Proceedings

of the Marine Safety Council

Vol. 43, No. 8

United States Coast Guard

August 1986

Proceedings
of the Marine Safety Council

Vol. 43, No. 8

August 1986

Published monthly by the Commandant, USCG, in the interest of safety at sea under the auspices of the Marine Safety Council. Special permission for republication, either in whole or in part, with the exception of copyrighted articles or artwork, is not required provided credit is given to the *Proceedings of the Marine Safety Council*. The views expressed are those of the authors and do not represent official Coast Guard policy. All inquiries and requests for subscriptions should be addressed to Commandant (G-CMC), U.S. Coast Guard, 2100 2nd Street, S.W., Washington, D.C. 20593; (202) 426-1477. Please include mailing label when sending in a change of address. The Office of the Secretary of Transportation has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this agency.

DIST.(SDL NO. 123)
A: abcde(2);fghklmntuv(1)
B: n(50);c(16);e(5);f(4) gj(3);r(2);bkiq(1)
C: eglmp(1)
D: adgklmw(1)
E: mn(1)
F: abcdehjkloqst(1)
List TCG-06

Contents

Features

171 Drugs and the Merchant Mariner
The Coast Guard continues to seek the revocation of licenses and Merchant Mariner's Documents of those who endanger their vessels through drug use
LCDR Christopher Walter

177 The Tug CELTIC and Barge CAPE RACE
It is probable that the barge's hull failure pulled the tug under, taking six crew members to their deaths

Departments

175 *Important Subscription Information*
176 *International Convention for the Safety of Life at Sea*
183 *Ship Structure Committee*
185 *Marine Safety Manual, Volume I, Now Available*
186 *New Publications*
187 *Chemical of the Month — Formic Acid*
188 *Nautical Queries*
190 *Coast Guard Papers Will Be Presented to the National Safety Congress*
191 *Keynotes*

Cover

Our cover photo shows Coast Guard personnel unloading marijuana from a seized vessel. In addition to its drug interdiction efforts, the Coast Guard acts to revoke licenses and Merchant Mariner's Documents from seamen who use drugs. "Drugs and the Merchant Mariner" begins on page 171. (Official U.S. Coast Guard photo by PA2 Kathi Boatman, Fifth District)

Drugs and the Merchant Mariner

LCDR Christopher Walter

Editor's Note: Although the author's theme centers on drug abuse, the Coast Guard believes alcohol abuse poses an equally important threat to the safety of the vessel. Accordingly, the Coast Guard has issued a comprehensive Notice of Proposed Rulemaking in the Federal Register, Vol. 51, No. 100, dated May 23, 1986. This Notice is designed to monitor, control and reduce alcohol and drug abuse aboard vessels. It proposes standards applicable to commercial vessels and vessels subject to statutory manning requirements for determining intoxication caused by alcohol or drugs, either based on a percentage of alcohol in the blood or on observations of the individual's demeanor or performance. Standards applicable to recreational vessels are being addressed in a separate rulemaking (CGD 84-099A). In addition, the Coast Guard is proposing (1) to prohibit crew members on vessels subject to inspection from performing any duties while intoxicated or within 4 hours of consuming any alcohol; (2) civil penalties for owners, charterers, managing operators, agents, master, or individuals in charge of vessels subject to inspection that allow crew members to perform any duties while intoxicated; (3) to allow personnel licensed, documented, or certificated by the Coast Guard to seek rehabilitation prior to being subject to proceedings to suspend or revoke the license, certificate, or document; (4) to provide for toxicological testing of individuals; and (5) to amend the regulations requiring reports of all marine casualties to include specific information on the role of alcohol or drugs in the casualty.

The proposals, if adopted, will aid the Coast Guard in providing for safety at sea by ridding vessels of alcohol and drug abusers. Interested persons are encouraged to review the Notice and submit comments.

LCDR Walter is Chief of the Investigation Department, U.S. Coast Guard Marine Safety Office, Hampton Roads, Virginia.

On January 10, 1985, an Able Seaman (AB) on a U.S. documented freighter did not relieve the watch on time. The vessel's Chief Mate searched for the AB and found him on the mess deck in a comatose state. His pockets were searched, and several vials containing a white powder were found. Fearing that the AB was suffering from a drug overdose, the Master had the seaman supported and walked around until he appeared to recover. A subsequent search of the seaman's room also produced a leafy vegetable matter which resembled marijuana. The vials and the suspected marijuana were given to U.S. Customs Service agents upon the vessel's arrival in Norfolk, Virginia; field tests proved positive for both heroin and marijuana. The seaman was charged by Coast Guard Investigating Officers under the provisions of Title 46 United States Code (U.S.C.) 7703 for misconduct, possession of heroin and marijuana, and his Merchant Mariner's Document was revoked in a hearing before an Administrative Law Judge. Customs levied an administrative fine against the AB which totaled $675.

On the same voyage, another AB on the vessel was logged by the Master for possession of marijuana. When the field test conducted by a U.S. Customs agent proved positive for marijuana, the seaman was charged by the Coast Guard under the provisions of 46 U.S.C. 7703 for misconduct, possession of marijuana, and his Merchant Mariner's Document was revoked, also. Customs fined this seaman a total of $75.

In each of the above cases, evidence presented by the Coast Guard Investigating Officers during the suspension and revocation hearings against the seamen's documents revealed that the conduct of these seamen had diminished their performance and endangered their vessel and its crew.

During the search of this vessel by U.S. Customs, a drug-sniffing dog "alerted" in the room of a third person. There appeared to be a minute amount of hashish residue left in an

ashtray. Since the amount present was not sufficient to support any suspension and revocation charges or administrative fines by Customs agents against that seaman, neither Customs nor the Coast Guard took any official action. She was given a verbal warning, however, in the hope this action would be sufficient to prevent future involvement with drugs.

In March 1985, 12 men were indicted by a federal grand jury in Norfolk, Virginia, for smuggling 69.5 **tons** of marijuana valued at $23.5 million from Colombia into North Carolina and Virginia. The indictment charged that this smuggling operation ran from 1979 through 1982. Marine Safety Office Hampton Roads Investigating Officers read about the indictments in the local newspaper and, after checking with Coast Guard Headquarters, they found that 3 of the 12 men were holders of Coast Guard licenses or Merchant Mariner's Documents. Two of the men were convicted of violating drug laws; the third remains a fugitive from justice. The two who were convicted and are presently serving sentences in prison voluntarily surrendered their Merchant Mariner's Documents (the equivalent of a revocation) in lieu of appearing at a hearing.

A careful reading of the local newspaper also resulted in a suspension and revocation case involving a man with a license as an Operator of Uninspected Towing Vessels. In this case, the man was convicted of violating drug laws in conjunction with the smuggling of 37,000 pounds of hashish into the United States. He was charged for violation of a dangerous drug law, and his license was revoked in a hearing before an Administrative Law Judge in Norfolk, Virginia. He is presently serving a sentence in prison.

In March 1985, the owners of a U.S. documented vessel required all the members of the crew to submit to a drug urinalysis test or be fired. The test results for 19 of the crew were positive for a number of drugs, and those crew members were discharged. Additional tests were run on the replacement crew, and eight of them also failed the drug screening. The crew members who failed the drug urinalysis test are the subjects of a Coast Guard suspension and revocation investigation for misconduct and use of dangerous drugs. Coincidentally, the seaman first mentioned in this article, the one who possessed vials of a white powder, had also signed onboard this vessel. The service of the Administrative Law Judge's decision revoking his Merchant Mariner's Document took place on this vessel and was totally independent of the company's decision to require the urinalysis tests.

In September 1985, Virginia Beach (Virginia) police arrested a man for assault. When they searched the suspect after the arrest, they found what appeared to be marijuana. The suspect complained bitterly that he was being harassed by the police and, while at the police station, pulled a Merchant Mariner's Document from his wallet, threw it at the police officer, and yelled, "While you're at it, why don't you check this for cocaine?" The police took the Merchant Mariner's Document and found a white powder inside it where the plastic lamination over the card had separated; the powder was analyzed and proved to be cocaine. Apparently, the individual had been using his Merchant Mariner's Document to cut lines of cocaine. Several months before, Marine Safety Office Hampton Roads had sent a letter to each law enforcement agency in the area, asking to be notified of any drug-related arrests of persons with Merchant Mariner Documents or licenses. The Virginia Beach police called Marine Safety Office Hampton Roads, and this seaman's Merchant Mariner's Document was revoked by an Administrative Law Judge.

