Matagorda Light; thence to Aransas Pass Lighted Whistle Buoy AP; thence to a position 10.5 miles, 90° true, from the north end of Lopeno Island (27°00.1′ N. latitude, 97°15.5′ W. longitude); thence to Brazos Santiago Entrance Lighted Whistle Buoy 1.

§ 82.131 Bodega and Tomales Bays.

A line drawn from the northwestern tip of Tomales Point to Tomales Point Lighted Horn Buoy 2; thence to Bodega Harbor Approach Lighted Gong Buoy BA; thence to the southernmost extremity of Bodega Head.

§ 82.145 San Pedro Bay.

A line drawn from Los Angeles Light to Los Angeles Main Channel Entrance Light 2; a line drawn from Long Beach Light to Long Beach Channel Entrance Light 2; a line drawn from Long Beach Breakwater East End Light to Anaheim Bay West Jetty Light 5; thence to Anaheim Bay East Jetty Light 6.

§ 82.147 Santa Barbara Harbor.

A line drawn from Stearns Wharf Light 4 to Santa Barbara Harbor Lighted Bell Buoy 1, thence to Santa Barbara Harbor Breakwater Light.

§ 82.149 Port Hueneme.

A line drawn from Port Hueneme West Jetty Light 1 to the southwest end of Port Hueneme East Jetty.

§ 82.153 Redondo Harbor.

A line drawn from Redondo Beach East Jetty Light 2 to Redondo Beach West Jetty Light 3.

§ 82.155 Newport Bay.

A line drawn from Newport Bay East Jetty Light 4 to Newport Bay West Jetty Light 3.

§ 82.210 Bahia de Mayaguez.

A line drawn from the southernmost extremity of Punta Algarrobo to Bahia de Mayaguez Entrance Lighted Buoy 3; thence to Bahia de Mayaguez Entrance Lighted Buoy 4; thence to the northwesternmost extremity of Punta Guanajibo.

Effective date. These amendments become effective on August 28, 1972.

Dated: June 30, 1972.

(Sec. 2, 88 Stat. 672, as amended, sec. 6(b)(1), 80 Stat. 938; 33 U.S.C. 151, 49 U.S.C. 1655(b); 49 CFR 1.46(b))

C. R. BENDER,
Admiral, U.S. Coast Guard
Commandant.

(Federal Register of July 21, 1972)

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter I—Coast Guard, Department of Transportation

[CGD 72-74R]

PART 67— AIDS TO NAVIGATION ON ARTIFICAL ISLANDS AND FIXED STRUCTURES

General Requirements for Fog Signals

The purpose of this amendment to Part 67 of Title 33, Code of Federal Regulations, is to revise the minimum loudness levels and establish testing procedures for fog signals on artificial islands and structures that are erected on or over the Outer Continental Shelf or in U.S. waters for the purpose of exploring for, developing, removing, and transporting resources from the seabed and subsoil. This amendment also clarifies and makes other minor changes to Part 67.

These amendments were proposed in a notice of proposed rule making published in the Federal Register of April 19, 1972 (37 F.R. 7703). The comments received in response to the notice have been considered in this issuance of a final rule. Several minor editorial changes have been made.

One comment suggested that the term "audible range" be changed to "usual range" to agree with accepted international terminology and to avoid the implication that a fog signal is always audible at the stated range. While the loudness levels proposed for an "audible range" of 2 miles are identical to that prescribed by the International Association of Lighthouse Authorities (IALA) for a "usual range" of 2 miles the levels for an audible range of one-half mile differ from those of an IALA usual range of one-half mile. Calling the half-mile range a "usual range" would be misleading. Since the term "audible range" may also be misleading it has been changed to "range" wherever appearing in these regulations.

Two comments were received questioning the proposed requirements of § 67.10–1(e) which would limit fog signal apparatus to a "height not exceeding eight times the wave length of the fundamental frequency." It appears that the proposed wording did not clearly indicate the intent of the rule which was to insure an adequate vertical sound pattern by prohibiting the stacking of more than eight sound sources. This paragraph has been rewritten to explicitly prohibit such installations.

One comment, from a fog signal manufacturer, protested the proposed § 67.10–1(g)(3) which would require fog signal apparatus to be permanently marked with a "model designation not previously used on any other apparatus." The manufacturer claimed it would be expensive to redesignate his existing product line and questioned the usefulness of such a redesignation. He further stated that the goodwill of his present designations would be lost if his product line must be redesignated to qualify for approval under the new regulations. The proposed rule was intended to identify signals subject to the proposed new regulations. (Signals authorized for use by the Coast Guard and manufactured prior to January 1, 1973, were excepted from some of the new rules). The Coast Guard agrees that the manufacturer's objections are valid and has therefore deleted the requirement for a new model designation. Instead, each signal will be required to be permanently marked with the date of manufacture.

Two comments expressed concern that the "Table A * * * in effect on December 31, 1972" (proposed § 67.10–40) would not be the Table A currently in effect. The effective date of these new regulations should eliminate this concern.

