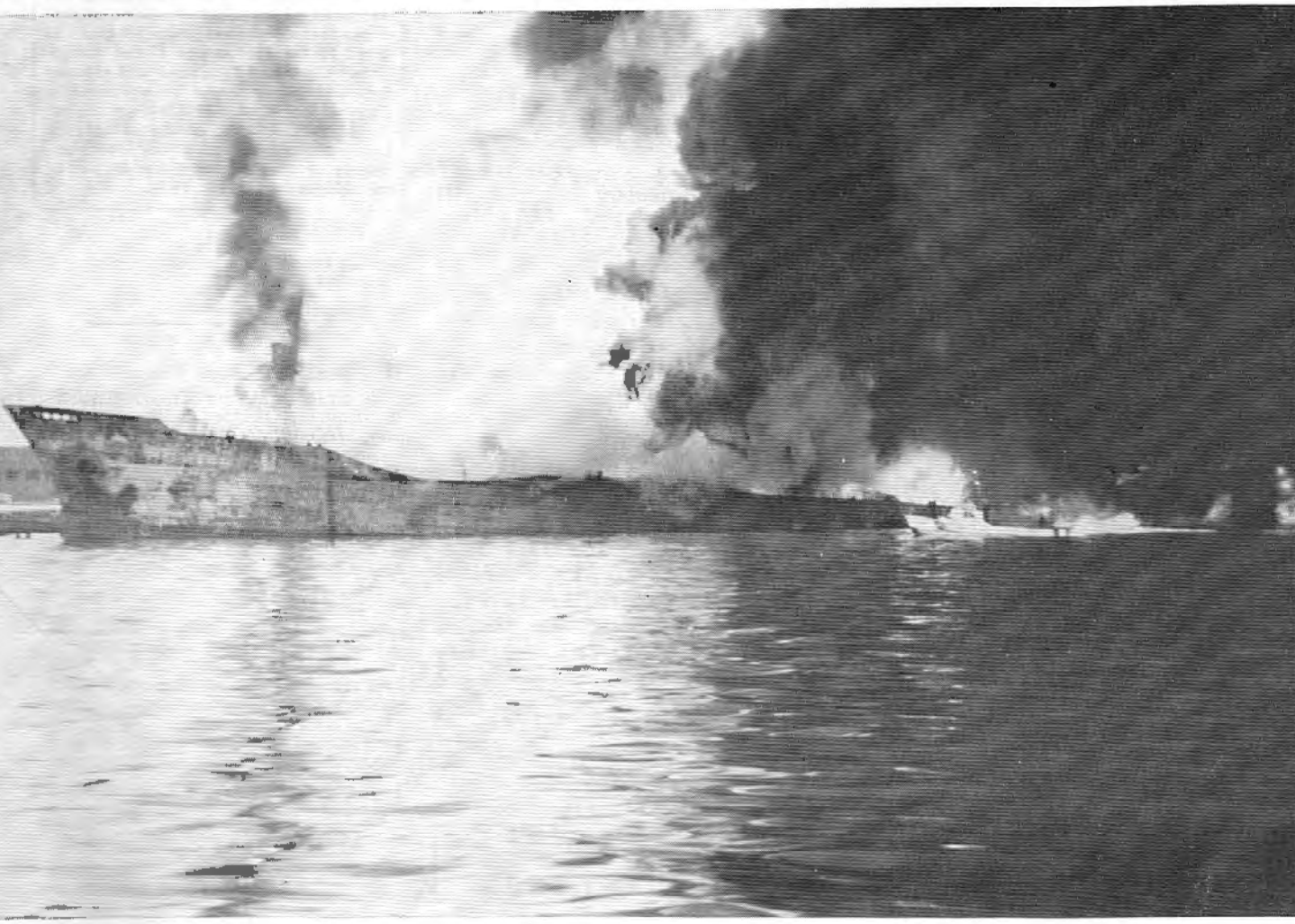
PROCEEDINGS
OF THE MARINE SAFETY COUNCIL



DEPARTMENT OF TRANSPORTATION UNITED STATES COAST GUARD

Vol. 32, No. 6 CG-129 June 1975

IN THIS ISSUE . . .

Hazardous Cargoes
Navigational Vocabulary

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FEATURES

DEPARTMENTS

FRONT COVER

A Coast Guard patrol boat watches over the burning hulk of the crude carrier *Corinthos*. A narrative report of this casualty, which resulted in 26 persons missing or dead, will appear in a future issue of the *Proceedings*.