Legislative History

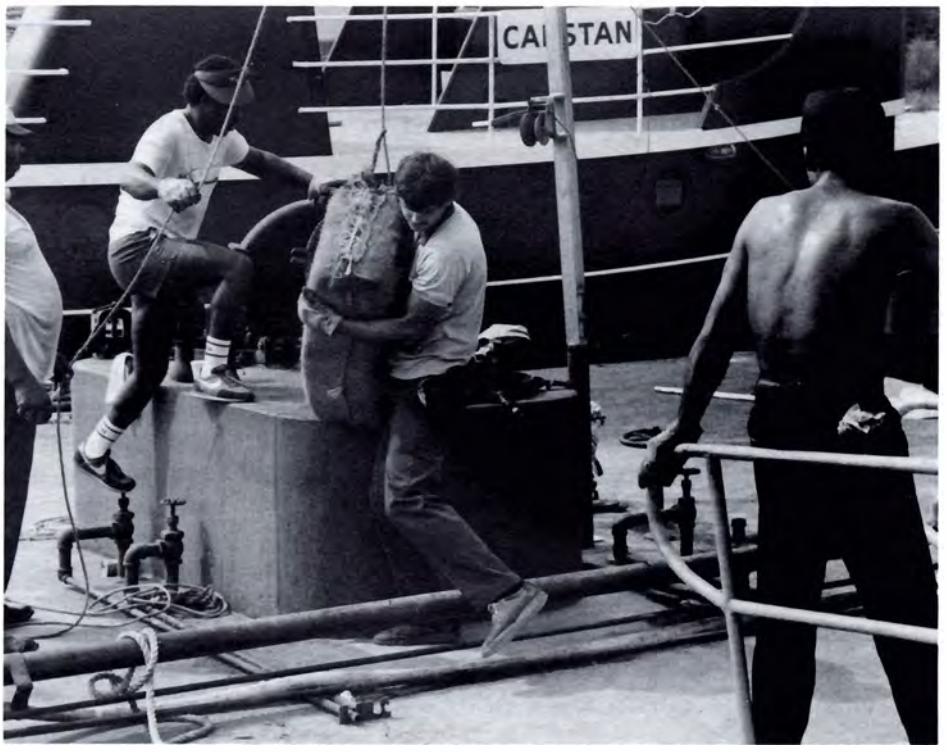
Title 46 U.S.C. 7704 provides for the mandatory revocation of a seaman's license, document, or certificate of registry for conviction of a dangerous drug law or for use of or addiction to dangerous drugs. The legislative history for 46 U.S.C. 239b, which was replaced by 46 U.S.C. 7704 when Title 46 was recodified, gives some interesting background and history for the law requiring revocation for involvement with drugs. The Coast Guard representative at the Senate hearing on the Act of July 15, 1954 (which was to become 46 U.S.C. 239b) testified that "in the last few years it has become evident that a large number of convicted addicts and/or traffickers are now able to serve in the United States Merchant Marine to the detriment of shipboard safety, morale and discipline because (presently) we are unable to proceed against them for narcotics offenses ashore."[1] The witness from the Bureau of Nar-

[1] *Senate Report No. 1648, 83rd Congress, 2nd session, reprinted in 1954, U.S. Code Congressional and Administrative News, p. 2558-9.*

cotics[2] testified that most drug smuggling is done by merchant seamen of all nations and that "A person who has been convicted of a narcotics offense or who has been addicted to narcotic drugs is a definite hazard insofar as the smuggling of narcotics is concerned."[3] The original law, passed in 1954, dealt with narcotics as defined by 21 U.S.C. 171(a) as well as marijuana. When Title 46 was recodified, the scope of the law was expanded to dangerous drugs as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970 (21 U.S.C. 802). This was done to incorporate violations of drug laws and misconduct involving drugs such as PCP and LSD[4] which, while not narcotics or marijuana, constitute definite hazards to safety at sea when a mariner is involved with them.

On February 4, 1985, the Coast Guard published an Advance Notice of Proposed Rulemaking (ANPRM) in the Federal Register concerning the possible revision of Title 46 Code of Federal Regulations (CFR) Part 12. These regulations cover the requirements for certification of seamen. The ANPRM background information stated, in part, "The growth in the use and abuse of narcotics and alcohol in society has drawn national attention to the safety problems associated with persons under the influence of such drugs. This safety problem is greatly increased aboard ship and persons under the influence pose hazards to both ship and crew."[5] The ANPRM went on to request comments on a number of areas, including (1) if physical examinations are required for original Merchant Mariner's Documents at the entry level, should drug/alcohol screening also be required; and (2) if retention physical examinations are required, should drug/alcohol screening be included?[6]

This ANPRM appears to be the first shot in a new battle to keep the Merchant Marine free of drug use. Other transportation modes have either taken measures to reduce the hazards from drug use or have received recommendations to institute measures to detect and control drug use. The National Transportation Safety Board (NTSB), an independent federal agency which is tasked with promoting transportation safety by conducting accident investigations and by formulating safety improvement recommendations, issued three drug-related recommendations



This vessel was turned over to the U.S. Customs Service and the Drug Enforcement Administration when the Coast Guard brought it into port. A commercial moving company was hired by DEA to remove bundles of marijuana from the seized vessel. (Official U.S. Coast Guard photo by PA2 Kathi Boatman, Fifth District)

[2] *Now known as the Drug Enforcement Administration.*

[3] *Senate Report No. 1648, 83rd Congress, 2nd session, reprinted in 1954, U.S. Code Congressional and Administrative News, p. 2559.*

[4] *House of Representatives Report No. 98-338, 98th Congress, 1st Session, reprinted in 46 U.S. Code Annotated, Subtitle II, 1985, West Publishing Co., St. Paul, Minnesota, p. 375.*

[5] *50 Federal Register 23, 4876, 1985.*

[6] *50 Federal Register 23, 4876, 1985.*

to the Federal Aviation Administration on August 15, 1985, as a result of a fatal aviation accident. One of these recommendations was as follows:

Establish at the Civil Aeromedical Institute the capability to perform state-of-the-art toxicological tests on the blood, urine, and tissue of pilots involved in fatal accidents to determine the levels of both licit and illicit drugs at both therapeutic and abnormal levels.

Similarly, NTSB, on March 7, 1983, issued the following recommendations to the Federal Railroad Administration as a result of several fatal railroad accidents:

Immediately promulgate a specific regulation with appropriate penalties prohibiting the use of alcohol and drugs by employees for a specific period before reporting for duty and while on duty.

and

With the assistance of the Association of American Railroads and the Railway Labor Executives Association, develop and promulgate effective procedures to ensure that timely toxicological tests are performed on all employees responsible for the operation of the train after a railroad accident which involves a fatality, a passenger train, releases of hazardous materials, an injury, or substantial property damage.

In the midst of this concern about drug use by persons employed in the transportation industry, the Coast Guard continues to seek the revocation of licenses and documents of mariners who use dangerous drugs or are convicted of violating dangerous drug laws. The following table shows the number of suspension and revocation hearings conducted by the Coast Guard for 1982, 1983, and 1984 along with voluntary surrenders to avoid a hearing. This table also shows the number of revocations and voluntary surrenders for drug offenses as well as sentences of less than revocation (where the defense can prove that marijuana use was experimental and not likely to recur, the Administrative Law Judge has the discretion to enter an order against the mariner's license or document that is less than revocation. As table 1 shows, orders of less than revocation for marijuana experimentation are rare.) These figures for dangerous drug-related revocations are very likely to increase if screening for drugs is instituted by unions, companies, or the Coast Guard.

Suspension and revocation actions and voluntary surrenders for drugs are a small part of the total in table 1. This is due primarily to the secretive nature of drug use and the lack of information available to the Coast Guard about mariners using drugs and being convicted for violation of dangerous drug laws. Part of this is also due to the reluctance of masters and other personnel in the industry to take action and report drug use on vessels to the Coast Guard.

Table 1

	1982	1983	1984	1985
Total Hearings With Guilty Findings and Total Voluntary Surrenders	301	251	249	801
Revocations and Voluntary Surrenders for Drugs Alone	29	17	32	78
Sentences Involving Less Than Revocation for Drugs Alone	8	8	7	23
Total Guilty Findings and Voluntary Surrenders for Drugs Alone (sum of rows two and three above)	37	25	39	101

It is very likely that the total number of guilty findings at suspension and revocation hearings and voluntary surrenders for drugs only represent a small part of the involvement with drugs on the part of merchant mariners in this country. For example, the urinalysis tests required of the crew on the previously mentioned vessel revealed that a large number of the crew were using illicit drugs. These urinalysis tests, by themselves, could account for most of the Coast Guard's suspension and revocation actions for drug involvement for an entire year. Unless the mariner is convicted of violating a dangerous drug law and the Coast Guard becomes aware of it through the news media or liaison with

other agencies or unless the vessel's master or owner reports drug use on a vessel, the Coast Guard will not have the information to take action against a mariner's license or document. This lack of information accounts for the limited number of suspension and revocation actions for drugs.

What does the future hold for this problem of drug use in the Merchant Marine? First, it is plain to see that the handwriting is on the wall for merchant mariners who are users of drugs. The provisions of the law regarding drug involvement on the part of applicants for or holders of Coast Guard issued licenses and documents, first in 46 U.S.C. 239b and now in 46 U.S.C. 7704 — to deny or revoke the licenses and Merchant Mariner's Documents of those who use or are addicted to drugs or are convicted of violating a dangerous drug law — are likely to be supplemented by screening for drugs when making application for documents and at periodic physical examinations. Second, mandatory drug screening after accidents may spread from other transportation modes to the marine field. Also, companies are likely to make use of drug screening to enhance the safety of their vessels by eliminating drug users from the crew; shipping companies may very well have the cooperation of the maritime labor unions, too. And, finally, the Coast Guard will continue to seek the revocation of licenses and Merchant Mariner's Documents of seamen who are associated with dangerous drugs. ⚓

The author wishes to thank the following persons for their assistance with this article: LCDR David Wallace and LT Phillip Corpuz (Marine Investigation Division, Coast Guard Headquarters), LTJG Sean Connaughton (Merchant Vessel Personnel Division, Coast Guard Headquarters), LCDR Walter Brudzinski (Fifth Coast Guard District), LCDR Timothy Healey (Marine Safety Office Baltimore), and LT William Uberti, (Marine Safety Office Hampton Roads).

Important Subscription Information

Dear Readers:

Do you wish to keep receiving **Proceedings** each month? If so, please take a few moments to complete and return the business-reply postcard enclosed in this issue. Simply attach your **Proceedings** mailing label to the postcard, and return the card to us by October 1, 1986. We'll use the returned cards to update our mailing list, which will in turn lower our printing and distribution costs.

If you've looked through this issue and the postcard is missing, just send us your mailing label with a note that you wish to keep receiving the magazine.

If you're unable to send us a mailing label but still want your copy of **Proceedings** each month, let us know in a note or letter that includes a **clearly written or typed** address, including zip code. (Subscribers outside the United States must clearly indicate their countries.) If we can't read your name and address, we can't continue your subscription.