One comment claimed that the proposed § 67.10–40 seemed inconsistent with the preamble to the notice of proposed rule making and therefore recommended a revision of § 67.10–40. The Coast Guard considers that there is no inconsistency and therefore rejects the proposed revision.

The complete text of these changes was published in the Federal Register of July 8, 1972.

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter I—Coast Guard, Department of Transportation

[CGFR 72-118R]

SUBCHAPTER D—NAVIGATION REQUIREMENTS FOR CERTAIN INLAND WATERS

PART 80—PILOT RULES FOR INLAND WATERS

SUBCHAPTER F—NAVIGATION REQUIREMENTS FOR WESTERN RIVERS

PART 95—PILOT RULES FOR WESTERN RIVERS

Lights for Certain Craft

The purpose of these amendments to Chapter I of Title 33, Code of Federal Regulations is to change the characteristic of the amber 20-point navigation light now required to be displayed at the center of the forward end of barge tows pushed ahead in the waters of the Gulf Intracoastal Waterway and the western rivers under 33 CFR 80.16a and 33 CFR 95.29 from fixed to flashing and to specify a flash rate for this light of 50 to 70 times per minute.

A notice of proposed rule making was published in the Federal Register on March 1, 1972 (CGFR 72-37; 37 F.R. 4293, Item 8), announcing this proposal as Marine Safety Council Public Hearing Agenda 27 March

1972 Item 8 and soliciting comments on these amendments under consideration in Parts 80 and 95.

Following several nighttime collisions involving barge tows pushed ahead, efforts to improve barge lighting requirements were undertaken and this proposal resulted from those efforts. Experiments using the flashing amber 20-point towhead light were conducted from May 1, 1970, to October 31, 1970, on tows operating on the Upper Mississippi River, the Ohio River, and the Tennessee River. As part of the experiments, comments were solicited from members of the towing industry and the boating public. Of 315 replies received, 88 percent were in favor of the use of the flashing amber light as proposed, 8 percent were in favor of no change to the navigation lights presently prescribed, and 4 percent were either undecided or made no comment. There have been favorable endorsements of the proposed adoption of the flashing amber light by State boating administrations, power squadrons, Coast Guard Auxiliary and other boating interests as well as the majority of line haul towboat operators.

At public hearings conducted in Cincinnati, Ohio, on November 15, 1971, and in St. Louis, Mo., on November 16, 1971, as part of an inquiry into the adequacy of vessel navigation lights on the western rivers, strong support for the adoption of the flashing amber towhead light was also voiced.

Comments in response to the notice of proposed rule making published in the Federal Register on March 1, 1972 (CGFR 72–37; 37 F.R. 4293, Item 8), were also in support of this proposal. The one letter of opposition to the proposed rule was from the operator of a passenger excursion vessel who felt that because of the possibility of confusion and a blinding effect in congested harbors, the Coast Guard should further study the flashing amber light before proposing its adoption. The Coast Guard believes that the experiments conducted sufficiently answer this objection.

The Coast Guard, upon review of all comments received, believes that the safety of navigation in the western rivers and the Gulf Intracoastal Waterway will be strongly enhanced by the adoption of this change to the regulations.

In consideration of the foregoing, Parts 80 and 95 of Title 33 of the Code of Federal Regulations are amended as follows:

1. By revising paragraphs (b) and (j) of § 80.16a to read as follows:

§ 80.16a Lights for barges, canal boats, scows and other nondescript vessels on certain inland waters on the Gulf Coast and the Gulf Intracoastal Waterway.

* * * * *

(b) When one or more barges, canal-boats, scows, or other vessels of nondescript type not otherwise provided for, are being towed by pushing ahead of a steam vessel, or by a combination of pushing ahead and towing alongside of a steam vessel, such tow shall be lighted by a flashing amber light at the extreme forward end of the tow, so placed as to be as nearly as practicable on the centerline of the tow, a green light on the starboard side of the tow, so placed as to mark the maximum projection of the tow to starboard, and a red light on the port side of the tow, so placed as to mark the maximum projection of the tow to port.

* * * * *

(j) The amber light shall flash 50 to 70 times per minute and be so constructed as to show a uniform light over an arc of the horizon of 20 points of the compass, so fixed as to show the light 10 points on each side of the tow, namely, from right ahead to 2 points abaft the beam on either side, and of such character as to be visible at a distance of at least 2 miles.

* * * * *

2. By revising paragraphs (a) and (d) of § 95.29 to read as follows:

§ 95.29 Lights for barges towed ahead or alongside.

(a) When one or more barges are being towed by pushing ahead of a steam vessel, or by a combination of pushing ahead and towing alongside of a steam vessel, such tow shall be lighted by a flashing amber light at the extreme forward end of the tow, so placed as to be as nearly as practicable on the centerline of the tow, a green light on the starboard side of the tow, so placed as to mark the maximum projection of the tow to starboard, and a red light on the port side of the tow, so placed as to mark the maximum projection of the tow to port.

* * * * *

(d) The amber light shall flash 50 to 70 times per minute and be so constructed as to show a uniform light over an arc of the horizon of 20 points of the compass, so fixed as to show the light 10 points on each side of the tow, namely, from right ahead to 2 points abaft the beam on either side, and of such character as to be visible at a distance of at least 2 miles.