BACK COVER

Underway for the first time, *Pegasus*, the U.S. Navy's new Patrol Hydrofoil Missile (PHM) ship, has started hullborne trials on Seattle's Lake Washington. Tests are being conducted by the ship's designer and builder, the Boeing Aerospace Co.'s Naval Systems Division.

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PROCEEDINGS

OF THE

MARINE SAFETY COUNCIL

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Lieutenant (jg) G. D. Szczurek, Editor
Angus C. McDonald, Assistant Editor

A REVIEW OF SOME RECENT ACCIDENTS IN THE MARITIME TRANSPORTATION MODE

By Lt. Cmdr. Fred H. Halvorsen, USCG, Cargo and Hazardous Materials Division, Office of Merchant Marine Safety, U.S. Coast Guard Headquarters. This paper was presented at the 79th National Meeting of the American Institute of Chemical Engineers in Houston, Tex. Any opinions expressed herein are those of the author and do not necessarily reflect Coast Guard policy.

INTRODUCTION

The U.S. Coast Guard is responsible for the safe transportation of hazardous material on the navigable waterways and territorial waters of the United States. This responsibility for safety extends to the vessel, the crew, and to property and persons adjacent to waterways and covers all vessels in U.S. waters and U.S. flag vessels anywhere in the world.

Part of the responsibility of the Coast Guard includes investigation of accidents involving death, serious injury, and/or a minimum amount of property damage. One purpose of the investigation is to establish the causal factors of the accident to determine the adequacy of present regulations.

Within less than a year, two tankers offloading crude oil have catastrophically exploded, burned, and sunk in a major U.S. port area. Loss of life on both vessels was extensive. Total monetary losses will reach into the hundred million dollar range. This paper will discuss these accidents and describe how inerting of the cargo tanks might have prevented or mitigated the explosions.

Readers should note that this paper has no connection with the official U.S. Coast Guard investigation of these accidents. The opinions and assertions contained herein are the private ones of this author and are not to be construed as official or reflecting the views of the Commandant or the Coast Guard.

LOSS OF TANKER *ELIAS*

An hour before midnight on 9 April 1974, the 30,000 d.w.t. Greek flag tanker *Elias* suffered massive multiple explosions, burned and sank in the Delaware River alongside the Atlantic Richfield Oil Terminal, Fort Mifflin, Pa. At the time of the accident, the vessel was in the last stages of offloading a cargo of crude oil from the Bachaquero field in Venzuela. A total of 13 persons board the vessel (including all principals involved in cargo transfer) were killed. The hulk of the vessel came to rest in an upright position of the river bottom. The ensuing fire was fought from the shore by units of the Philadelphia Fire Department and from the water side by units of the U.S. Navy, U.S. Coast Guard, and commercial tugs. Over 30 firefighting and support units were involved at the height of the fire.

The *Elias,* originally named *Hilda Knudsen,* was launched in 1956 in Goteborg, Sweden and classed by Germanischer Lloyd. The vessel sailed under Norwegian flag in worldwide petroleum service. In April 1972, *Hilda Knudsen* was laid up. In September 1973, the vessel was purchased and delivered to new owners, renamed *Elias,* and placed under Greek registry. *Elias* sailed without major incident until the time of the accident, again in worldwide petroleum service.

Elias was a standard sized tanker of conventional design. The vessel was 605 feet in length with a beam of 82 feet and a maximum summer draft of 34 feet. The vessel had a raised forecastle head, an amidships house and an afterhouse. The master, deck officers, and radio officer were quartered in the amidships house from which the vessel was also navigated. The afterhouse contained the main machinery and the accommodations for the remainder of the crew. The cargo space of the vessel was divided into 6 main sections which were further subdivided into 23 individual cargo tanks. The vessel had two cargo pumprooms, accessible only from the main deck. One pumproom was located forward of the amidships house, the other halfway between the amidships house and the afterhouse. Cargo pump machinery consisted of steam driven reciprocating pumps. The cargo tanks were vented through a common header system through individual pressure-vacuum valves set

to relieve at 1.99 p.s.i.g. pressure and 0.995 p.s.i.g. vacuum. The cargo tanks were not equipped with an inert gas system.