Correspondence should be sent to the following address:

Editor, **Proceedings** Magazine
U.S. Coast Guard (G-CMC)
2100 Second Street, SW
Washington, DC 20593.

SPECIAL NOTE: SUBSCRIBERS IN FOREIGN COUNTRIES OR SUBSCRIBERS WHO HAVE AN APO OR FPO ADDRESS MUST USE THEIR OWN POSTAGE ON THE POSTCARD.

Remember, we must hear from you by October 1, 1986.

Sharon Chapman

International Convention for the Safety of Life at Sea

Of all the international conventions dealing with maritime safety, the most important is the International Convention for the Safety of Life at Sea (SOLAS).

It is also one of the oldest, the first version having been adopted at a conference held in London in 1914. The incident which led to the convening of the 1914 Conference was the sinking of the TITANIC on its maiden voyage in April 1912 when more than 1,500 passengers and crew died.

Since then, there have been four more versions of the SOLAS Convention: the second was adopted in 1928 and entered into force in 1933; the third was adopted in 1948 and entered into force in 1952; the fourth was adopted (under the auspices of IMO) in 1960 and entered into force in 1965; and the present version was adopted in 1974 and entered into force in 1980.

The 1974 Convention is unlikely to be replaced by a new instrument because it can be amended by the new procedure which is included in article VIII.

A series of accidents involving oil tankers in the winter of 1976-1977 led to increasing pressure for further international action. As a result, early in 1978 IMO convened an international conference on tanker safety and pollution prevention which adopted a number of important modifications to SOLAS as well as to the International Convention for the Prevention of Pollution from Ships (MARPOL), 1973.

During the 1970s the Organization prepared a number of major changes to the 1974 Convention, some of which were incorporated in the 1978 Protocol. Others were included in amendments adopted on 20 November 1981 and, under the tacit acceptance procedure, entered into force on 1 September 1984.

The second set of amendments to the SOLAS Convention was adopted by IMO's Maritime Safety Committee on 17 June 1983 and is expected, under the tacit acceptance procedure, to enter into force on 1 July 1986.

On 17 June 1983 the Maritime Safety Committee also adopted the *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code)*[1] and the *International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IBC Code)*.[2] The 1983 amendments (parts B and C of chapter VII) make these codes mandatory under this Convention.

In order to provide an easy reference to all SOLAS requirements applicable from 1 July 1986, the 1986 publication contains a consolidated text of the 1974 SOLAS Convention, the 1978 SOLAS Protocol, and the 1981 and 1983 SOLAS amendments.

Published in a hardback cover, the consolidated English edition contains 440 pages and is on sale at £16.00. Arabic, Chinese, French, Russian, and Spanish editions will be available later.

[1] Sales number 100.83.11.E, price £3.75.
[2] Sales number 104.83.12E, price £4.50.
Please note that these two publications are not consolidated with the 1986 SOLAS publication.

The above-mentioned publication may be ordered by completing the order form below which should be returned to: IMO, Publications Section, 4 Albert Embankment, London SE1 7SR England.

Prepayment is required on all orders.

ORDER FORM

From _____

_____

_____

_____

Date _____

	Price (in pounds sterling)	Quantity	Total
SOLAS - Consolidated edition Sales No. 110 86.02.E	£16.00		

A remittance of _____ is enclosed

The Tug CELTIC and Barge CAPE RACE

The Accident

On October 27, 1984, the empty scrap barges CAPE RACE and HERBERT E. SMITH were towed to the loading berth at the Jacob Brothers, Inc. (Jacob) scrapyard in Bridgeport, Connecticut, to receive a load of scrap iron. The owner of the barges had specified that the barges would be loaded so as to have a freeboard of 5 feet, which would allow about 1,400 long tons of cargo to be loaded. The CAPE RACE was moored alongside the berth and would be loaded first, and the HERBERT E. SMITH was moored outboard of the CAPE RACE. When loading of the CAPE RACE was finished on November 8, 1984, the barges were turned around together so that the HERBERT E. SMITH was alongside the berth.

About 1200 (Eastern Standard Time) on November 9, 1984, loading of the HERBERT E. SMITH was begun. About this time the crane operator noticed that the HERBERT E. SMITH was listing and notified the yard foreman. The foreman notified the M.J. Rudolph Corporation (Rudolph), owners of the HERBERT E. SMITH, that the barge apparently was leaking and required repairs. A welder who was one of seven repairmen regularly employed by the barge owner to perform continuing repairs to barges was sent to the scrapyard to find out what was wrong with the HERBERT E. SMITH. The welder recalled that he probably arrived at the scrapyard on November 12, 1984. The welder located a leak in the after rake compartment of the HERBERT E. SMITH. At his request, scrap iron was loaded forward in the barge to raise the stern and bring the leaking area out of the water. The welder found two 1/4-inch-wide cracks, one 5 inches long and the other 6 inches long. He welded both cracks, and loading was resumed.

This article was taken from the National Transportation Safety Board's Marine Accident Report No. NTSB/MAR-85/12.

While the welder was at the scrapyard, he also checked on the condition of the CAPE RACE. The welder recalled that he probably inspected the CAPE RACE for the first time on November 12, 1984. He found approximately 5 feet of water in the forward rake compartment, which he pumped out. He walked through the three void compartments on each side of the cargo compartment, where he found only a small amount of fresh water in the double bottoms. He stated that it was probably rainwater that had entered the void compartments through holes in the cargo compartment. He stated that there were numerous holes — some 1 foot or more in diameter — in the deck and sides of the cargo compartment. He stated that the bucket, a large grapple device used for unloading the barges, sometimes punched holes or made cracks in the cargo compartment.

The welder said that he again inspected the barges the next day, probably November 13. This time he found that approximately 1 foot of water had leaked into the forward rake compartment of the CAPE RACE. An inspection revealed that water was entering the compartment through a leak in the shell plating of the bow rake approximately 1/2 foot inboard from the starborad side and about 10 feet from the bottom of the barge. The welder removed a large piece of scale, about 1/4-inch thick and about 1 foot in diameter, in the area of the leak. Removal of the scale exposed a hole about 3/4-inch in diameter, through which a stream of water was leaking into the compartment. The welder drove a round, tapered, wooden plug into the hole, which stopped the leak. He again pumped out the water, except for about 1 inch that was below the suction capability of the pump hose. The welder said that he checked the barges on November 14 and found that they were not leaking. Loading of the HERBERT E. SMITH was completed at 1100 on November 17, 1984.

About 0310, on November 17, 1984, the U.S. tug M/V CELTIC, with a six-man crew, got

underway from Port Newark, New Jersey, with the hopper barge CAPE BARBARA. The tug was under orders to tow the empty barge to the Jacob scrapyard, pick up the CAPE RACE and HERBERT E. SMITH, and tow the barges from the scrapyard to Port Newark.

Shortly after arrival in Bridgeport, the CELTIC's crew moored the CAPE BARBARA at the Union Square Dock at 1115, and the CELTIC proceeded the short distance across Bridgeport Harbor and entered Yellow Mill Channel, arriving at the scrapyard at 1220. (See figure 1.) One of the loaded scrap barges at the loading berth was aground, so the CELTIC's captain decided to wait for the tide to rise. About 1445, the tug got underway towing the CAPE RACE and HERBERT E. SMITH astern. The CELTIC's crew moored the two barges at Cilco Wharf at one of the deepwater berths for oceangoing ships. The bridge tender at the nearby Pleasure Beach Bridge stated that one of the barges had a list before the two were moored at the Cilco Wharf and that he notified the CELTIC's captain of the list on VHF-FM channel 13. The CELTIC's captain replied that he was aware of the list. The CELTIC returned to Union Square Dock to pick up the CAPE BARBARA to resume its delivery to the scrapyard. By 1610, the CAPE BARBARA was moored at the scrapyard loading berth, and the CELTIC proceeded out of Yellow Mill Channel en route to the Cilco Wharf.