* * * * *

Effective date. This amendment is effective September 1, 1972.

(R.S. 4233A, as amended, sec. 2, 30 Stat. 102, as amended, sec. 6(b)(1), 80 Stat. 937; 33 U.S.C. 353, 157, 49 U.S.C. 1655(b)(1); 46 CFR 1.46(b))

Dated: June 30, 1972.

C. R. BENDER,
Admiral, U.S. Coast Guard,
Commandant.

(Federal Register of July 7, 1972)

Approved Equipment

Commandant Issues Equipment Approvals; Terminates Others

U.S. Coast Guard approval was granted to certain items of lifesaving, and other miscellaneous equipment and materials. At the same time the Coast Guard terminated certain items of lifesaving, and other miscellaneous equipment and materials.

Those interested in these approvals and terminations should consult the Federal Register of July 4, August 9, 11, and 31, 1972, for detailed itemization and identification.

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 Sunday, Monday, and days following 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 $2.50 per month or $25 per year, payable in advance. The charge for individual copies is 20 cents for each issue, or 20 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. Regulations for Dangerous Cargoes, 46 CFR 146 and 147 (Subchapter N), dated January 1, 1972 are now available from the Superintendent of Documents price: $3.75.

CG No.	TITLE OF PUBLICATION
101	Specimen Examination for Merchant Marine Deck Officers (7–1–63).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (5–1–68). F.R. 6–7–68, 2–12–69, 10–29–69, 12–30–70, 3–20–71, 7–21–72.
115	Marine Engineering Regulations (7–1–70) FR. 12–30–70, 3–25–72, 7–18–72.
123	Rules and Regulations for Tank Vessels (5–1–69) F.R. 10–29–69, 2–25–70, 6–17–70, 10–31–70, 12–30–70, 3–8–72, 3–9–72, 6–14–72, 7–18–72.
129	Proceedings of the Marine Safety Council (Monthly).
169	Rules of the Road—International—Inland (9–1–65). F.R. 12–8–65, 12–22–65, 2–5–66, 3–15–66, 7–30–66, 8–2–66, 9–7–66, 10–22–66, 5–11–67, 12–23–67, 6–4–68, 10–29–69, 11–29–69, 4–3–71, 3–15–72, 6–21–72, 6–28–72.
172	Rules of the Road—Great Lakes (9–1–66). F.R. 2–18–67, 7–4–69, 8–4–70, 3–15–72, 6–21–72, 6–28–72, 7–21–72.
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 (3–1–65).
176	Load Line Regulations (2–1–71) F.R. 10–1–71.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
184	Rules of the Road—Western Rivers (9–1–66). F.R. 9–7–66, 2–18–67, 5–11–67, 12–23–67, 6–4–68, 11–29–69, 4–3–71, 3–15–72, 6–21–72, 6–28–72, 7–7–71, 7–21–72.
190	Equipment Lists (8–1–70). F.R. 8–15–70, 9–29–70, 9–24–71, 9–30–71, 10–7–71, 10–14–71, 10–19–71, 10–30–71, 11–3–71, 11–6–71, 11–10–71, 11–23–71, 12–2–71, 1–13–72, 1–20–72, 2–4–72, 2–19–72, 3–3–72, 3–9–72, 3–14–72, 4–4–72, 4–28–72, 5–10–72, 5–17–72, 6–14–72, 6–21–72, 7–4–72, 8–9–72, 8–11–72, 8–31–72.
191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (5–1–68). F.R. 11–28–68, 4–30–70, 6–17–70, 12–30–70, 6–17–71, 12–8–71, 5–31–72.
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.
220	Specimen Examination Questions for Licenses as Master, Mate, and Pilot of Central Western Rivers Vessels (4–1–57).
227	Laws Governing Marine Inspection (3–1–65).
239	Security of Vessels and Waterfront Facilities (5–1–68). F.R. 10–29–69, 5–15–70, 9–11–70, 1–20–71, 4–1–71, 8–24–71, 2–15–72.
249	Marine Safety Council Public Hearing Agenda (Annually).
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.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (8–1–69). F.R. 10–29–69, 2–25–70, 4–22–70, 4–30–70, 6–17–70, 10–31–70, 12–30–70, 9–30–71, 3–9–72, 7–18–72.
258	Rules and Regulations for Uninspected Vessels (5–1–70).
259	Electrical Engineering Regulations (6–1–71). F.R. 3–8–72, 3–9–72, 8–16–72.
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
293	Miscellaneous Electrical Equipment List (9–3–68).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (11–1–68). F.R. 12–17–68, 10–29–69, 1–20–71, 8–24–71, 10–7–71.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (12–1–71). F.R. 3–8–72, 3–25–72, 6–24–72, 7–18–72.
329	Fire Fighting Manual for Tank Vessels (7–1–68).

CHANGES PUBLISHED DURING AUGUST 1972

The following have been modified by Federal Registers:

CG–190, Federal Registers of August 9, 11, and 31, 1972.
CG–259, Federal Register of August 16, 1972.


DEEP DIVER
SEA DIVER
NEW YORK,N.Y.