The forces of the explosions literally destroyed the cargo tank portion of the vessel. Large pieces of the deck, hull, and interior tank bulkheads were propelled hundreds of feet from the site and damaged adjacent vessels, buildings, and the pier. The bow section, forward of the cargo tanks, was essentially undamaged by the explosions, as was the aft section which included the engine room, although both were later gutted by fire. Due to the explosions, the tank top forward of the amidship house was rolled up and over the amidship house which either fell or was forced into the cargo tank below it.

The cause of the initial ignition source is unknown. One witness reports the first explosion was preceded by a loud hissing noise, and seemed to originate in the fore part of the vessel. Immediately thereafter, a second more violent explosion engulfed the entire vessel. The total number of separate explosions was reported as one, two, or three, depending on the location of the witness. The sound of the explosion was reported as far away as 20 miles. After the second explosion, it was reported that the entire deck area was a mass of flames and that the blast effects propelled flames high into the air.

This particular crude oil cargo carried by *Elias* was by no means remarkable. It could be characterized as a thick viscous crude with high asphalt content whose ultimate use was for road surfacing. The oil must be heated to flow easily and in fact aboard *Elias* was heated to between 125° and 135° prior to offloading by fixed steam coils in the cargo tanks. The Reid vapor pressure (RVP) of the crude was 1.4 p.s.i.a. at 100°F and 3.5 p.s.i.a. at 125°F. This RVP is relatively low when compared to other types of crude oil. Tests indicate the flashpoint was 62°F using the tag closed cup method.

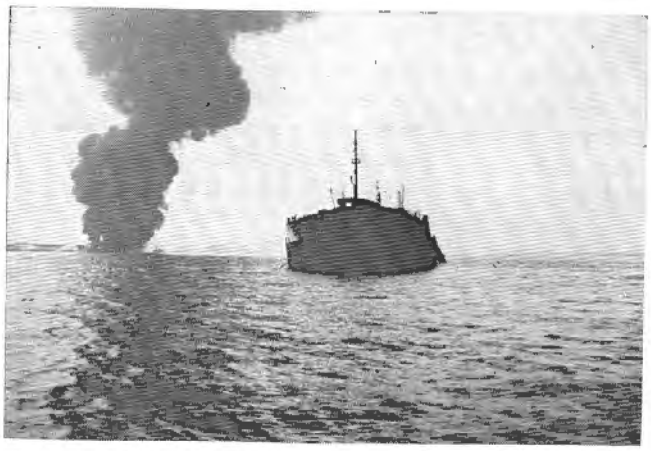
Insofar as transportation safety is concerned, the hazards of the crude oil are directly related to the characteristics of the flammable vapor phase. It is therefore of interest and importance to consider the composition and concentration in the vapor space (ullage) above the crude oil liquid.

In general, crude oils contain low molecular weight gases, such as methane, ethane, and propane dissolved in the liquid. These gases are released from the liquid and if confined will establish a predictable equilibrium between the liquid phase and vapor phase. Physical and chemical properties vary fairly widely among these gases. A mixture of these gases will exhibit physical properties in proportion to the concentrations of these gases found therein. On *Elias*, vapor phase composition of flammable vapors was estimated to be:

	(Percent)
Propane	5
Butane	3
Pentane	1

This corresponds to a lower flammable limit of about 2 percent and an upper flammable limit of about 9 percent.

Prior to and during offloading, the oil in the tanks of the *Elias* was heated to reduce viscosity and facilitate pumping. Steam at about 100 p.s.i.g. was delivered through a fixed system to heating coils within the cargo tanks. As the oil was heated the vapor pressure and therefore concentration of flammable vapors in the ullage above the crude oil would increase. The ullage space concentration of flammable vapors was about 30 percent, well above the upper flammable limit. Being "too rich," the vapor space above the cargo tanks would be



This sequence of photos shows the magnitude of the explosions and fire which wracked the crude oil carrier *Corinthos*. Just after midnight on 31 January 1975 the *Edgar M. Queeny* made contact with the *Corinthos*, which was moored at Marcus Hook, Pa. Crewmembers on the

inherently safe from ignition as long as the tanks were closed.

Elias reached port on 8 April and preparations were made for offloading the cargo; cargo hose was connected, tank closures were opened and fitted with flame screens, and the vessel electrically grounded to shore. Cargo transfer commenced at about 1730 hours on 8 April.