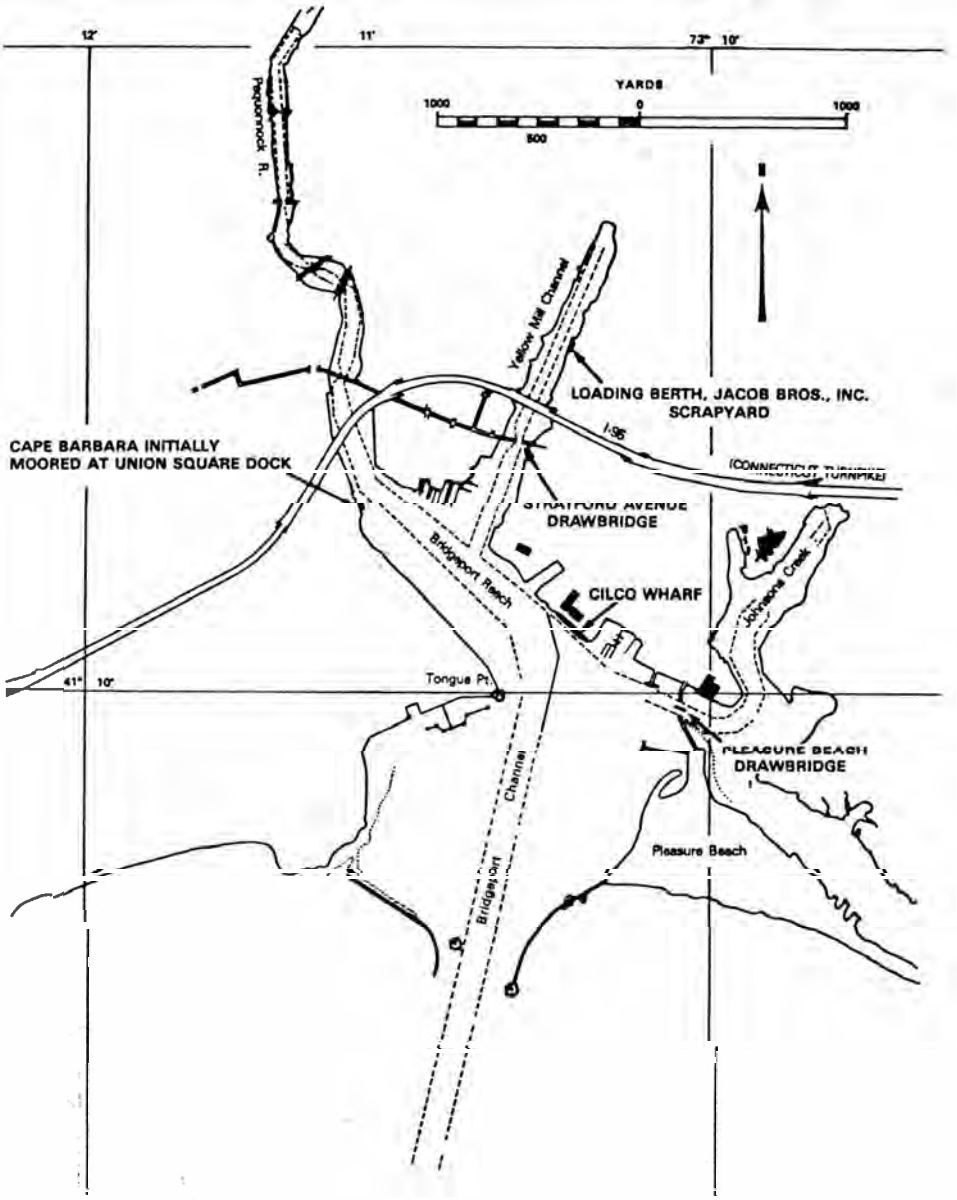


Figure 1. Bridgeport Harbor.

Upon arriving alongside the CAPE RACE and HERBERT E. SMITH, about 1630, the CELTIC's crew attempted to pump water from the HERBERT E. SMITH to correct its list, but this effort was unsuccessful. About 1815, the CELTIC's mate asked the bridge tender at the Pleasure Beach Bridge to open the drawbridge in Yellow Mill Channel because one of the barges was sinking and had to be returned to the scrapyard. The bridge tender arranged for the Yellow Mill bridge tender to be called in to operate the drawbridge across Yellow Mill Channel, since the bridge was not manned at that time. The Yellow Mill bridge tender arrived and opened the drawbridge at 1910, and the CELTIC with the HERBERT E. SMITH immediately passed through. After mooring the HERBERT E. SMITH to pilings south of the scrapyard loading berth, the CELTIC departed at 1940 to return to the Cilco Wharf to pick up the CAPE RACE.

About 1945, the mate of the CELTIC called the ferry vessel GRAND REPUBLIC on channel 13 to inquire about weather conditions in Long Island Sound. The captain of the GRAND REPUBLIC informed him that the seas were 3 feet high and decreasing and that the seas were from the west. Later, the mate spoke with another tug about weather and sea conditions in Long Island Sound. The operator

of that tug stated that the weather was improving and that he was pushing a barge ahead. By 2000, the CAPE RACE was secured to the CELTIC, and the tow got underway from the Cilco Wharf en route to Port Newark via Long Island Sound. The bridge tender at the Pleasure Island Bridge saw the tow get underway. He stated that the barge had about 3 to 4 feet of its hull above the water and that the barge appeared to be "level." He stated that he could see lights, including a red light, on the tug but no lights on the barge. He stated that the tug appeared to be pushing the barge.

At 2100, the CELTIC's mate called the dispatcher at the offices of the Eklof Marine Corporation (Eklof), the tug's operator, in Staten Island via the marine operator. The mate reported that only one barge, the CAPE RACE, was in tow. He stated that the HERBERT E. SMITH was leaking and had assumed a list, and that because efforts to pump the barge had not been successful, the barge had been returned to the Jacob scrapyard. He stated that there was no further problem and that he would call the Eklof office in the morning.

Nothing further was heard from the CELTIC.

When the CELTIC did not arrive at Port Newark the next morning, November 18, 1984, the Eklof dispatcher on duty attempted unsuccessfully to contact the tug on VHF-FM channel 5, a channel used by the Eklof office and vessels. At 1218, the Eklof dispatcher notified the U.S. Coast Guard that the CELTIC and CAPE RACE were overdue and requested the Coast Guard to search for the vessels.

At 1343, on November 18, 1984, the Coast Guard issued an urgent radio broadcast informing mariners that the CELTIC and CAPE RACE were overdue. The broadcast provided a description of the vessels and requested mariners to keep a sharp lookout for the vessels and to report any contact to the Coast Guard. The Coast Guard requested various police departments to check all harbors where the CELTIC might have sought refuge and then began attempts to contact the CELTIC on VHF-FM channels 16 and 13.[1] Later in the afternoon, Coast Guard helicopters searched Long Island Sound along the CELTIC's route. All efforts to locate the tug and barge were unsuccessful, and by late that evening, the Coast Guard requested the National Weather Service to broadcast after every routine marine weather report a description of the overdue vessels and a request that mariners keep a sharp lookout, render assistance as required, and report any contact to the Coast Guard.

On November 19, 1984, three Coast Guard cutters, SAUK and WIRE from New York, New York, and BOLLARD from New Haven, Connecticut, joined the search for the tug and barge. Coast Guard helicopters also resumed searching. The search units were directed to look especially for a liferaft, oil slick, debris, and personnel in the water. At 0752, the SAUK observed an oil slick on the water of Long Island Sound about 6 miles south of Norwalk, Connecticut. At 0810, a Coast Guard helicopter, which the SAUK had directed to assist in investigating the slick, observed a large fiber line, believed to be a towing hawser, floating below the surface.

By 0830, the SAUK had located the origin of the oil slick about 2 miles to the northeast of the original sighting. At this location, oil and air could be observed rising from below the surface. About 0900, the passing fishing vessel MOONSHINE volunteered to assist the search by transiting the area while operating its fathometer, which was equipped with a graph recorder. At 0910, the MOONSHINE's fathometer located the CELTIC about 40 feet below the surface. The Coast Guard sought diver assistance from the marine police in Norwalk and Bridgeport, and the police departments in both cities agreed to provide divers to attempt to locate and rescue survivors. Divers from the Norwalk marine police arrived at 1020 and began diving operations at 1047. The divers found the floating line and used it to descend to the CELTIC. They found two bodies in the pilothouse and then conducted a tapping survey of the hull to determine if anyone was trapped inside. There were no replies to the tapping noises made by the divers. The body of the mate was removed from the pilothouse and brought to the surface at 1110, and a few minutes later the body of the chief engineer was recovered from the upper engineroom.

The divers initially reported that the CELTIC was resting on the bottom, upright but listing 10^{o} to port, and was heading east to northeast. They stated that it appeared to be undamaged, although oil was coming out of a vent on the after deck of the vessel. Remnants of two towlines were still in place on the vessel's forward towing bitts, and one towline on the stern was still secured to the after capstan. Visibility in the vicinity of the tug was estimated to be about 8 feet. The divers reported that the cradle for the inflatable life-

[1] *Channel 16 is used for calling and emergency messages. Channel 13 is used for vessel bridge to vessel bridge communications.*

raft was empty, indicating that the liferaft had deployed.

The Coast Guard continued to search for the liferaft, since it was conceivable that the liferaft could have been used by some of the crew to abandon the vessel. Meanwhile, diving efforts were directed to searching the vessel for bodies of other crew members. At 1115, divers from the Bridgeport marine police arrived onscene to join in the search of the vessel. At 1240, the body of the deckhand, who had been on mate's watch, was removed from the pilothouse and brought to the surface.

At 1705, the Eklof-operated tug YANKEE arrived onscene to render assistance as a floating base for diving operations and for transporting equipment and personnel to the scene. Commercial divers, hired by the owners of the CELTIC, arrived at 1810 and relieved the police divers. At 2151, the body of the cook was found in the galley and brought to the surface.

On November 20, 1984, the last two bodies, that of the captain and the able seaman on the captain's watch, were located in their respective living quarters, where they apparently had been asleep at the time of the accident. Their bodies were recovered and brought to the surface.

Later that afternoon, the commercial divers began surveying the CAPE RACE, which was resting upright and heading in a southwesterly direction. The divers reported that the tug was a few feet astern of the barge, and that the stern of the barge was adjacent to the tug's port beam. (See figure 2.) The divers stated that the tug was on a northwesterly heading and was listing about 40° to port, which prevented inspection of all of the tug's hull on the port side. Remnants of the towing lines remained secured to the forward bitts and the capstan located on the after deck. No portions of the towing lines remained attached to any of the cleats on the barge. A diver reported that there was a crater in the sea floor at the starboard bow of the barge, which he stated appeared to have been formed by the starboard bow of the barge striking the bottom.

On November 23, 1984, the liferaft, still in its container, was found on the shore near Setauket, Long Island, New York, by some persons walking along the beach. One person pulled the painter (a line which connects the liferaft to the vessel) out of the liferaft until the inflation mechanism functioned, releasing the CO_2 cylinder to inflate the liferaft. The liferaft reportedly inflated normally. One half of the float-free link was still attached to the short length of wire cable that connected to the painter. The other half was still attached to the CELTIC.