As the cargo was offloaded, air was drawn into the cargo tanks as the liquid level fell. It has been well established that the vapor-liquid equilibrium is not immediately reestablished during offloading. In fact, it has been reported and documented that the equilibrium layer of flammable gases initially persists only a few feet above the liquid level with the concentration of flammable gases decreasing toward the tank top. It is not unreasonable to expect that at some level in the tank a concentration of gas would be within the flammable range. Tanks which were once inherently safe by being "too rich" now would become unsafe.

Thus on *Elias*, in the last stages of cargo transfer, flammable gas concentrations in some or all of the cargo tanks were in the flammable/explosive range. All that was necessary was a source of ignition.

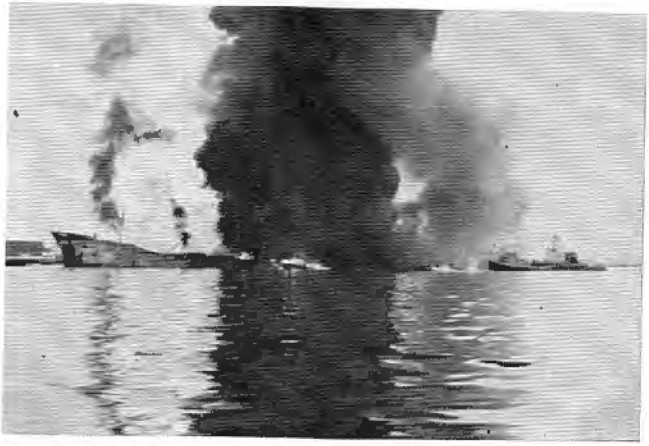
LOSS OF TANKER *CORINTHOS*

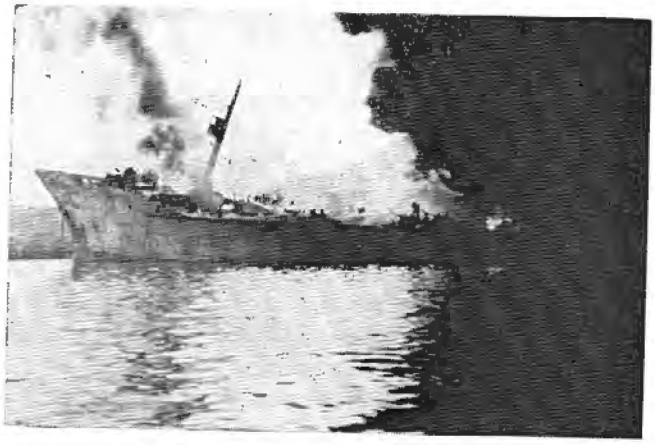
At about 0030 on 31 January 1975, the bow of the U.S. flag chemical tanker *Edgar M. Queeny* made contact with the outboard (port) side of the moored 54,000 d.w.t. Liberian flag crude carrier *Corinthos*. A low order explosion immediately resulted and was followed within seconds by a series of increasingly more violent explosions. The entire deck area of *Corinthos* was soon engulfed in flames and as a result of the initial explosions and attendant fire, the vessel broke and sank alongside the British Petroleum dock No. 1, Marcus Hook, Pa. Twenty-six persons are either known dead or are missing and presumed dead. Intense firefighting efforts continued for at least 12 hours after the first explosion.

From the testimony given to the Marine Board of Investigation, the vessel *Edgar M. Queeny* remained adjacent to *Corinthos* for about 10 minutes after the initial contact. During this time a large piece of the starboard side of *Corinthos's* deck and hull (estimated to weigh 110 tons) was blown across *Corinthos* and landed on the deck of *Queeny*. This piece of metal projected far underwater and pierced the hull of *Queeny* in the area of tanks 4P and 5P. These tanks contained light paraffin. The bow of *Queeny* was subjected to the blast effects, intense heat, and burning oil spewn from *Corinthos*. Due to the effects, combustible materials and paint in the bow area caught fire. One man on the bow of *Queeny* was killed as he attempted to flee. Crew members on *Queeny* who responded to the fire on their vessel performed in what must be termed a superlative fashion. Their gallant efforts extinguished the fire on *Queeny* soon after moving away from *Corinthos;* although *Queeny* was carrying some very hazardous products including methanol, phenol, aviation gasoline, and some combustible monomers. The fire on *Queeny* was fought using the foam generator and five fixed monitors on deck. The supply of approximately 4,000 gallons of foam was expended in the successful effort.