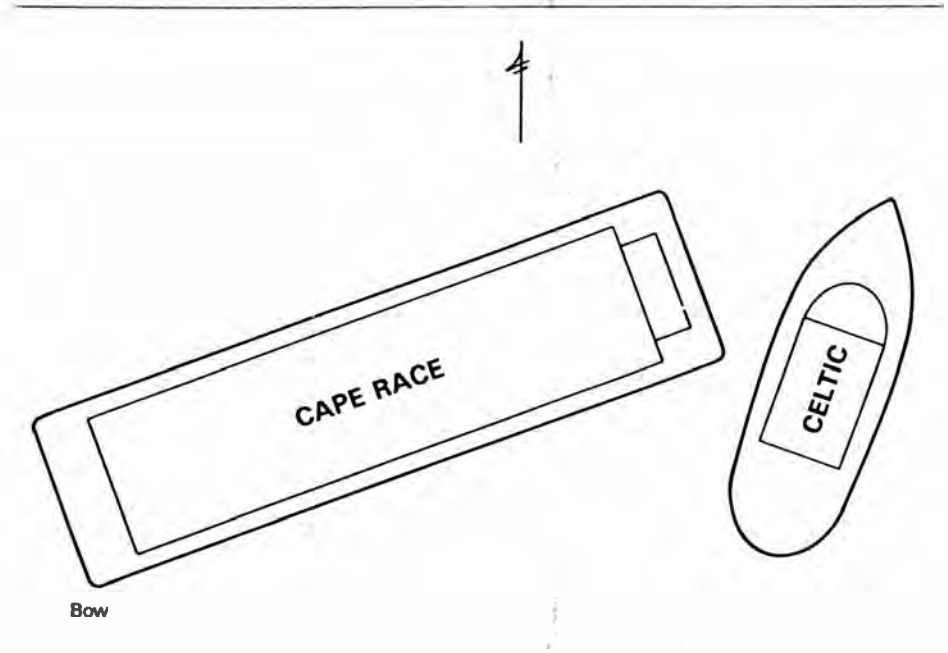


Figure 2. Approximate relative position of tug CELTIC and barge CAPE RACE on the bottom of Long Island Sound.

Vessel Information

CELTIC. The tug CELTIC, originally named the RUSSELL 10 and later the JUDITH MCALLISTER, was built in 1958, at Oyster Bay, New York, by Jakobson Shipyard, Inc. (See figure 3.) The tug was purchased by Island Park Tanker Corporation in January 1981 and was operated thereafter by Eklof. The tug was of all-steel construction, and it was built under the rules of the American Bureau of Shipping (ABS) and classed Maltese Cross A1 Towing Service, Coastwise Service. The vessel's principal characteristics were:

Length	85.9 feet
Beam	24 feet
Depth	11.23 feet
Gross tons	146
Horsepower	1,640

Because the CELTIC was a motor vessel of less than 300 gross tons and did not carry freight or passengers for hire,

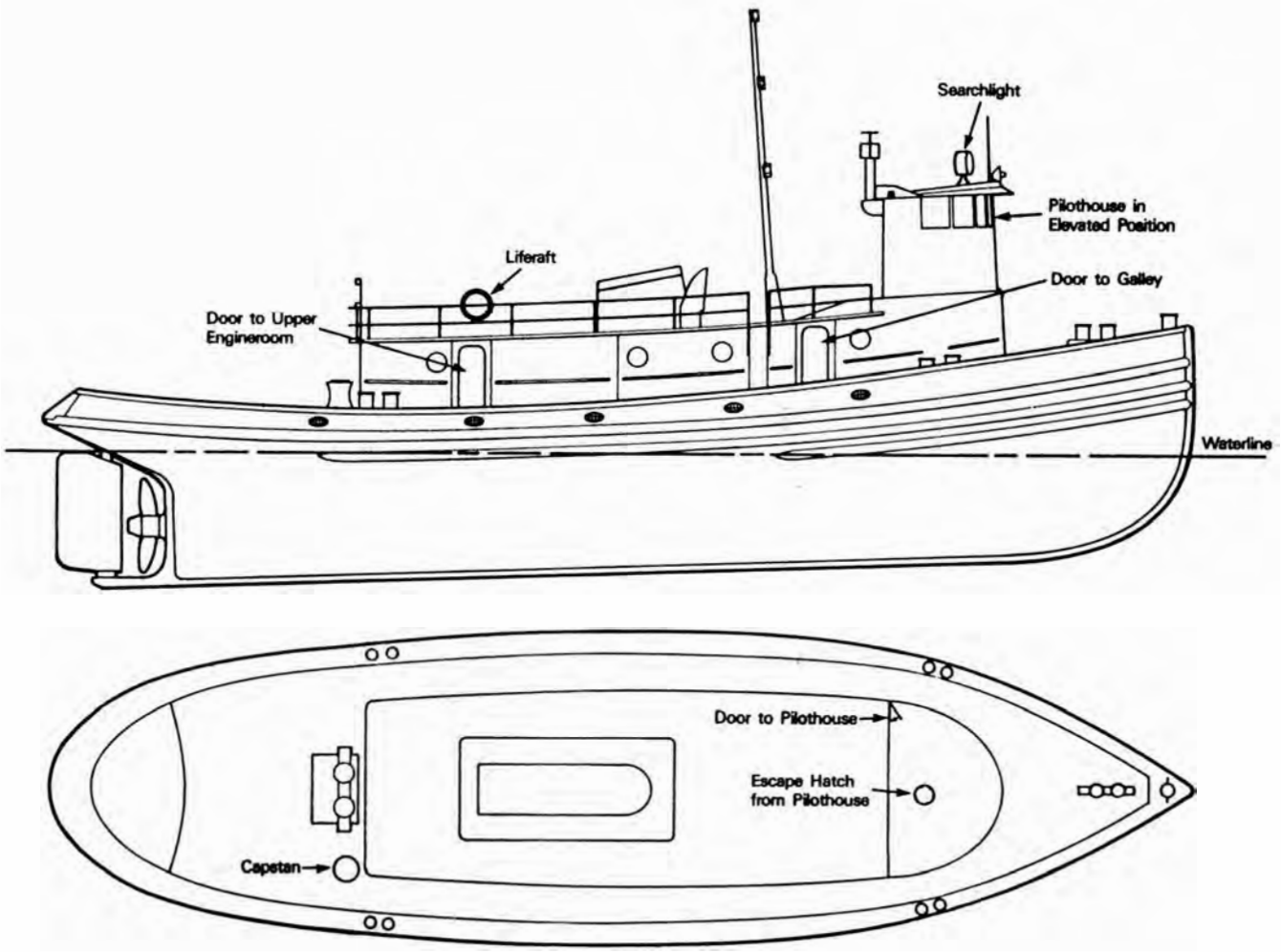


Figure 3. Plan and profile views of the tug CELTIC.

it was not subject to Coast Guard construction and inspection regulations. Since it was engaging in domestic voyages and was less than 150 gross tons, it was not subject to Coast Guard load line regulations.

CAPE RACE. The barge CAPE RACE was built in 1951 by the Bethlehem Steel Company at Mariners Harbor, New York, for the Tracy Coal Company of New York City specifically for carrying coal in the New York Harbor area. The barge was not subject to Coast Guard construction and inspection regulations, but its construction was in accordance with the ABS rules for bulk cargo barges in harbor service. The barge was designed to carry 2,050 long tons of coal at a draft of 16 feet 8 inches and to have a corresponding freeboard of 10 inches. The CAPE RACE and three other barges, the CAPE BORER, HERBERT E. SMITH, and the CAPE BARBARA, were purchased by Rudolph in 1970 for use in carrying scrap metals. The principal characteristics extracted from plans of the barge were:

Length	146 feet
Beam	38 feet
Depth	17.6 feet
Gross tons	885

The CAPE RACE was an open-hopper barge with one large cargo compartment, about 132 feet long, 31 feet wide at the main deck, and 16 feet deep. The cargo compartment (hopper) was surrounded by a coaming measuring 4.75 feet above the main deck. Both ends of the barge were raked, and there was a deckhouse on the after main deck immediately aft of the hatch coaming. The barge was of double-hull construction, so that void compartments and double bottoms surrounded the cargo compartment. The void compartments included the two rake compartments at the ends and three void compartments, which formed double bottoms and wing tanks around the cargo compartment. Each void compartment was designed to be watertight. The

double bottom portion of the three void compartments provided approximately 24 inches of separation between the full and bottom of the cargo compartment. There was no longitudinal separation; thus, water in the double bottoms could flow freely from one side to the other. Transverse frames of open construction, braced by diagonal T-beams, supported the bottom shell plating of the barge and the bottom of the cargo compartment. These transverse bottom frames were spaced 24 inches apart. In the wing sections of the void compartments outboard of the cargo compartment, vertical ribs of open truss-like construction were spaced 6 feet apart. Horizontal T-beam stiffeners inside the wing areas were welded to the inner side of the shell plating of the barge and outer sides of the cargo compartment.

The void compartments could be entered through either rake compartment. Access to each rake compartment was gained via a non-watertight, 2-foot-square deck hatch. From inside each rake compartment, it was possible to enter the port or starboard wing sections of the adjacent void compartment via manholes on each side in the vertical bulkhead between the rake compartment and the adjacent void compartment. Access between the wing areas of the three void compartments was via manholes in the two vertical bulkheads separating the void compartments. The manholes were designed to be made watertight by steel covers bolted in place. These steel covers were onboard but were not used and were not in place at the time of the accident.

The CAPE RACE had a leaking problem and was drydocked from October 11 through October 22, 1984, for repairs to the barge's bottom and for painting of the bottom. Once the barge was out of the water, it was found that the leak was in a butt weld in the bottom plating amidships, a few feet in from the port side. The weld, which was described as being about 1/2-inch wide, ran across the bottom from one side of the barge to the other and joined two large bottom plates. Because the weld was found to be considerably wasted, a decision was made to build up the entire weld. The weld was to be built up by welding several courses of weld on top of the old weld. By the time the welding operation progressed a few feet from the port side, the welder discovered that the bottom plate adjacent to the weld was too thin, apparently due to wastage, to weld on and that holes were being burned in the plate. The welder attempted to weld at two other locations along the weld and discovered that the plate in those locations was also too thin to weld on. The welding foreman supervising the welding estimated that the plate where the holes were occurring was about 1/16-inch thick or less. As the holes occurred, water leaked out of the barge.

The barge owner decided that a doubler place[2] would be placed on the hull to cover the wasted weld. The doubler plate when installed was a 3/8-inch-thick, 1-foot-wide strap, extending 6 inches on each side of the weld, and it reached from side to side of the barge. Individual plates, 1 foot wide and 5 to 6 feet long, were fillet-welded to the bottom from the outside one at a time to form the long doubler plate. No inspection was made inside of the double bottom, and no gaugings of the bottom were taken. No attempt was made to drain water from the hull. The leaking diminished, but some water continued to drip until the plate covering the leak was dogged[3] in place for welding. The welding foreman testified that he was satisfied a good weld had been accomplished.

Analysis

In this accident, there were no survivors and no witnesses, nor was any distress call heard. Since four of the CELTIC's six-member crew were awake, including two on watch in the pilothouse, but none of the crew members was able to escape from the tug, it appears that the sinking must have been sudden and unexpected. An inspection of the wreckage of both vessels and a review of television recordings revealed no indication of any fire or explosion. Also, there was no visual evidence of any massive structural failure of either vessel that might have led to the accident. The CELTIC was found virtually intact resting on the bottom initially with only a 10° port list, and all crew members were found inside the vessel. The CAPE RACE had sustained considerable damage, but all significant damage appeared to have been sustained by the barge when it hit the bottom.

It may have been possible for the tug, if it

continued on page 184

[2] *A plate of steel placed over a hole and fillet-welded to good metal beyond the hole.*

[3] *Temporary clamps welded to the hull for holding a place in place. Metal wedges are driven between the clamps and plate to force the plate against the hull.*

Member Agencies:

United States Coast Guard
Naval Sea Systems Command
Maritime Administration
American Bureau of Shipping
Military Sealift Command
Minerals Management Service

Ship Structure Committee

An Interagency Advisory Committee
Dedicated to the Improvement of Marine Structures April 1986

Address Correspondence to:

Secretary, Ship Structure Committee
U.S. Coast Guard Headquarters, (G-M/TP 13)
Washington, D.C. 20593
(202) 426-2197

The Ship Structure Committee, an interagency advisory committee dedicated to the improvement of marine structures, has recently published ten new technical reports of interest to those concerned with the design and safety of ships and offshore structures. The reports are as follows:

SSC-317, Determination of Strain Rates in Ship Hull Structures: A Feasibility Study

This report presents a survey of existing data on shipboard stress/strain rates. The data bases are evaluated, and strain rates from existing ship data are developed.

SSC-319, Development of a Plan To Obtain In-Service Still Water Bending Moment Information for Statistical Characterization

This report reviews previous instrumentation programs and recommends means to gather still water bending moment (SWBM) data in sufficient quantity to be useful for statistical characterization and to obtain SWBM envelope curves.

SSC-321, Survey of Experience Using Reinforced Concrete in Floating Marine Structures

This report reviews applications of marine concrete structures, research into concrete structures, and inspection and repair of these structures and presents an extended bibliography on the subject.

SSC-322, Analysis and Assessment of Major Uncertainties Associated with Ship Hull Ultimate Failure

This report considers the uncertainties of the primary hull longitudinal compression failure mode and uses coefficients of variation to obtain safety indices used in this reliability design approach.

SSC-323, Updating Fillet Weld Strength Parameters for Commercial Shipbuilding

This report presents a possible alternative method of assessing fillet weld requirements to the ABS weld tables. The recommended methodology is demonstrated on previous designs pointing to a cost savings of from 9 to 15 percent of welding costs.

SSC-324, Analytical Techniques for Predicting Grounded Ship Response

This report investigates the use of portable computers during salvage scenarios after a ship grounding and demonstrates how they could be used by the salvage master.

SSC-325, Correlation of Theoretical and Measured Hydrodynamic Pressures for the SL-7 Containership and the Great Lakes Bulk Carrier S.J. CORT

This report shows the amount of correlation between theoretical calculations, model testing results, and full-scale data collection of hydrodynamic pressures on the SL-7 class of containership and the M/V STEWART J. CORT.

SSC-326, Long Term Corrosion Fatigue of Welded Marine Steels

This report represents a first look at corrosion fatigue by the Ship Structure Committee. It assesses those future directions that would be most fruitful for further study, approaching fatigue from both the deterministic and the probabilistic viewpoints.

SSC-327, Investigation of Steels for Improved Weldability in Ship Construction

This report is directed toward determining the weld procedure and metallurgical control necessary to develop adequate toughness in the weldment, using high-deposition rate weld procedures. This report is the third and final phase of the welding effort and follows SSC-298 and SSC-305.

SSC-328, Fracture Control for Fixed Offshore Structures

This report gives a state-of-the-art summary of material selection design, construction, and operation of fixed offshore platforms and explains how detrimental fractures are prevented. This report will serve as a basis for beginning a fracture control program.

A limited number of reports will be available free of charge. After that, copies will be available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. For copies of the reports or further information, contact LCDR Thomas H. Gilmour, Secretary, Ship Structure Committee, U.S. Coast Guard (G-MTH-5), 2100 Second Street, SW, Washington, DC 20593. ↕

CELTIC and CAPE RACE

continued from page 182

sank first, to have heeled the barge and reduced the barge's after freeboard enough so that water could have flooded into the cargo compartment through holes in the coaming near the deck. However, the evidence suggests that the accident was not caused by the tug. There was nothing to indicate that the tug sustained any catastrophic hull failure that could cause it to lose buoyancy rapidly. Any serious flooding of the vessel probably would have become apparent to those crew members who were awake. Also, the engineroom, the largest floodable space, was fitted with a bilge alarm. The chief engineer was among the four crew members who were awake at the time of the accident, and he probably would have become aware of any serious flooding in the engineroom. Any substantial flooding of the tug probably would have produced a noticeable list or change in trim well before all positive buoyancy was lost. Also, a sinking tug connected to the after port side of the CAPE RACE probably would not have resulted in rapid sinking of the barge. Further, it is probable that if the tug sank first, it would have caused the barge to sink by the stern and sustain substantial damage aft; however, there was no damage on the stern of the CAPE RACE.

The most probable explanation of the sinking is that the CAPE RACE, which was loaded to a safe freeboard, sustained a full failure resulting in an opening in the underwater hull. The barge probably took sufficient water forward to plunge the bow underwater, resulting in critical downflooding into the cargo compartment through holes in the coaming, and to sink bow first; as the barge sank, it pulled the tug underwater with it. The impact damage to the CAPE RACE was concentrated on the bow and in the forward half of the barge, indicating that the forward end of the barge sustained the force of the impact with the bottom. The cargo of scrap iron had shifted forward, some pieces spilling over the forward coaming and some pieces spilling over the bow onto the bottom, indicating that the bow of the barge was angled sharply downward at the time it struck the bottom. A crater in the bottom observed at the starboard bow by one of the divers indicates that the starboard bow struck first. The damage on the starboard side was significantly greater than on the port side, which tends to confirm that the starboard bow absorbed most of the impact. As the barge sank, the starboard bow probably was depressed more than the port bow as a result of the buoyancy of the tug fastened at the after port side of the barge.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the sinking of the tug CELTIC and barge CAPE RACE was the failure of the owner of the barge to maintain the barge adequately, which allowed the internal structure and shell plating of the barge to deteriorate until the barge sustained a hull failure, resulting in the flooding of the forward part of the barge, causing the barge to plunge underwater bow first and sink. The tug was pulled underwater by the sinking barge. Contributing to the sinking of the tug was the lack of a means to release the towing lines to the barge quickly and remotely from the pilothouse. ↕

Marine Safety Manual, Volume I, Now Available

The **Marine Safety Manual (MSM)** is a 10-volume publication which provides information and guidance to Coast Guard personnel assigned to marine safety duties. First published in 1978, the **MSM** is being revised to update the subject matter and to comply with the Coast Guard Directives System. Volumes previously published were Volume IV, **Technical,** December 1984; Volume II, **Materiel Inspection,** October 1985, and Volume III, **Marine Industry Personnel,** December 1985.

Seven of the volumes will be available to the general public when revision has been finalized (two volumes are being developed, and one is classified).

Volume No.	Title	COMDINST No.
I	Administration and Management	M16000.6
II	Materiel Inspection	M16000.7
III	Marine Industry Personnel	M16000.8
IV	Technical	M16000.9
V	Investigations	M16000.10
VI	Ports and Waterways Activities	M16000.11
X	General (MOUs, ACRONYMS)	M16000.15

The fourth of the revised **MSM** volumes, Volume I, **Administration and Management,** is now available from the U.S. Government Printing Office (GPO). For your convenience, we are including a GPO order form for this publication.

Volume I presents the authority, background, and rationale for the various programs associated with marine safety duties, along with a detailed overview of specific legal authorities, enforcement policies, management standards, professional training, and administrative and information systems which relate to these program areas.

Similar notifications will be provided in this magazine when the remaining **MSM** volumes are published.

Order Form Mail To: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

Enclosed is $ _____ ☐ check, ☐ money order, or charge to my Deposit Account No.

☐☐☐☐☐☐-☐

Order No. _____

MasterCard and VISA accepted.

MasterCard VISA

Credit Card Orders Only

Total charges $_____

Fill in the boxes below.

Credit Card No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiration Date Month/Year ☐☐☐☐

Customer's Telephone No.'s

Area Code Home Area Code Office

Charge orders may be telephoned to the GPO order desk at (202)783-3238 from 8:00 a.m. to 4:00 p.m. eastern time, Monday-Friday (except holidays).

Please enter ____ subscription(s) to MARINE SAFETY MANUAL, VOLUME I, ADMINISTRATION AND MANAGEMENT. File Code: 1L List ID: MSM01. $65.00 Domestic; $81.25 if mailed to a foreign address.

Company or Personal Name

Additional address/attention line

Street address

City State ZIP Code

(or Country)

PLEASE PRINT OR TYPE

For Office Use Only

Quantity Charges

____ Publications

____ Subscriptions

Special Shipping Charges

International Handling

Special Charges

OPNR

____ UPNS

____ Balance Due

____ Discount

____ Refund

982

GPO 886-910

Pilot Ladder Safety, Fourth Edition

This book, as the title implies, has been written for the practical purpose of providing pilots, masters, ships' officers, and all those who are involved in pilotage generally with a concise account of international requirements for boarding and disembarking by pilot ladder.

In a modern, highly organized maritime world, the professional mariner is expected to have knowledge of national and international regulations, despite their growing complexity, whenever the mariner comes into contact with them. These considerable obligations weigh particularly upon the master and ships' officers who incur special responsibilities toward the pilot for the safe boarding and disembarkation by pilot ladder.

Pilot ladder regulations in all countries are based on Safety of Life at Sea (SOLAS) Chapter V Regulation 17, which was drawn up by the International Maritime Organization (IMO) in 1973. In addition to a detailed explantion of this regulation, the book also includes other IMO recommendations and several recommendations proposed by the International Maritime Pilots' Association (IMPA).

The author of this book, Captain Malcolm Armstrong, combines his professional experience (as a professional pilot in Australia and as a former Vice-President of the International Maritime Pilots' Association) and his knowledge of international technical pilotage matters for the benefit of the pilot who needs information or wants to refresh his memory from an authoritative source.

Proceedings readers should note that the article entitled "Pilot Ladder Safety" in the July 1982 issue of the magazine (page 201) was based on an earlier edition of Captain Armstrong's book.

Pilot Ladder Safety is available for £6.00 from Brown, Son & Ferguson, Ltd., 4-10 Darnley Street, Glasgow G41 2SD Scotland.

This Is Boat Handling at Close Quarters

In the tradition of the highly regarded "This Is..." series on sailing, this new title details how to operate a boat in tight situations. These situations are commonly found in the areas where most boaters spend much of their time: marinas, around moorings and dock areas, in harbors, and on rivers and canals. The authors have deftly analyzed an array of boat handling problems, and here they offer step-by-step advice on how to handle a boat, power or sail, in all types of conditions and circumstances.

Utilizing the lavish graphics that are the trademark of the "This Is..." series, *This Is Boat Handling at Close Quarters* depicts the best methods of maneuvering to avoid collisions. It is a complete guide to building seamanship skills and confidence.

The authors, Dick Everitt and Rodger Witt, are yachting journalists who have written on the subject for many years. They are currently staff members of the magazine **Practical Boat Owner** and live in England.

This Is Boat Handling at Close Quarters is available for $17.95 from William Morrow & Co. (Hearst Marine Books), 105 Madison Avenue, New York, New York 10016.

This Is Fast Cruising

This is a book for those who want to further their sailing enjoyment and experience. "Fast cruising" is a phrase used by the author, Peter Johnson, to describe the philosophy and practice of sailing with everything just right. For instance, the owner or skipper and crew is shown how skilled navigation can result in quicker passages, how cetain kinds of deck gear can make sail handling a pleasure, and how accommodations designed for passage making can enhance night sailing.

Though much of the selection and updating to improve performance and style applies to a modern production cruiser, variations are not ignored, and there is discussion on multihulls, special rigs and sails, and the relevance of different designs and construction.

Among the topics, all illustrated with full-color photographs and full-color diagrams, are modern techniques for heavy weather and advisable preparations for it. Single-handed sailing receives close attention as do modern electronic aids, which are surveyed in a practical manner, an approach which is maintained on the many detailed subjects in this book.

continued on page 188

Scott Rogerson

Formic Acid

If you've ever been stung by a stinging ant or caterpillar, or if you've come in contact with stinging nettles, then you know about this month's chemical. Formic acid is the irritating component in the poison which is so generously given to you by each of the above in their natural acts of defense. The name itself comes from the fact that the acid was first prepared by the distillation of red ants (Formica Rufa).

Formic acid, HCOOH, is used in a number of processes, including dehairing hides for leather, manufacturing fabric dyes, and coagulating rubber latex. It is prepared commercially from carbon monoxide and sodium hydroxide at elevated temperature and pressure in the following reaction:

$$CO + NaOH \rightarrow HC HCOONa$$

The sodium formate is then converted to the free acid by the addition of sulfuric acid. Formic acid is manufactured by several well-known companies, including Middleboro Industries and Union Carbide Corporation.

Formic acid is the simplest of the carboxylic acids, yet it is not typical of others in its group. It is distinguished by its acid strength, its failure to form an anhydride, and its reactivity as a reducing agent, a property due to the -CH=O group, which imparts some of the character of an aldehyde.

The chemical decomposes to water and carbon dioxide catalytically or upon heating, and concentrated sulfuric acid dehydrates it to water and carbon monoxide. Pure formic acid is a colorless, fuming liquid with a pungent odor. It is irritating to the mucous membranes and vesicant (causes blistering).

The first step in dealing with an accidental discharge of formic acid is to shut off or eliminate all possible ignition sources. The next step is to stop the discharge. Anyone working in the area should be wearing a chemical protective suit (including gloves and goggles) and should be using a self-contained breathing apparatus. The fire department should be called immediately and every attempt should be made to isolate and remove the discharged material. Local health and pollution control agencies should be notified, and in the case of a spill in natural waters, wildlife officials and operators of nearby water intakes should also be notified. Formic acid in high concentrations can be dangerous to aquatic life and can be extremely dangerous if it enters water intakes.

In case of exposure to the acid, a doctor should be notified. The liquid will burn the skin and eyes. All contaminated clothing and shoes should be removed, and the affected areas should be flushed with plenty of water. If any acid gets in the eyes, the eyelids should be held open and flushed with plenty of water.

If formic acid is swallowed, **do not induce vomiting.** If the victim is conscious he/she should drink water or milk. If the victim is unconscious, then do nothing except to keep the victim warm. Wait for professional assistance for treatment beyond this step.

Fires involving formic acid should be extinguished with water, dry chemicals, alcohol foam, or carbon dioxide. Exposed containers should be cooled with water to prevent further danger.

Formic acid is shipped as a colorless liquid. It is transported by various means: railroad tank cars, tanker trucks, or in tankships. Type 316, stainless steel or lead-lined tanks are satisfactory containers for the acid. It is very stable but does react with bases to produce heat. Although the U.S. Environmental Protection Agency does not regulate formic acid as a pollutant, the U.S. Department of Transportation regulates formic acid as a corrosive. The U.S. Coast Guard requires that formic acid be separated from other corrosive materials by one of the following: cofferdam, empty tank, void space, cargo handling space, a tank containing a compatible cargo, or piping tunnel.

Scott Rogerson was a Fourth-Class Cadet at the U.S. Coast Guard Academy at the time this article was written. It was written under the direction of LCDR J.J. Kichner for a class on hazardous materials transportation.

Chemical name:	Formic Acid
Formula:	HCOOH
Synonyms:	methanoic acid formylic acid
Physical Properties:	
boiling point:	101°C (214°F)
freezing point:	8.4°C (47.1°F)
vapor pressure: 20°C (68°F)	23-33 mmHg
Threshold Limit Values (TLV)	
time-weighted average:	5 ppm; 17.5 mg/m^3
Flammability Limits in Air	
lower flammability limit:	18% by vol.
upper flammability limit:	57% by vol.
Combustion Properties	
flash point (cc):	69°C (156°F)
autoignition temperature:	601°C (1114°F)
Densities	
vapor (air=1):	1.6
U.N. Number:	1779
CHRIS Code:	FMA
Cargo compatibility group:	4 (Organic Acids)

NEW PUBLICATIONS

continued from page 186

This Is Fast Cruising is available for $18.95 from William Morrow & Co. (Hearst Marine Books), 105 Madison Avenue, New York, New York 10016.

General Engineering Knowledge

The second edition of a handy book entitled *General Engineering Knowledge* has been published by Sheridan House, Inc., 145 Palisade Street, Dobbs Ferry, NY 10522. The book's author, David McGeorge, lectures at the College of Maritime Studies, Southampton, England.

The publication is intended for marine engineers who are studying for certificates based on the British system, but it could be useful for anyone studying for similar examinations. The book covers pumps, coolers, fire protection, refrigeration, steering gear, stern bearings, fuel, and pollution.

A large number of simple drawings are used to illustrate descriptions in the book, and it contains a great deal of information packed into a small space.

Copies may be ordered from the publisher at $10.95.

Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations:

ENGINEER

1. A high percentage of carbon dioxide in boiler flue gases indicates

A. no carbon dioxide present.
B. too much excess air.
C. contaminated fuel oil.
D. nearly complete combustion.

Reference: Babcock & Wilcox, Steam: Its Generation and Use

2. A turbocharged, four-stroke cycle engine has a larger valve overlap than a naturally aspirated four-stroke cycle engine to increase the

A. temperature of the exhaust gases.
B. energy supplied to the turbocharger.
C. air pressure to the intake manifold.
D. cooling effect on the exhaust valves.

Reference: Henshall, Medium and High Speed Diesel Engines for Marine Use

3. The most common type of A.C. service generator found aboard ship is the stationary

A. electromagnetic field revolving armature-type.
B. electromagnetic field oscillatory armature-type.
C. armature-oscillatory electromagnetic field-type.
D. armature rotating elec-

tromagnetic field-type.

Reference: Basic Electricity, NAVPERS 10086-A

4. Where are moisture shields located?

A. Around the throttle valve stems
B. At the steam strainer inlet
C. At the inner stage diaphragms
D. On the last stages of the rotor blading

Reference: Harrington, Marine Engineering; Osbourne, Modern Marine Engineer's Manual, Vol. I

5. Which refrigerant will break down and produce phosgene gas when subjected to high heat?

A. CO_2
B. Methyl chloride
C. R-22
D. Sulphur dioxide

Reference: Marsh, Olivo, Principles of Refrigeration, 2nd ed.

DECK

1. For the purpose of cargo oil containment, the fixed container under the manifold of an 8-inch loading line must hold a minimum of

A. 3 barrels.
B. 4 barrels.
C. 6 barrels.
D. 8 barrels.

Reference: 33 CFR 155.310 (1)(IV)

2. Loran C ground waves provide position information of reasonable accuracy out to a range of

A. 300 miles.
B. 1200 miles.
C. 1800 miles.
D. 2400 miles.

Reference: Bowditch, American Practical Navigator

3. Your draft in fresh water is 179". What will be your draft at sea?

A. 170"
B. 174"
C. 181"
D. 188"

Reference: Ladage, Stability and Trim for the Ship's Officer

4. The wind is NE, and a sailing vessel is steering NW. What tack is the vessel on, and what fog signal should it sound?

A. Port tack — one blast at 1-minute intervals.
B. Starboard tack — one blast at 1-minute intervals.
C. Starboard tack — two blasts at 1-minute intervals.
D. Starboard tack — one prolonged and two short blasts at 2-minute intervals.

Reference: "Navigation Rules, International-Inland," COMDTINST M16672.2A

5. Which of the following flash points would indicate a grade D combustible liquid?

A. 40°F
B. 95°F
C. 79°F
D. 155°F

Reference: 46 CFR 30.10-15(a)

ANSWERS

1-A;2-B;3-B;4-D;5-B
DECK
1-D;2-D;3-D;4-D;5-C
ENGINEER

If you have any questions about "Nautical Queries," please contact Commanding Officer, U.S. Coast Guard Institute (mvp), P.O. Substation 18, Oklahoma City, Oklahoma 73169; telephone (405) 686-4417.

More Gallant Ships

In May 1985, Gallant Ship plaques were presented by the Maritime Administration to the owners and crews of three vessels whose heroic response saved many lives during the sinking of the tanker AMERICAN EAGLE in the Gulf of Mexico on February 26, 1984.

F. X. McNerney, the Maritime Administration's Central Region Director, acting on behalf of Secretary of Transportation Elizabeth Hanford Dole and Maritime Administrator John Gaughan, presented Gallant Ship plaques to Offshore Logistics, Inc., at Lafayette, Louisiana, as owners of the M/V ENTERPRISE and M/V STARLIGHT, and to White Cap Marine at Morgan City, Louisiana, as owner of the M/V LIBERATOR.

Individual awards to crew members of the vessels were also presented at Lafayette and Morgan City, as were awards to the anchor handling crew of the M/V ENTERPRISE at Del Mar Offshore in New Iberia, Louisiana. ‡

Coast Guard Papers Will Be Presented to the National Safety Congress

Several Coast Guard officials will be presenting papers to the National Safety Congress, to be held in Chicago, Illinois, October 19-20, 1986. A list of authors, as well as synopses of their papers, is given below. Interested readers may wish to contact the authors for copies.

Marine Vapor Control/Recovery Safety Concerns
Mr. Frits Wybenga, Hazardous Materials Branch
(202) 426-1217

State Implementation Plans (SIPs) for achieving federally required ambient air quality standards for volatile organic compounds may include standards restricting tank vessel hydrocarbon emissions during loading, ballasting, and tank cleaning. These restrictions may necessitate the use of vapor control/recovery equipment by marine vessels during these operations. The use of this equipment and the possibility of non-uniform state emission standards can pose significant safety hazards to these vessels and potentially hinder interstate commerce. The Coast Guard is particularly concerned about the possibility of any derogation of safety. Industry has expressed its concern on these subjects and encouraged federal preemption of control over marine vessels through legislation or direct Coast Guard intervention. The paper will discuss present state initiatives, Coast Guard policy, Department of Transportation (DOT) activities, and a recent study undertaken by the Marine Board of the National Academy of Sciences on vapor control/recovery systems.

Merchant Marine Occupational Health Studies
Mr. Michael Morrissette, Hazardous Materials Branch
(202) 426-1577

In the late 1970s, the Coast Guard began a series of research studies to investigate the potential health problems related to various work activities on board chemical and petroleum tank vessels. An estimated 21,000 merchant marine personnel are engaged in petrochemical/chemical cargo operations. The research studies have generated extensive occupational exposure data which show that chemical vapor concentrations are frequently above permissible limits during such operations as tank gauging and tank entry. The long-term health implications are potentially serious — many products are known to have detrimental health effects including a significant number which are known or suspected human carcinogens. The Coast Guard's overall goal is to minimize occupational health risks using a combination of engineering, administrative, training, and personal protective measures.

Our contractor for the research studies has recently completed a 6-month trial implementation of a model health and safety program at Coast Guard units in Houston and Galveston, Texas. A second program is being implemented with a marine company. It is scheduled to begin this fall. The final product of the study will be a generic but comprehensive health and safety plan that each company can structure to its own needs. The plan will be available in 1987 and will be distributed to the marine industry.

Certification and Drydocking of Tank Barges
LCDR Francis Barnett, Eighth District Marine Inspection Office, New Orleans
(504) 589-6183

This paper discusses the certification and drydocking of tank barges with the emphasis on dangerous cargo barges. Nowhere in the Coast Guard's arsenal of manuals and instructions is there a readily understandable, definitive treatment of this sometimes complex topic. This paper uses the Certificate of Inspection as its focus, addressing all the various entries and endorsements that the Coast Guard employs. Primary attention is paid to operational areas, such as (a) how and why loading constraints are developed, (b) how cargo tank inspection and drydocking intervals are established and sometimes extended, and (c) the addition of dangerous cargoes to a barge's certificate. Also, advice on properly preparing a tank barge for Coast Guard inspection is included.

International and Domestic Port Facility Security
CDR Thomas Robinson, Port and Environmental Safety Division
(202) 426-1934

The September 1985 hijacking of the cruise ship ACHILLE LAURO and the subsequent murder of one of its passengers resulted in increased awareness of the vulnerability of our port facilities, and the ships that use them, to terrorist acts. More than half of the world's cruise passengers are U.S. citizens, and nearly all cruise ships embarking passengers in U.S. ports are registered in foreign countries, making this truly an international problem. The Coast Guard has been intimately involved, through the International Maritime Organization (IMO), in developing security measures for the protection of passengers and crews from unlawful acts. A domestic port security program focusing on prevention of terrorism is being formulated by the Administration and the Congress. Improved security systems and procedures, based on the internationally agreed measures, will be implemented at U.S. port terminals, as appropriate. Recent world events have shown that increased cooperation and exchange of information among like-minded nations is necessary to enhance the safety and security of passengers and crews embarking on ships. A description of the international proposals is provided as well as the potential input on U.S. interests. ↨

Keynotes

Notice

CGD 86-019	Alternative Compliance, Inland and International Navigation Rules	(June 9)

Rule 38 of both the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS) and the Inland Navigation Rules exempts vessels which were built before the rules became effective from certain technical provisions concerning the position of lights. Certain temporary exemptions terminate 9 years after the effective date. The 9-year exemption periods expire July 15, 1986 on COLREGS waters, December 24, 1990 on Inland waters, and March 1, 1992 on the Great Lakes. Vessels which have been operating under the temporary exemption of Rule 38 are expected to be in full compliance by these dates; however, vessels of special constuction or special purpose, especially those 20 to 50 meters in length with the pilothouse located forward of a single mast and the sidelights forward of the masthead light, may be entitled to Alternative Compliance Certificates, which will allow them to continue to operate with their existing lights.

Notice of Proposed Rulemaking

CGD 86-037	Documentation of Forfeited Vessels	(June 13)

The Coast Guard is proposing to revise the regulations concerning the documentation of vessels forfeited for a breach of the laws of the United States. The revised regulations would recognize administrative forfeiture proceedings and the effect of forfeiture on liens and encumbrances of record. Recent statutory changes affecting the maximum value of vessels subject to administrative forfeiture proceedings has resulted in an increase in the number of vessels eligible for documentation being forfeited in this manner. Existing regulations only recognize judicial forfeiture and do not take into account that a forfeiture results in the vessel being cleared of existing liens and encumbrances. These changes will improve the marketability of vessels forfeited and allow vessel purchasers to realize the full benefits of a vessel with a clear title and domestic trade entitlements. The deadline for comments on this notice was July 14, 1986.

CGD 85-059	Ventilation Standards	(June 23)

This notice proposes amendments to the Ventilation Regulations in Subpart K of Part 183 of Title 33, Code of Federal Regulations. The Coast Guard undertook a review of its regulations governing construction standards which apply to the manufacture of recreational boats in an effort to reduce the burden of existing regulation while ensuring that boats are built to an adequate level of safety. Based upn the review effort, it has been determined that two of the requirements for natural ventilation do not contribute to boating safety. Therefore, these proposed amendments would relieve existing regulatory burdens upon recreational boat manufacturers. Comments must be received on or before August 22, 1986.

Requests for copies of NPRMs should be directed to the Marine Safety Council. The address is Commandant (G-CMC), U.S. Coast Guard, 2100 Second Street, SW, Washington, DC 20593; telephone (202) 426-1477. The office, Room 2110, is open between the hours of 8:00 a.m. and 3:00 p.m. Monday through Friday. Comments are available for inspection or copying during those hours. ↨