No effective firefighting efforts could have been undertaken on *Corinthos*. After the third explosion, which occurred about 10 to 20 seconds after initial contact of the *Queeny*, the blast, shock effects, and intense fire probably destroyed the vessel's firefighting capabilities.

The intensity of the fire on *Corinthos* totally destroyed the vessel. Persons walking about the burned deck after the fire subsided reported cracks and buckling of the deck and super-





Queeny managed to extinguish the fire on their vessel and move it away from the *Corinthos* (photo, far left). Several explosions immediately after the collision destroyed the firefighting capabilities of the *Corinthos*. Local, commercial, and Coast Guard firefighting units battled the blaze for 12 hours before it was brought under control.

Could a cargo tank inerting system have prevented this casualty? These views of the crude oil carrier *Elias* show the massive damage caused by the explosions and fire which erupted during the offloading process. Thirteen persons were killed in this casualty, which occurred just before midnight on 9 April 1974.

structure. *Corinthos* was a vessel with all living, control, and machinery spaces aft. The superstructure in the after portion of the vessel collapsed into the machinery spaces below, ostensibly from support members losing their strength in the intense heat.

At the time of the incident, *Corinthos* was in the process of offloading a cargo of Algerian crude oil from the Hassi Messaoud field. Offloading was estimated to be about half completed.

As on *Elias, Corinthos* used an open cargo vapor system. Tanks were opened, fitted with flame screens and air allowed to enter the tanks to replace cargo as the liquid level was drawn through offloading. The cargo was fairly volatile having a Reid vapor pressure of 8.9. Vapor phase composition is estimated to be:

	(*Percent*)
Ethane	6
Propane	18
Butane	13
Pentanes	2

The upper and lower flammable limits are estimated to be 9.3 percent and 2.1 percent by volume, respectively. Under the conditions of temperature at the time of the accident, the ullage space composition would be about 40 percent flammable gas, well above the upper flammable limit of 9.3 percent. The tanks while closed would be "too rich" and therefore inherently safe.

However, as on the *Elias,* the method of offloading placed the cargo tanks within the explosive range. All that was needed was the source of ignition for these vapors.

HOW TO IMPROVE SAFETY

The most practical means to prevent such an accident as this would have been to inert the cargo tanks while offloading. As the liquid level fell in the tanks, inert gases, either CO_2 or N_2 or scrubbed flue gas could have been fed into the cargo tanks. The inerting gas obviously would not reduce the quantity of flammable gas present but would reduce oxygen content to less than that necessary for combustion (less than 10 percent). The estimated cost of an inert gas system for installation on a crude carrier of 30,000 d.w.t. would be in the neighborhood of $1 million. However, a possible less expensive solution would be to have the terminal provide inert gas to the vessel. Only minor modifications would be necessary on a vessel such as *Elias* to use shore-provided inert gas.

It is interesting to place the explosion on *Elias* in context with explosions on other crude oil tankers. A study done for the Coast Guard for calendar years 1971 and 1972 shows a worldwide total of 1,587 tanker casualties (*An Analysis of Oil Outflows Due to Tanker Accidents,* 1971–72, report No. CG–D–81–74). Of these, 70 were explosions. Of the 70 explosions, 29 occurred in the cargo tanks.

On *Corinthos,* the presence of an inert atmosphere in a cargo tank subjected to collision might or might not have reduced the effects of the initial explosion. Intuitively, one might argue that the effects of the explosion might have been confined to only the volume of the tank proximate to the collision area. Intuitively, one could also argue that an explosion might have difficulty in propagating throughout the other tanks, and that even if other tanks were involved it would take a greater length of time—time in which to initiate firefighting efforts or escape a burning vessel. Intuition, however, is a poor substitute for fact. It is obvious that more work must be done to establish the benefits of tank inerting in an accident situation.

Inerting of cargo tanks on tankers does have positive benefits in noncollision situations. First, a number of studies have pointed out that no cargo tank explosions have occurred on vessels where cargo tanks are routinely inerted. In an article in the January 1975 issue of *Marine Engineering Log,* Ted Franklin of Sun Oil, states that his company has inerted cargo tanks on all of its tanker fleets for

the past 40 years and has not suffered one explosion.

The not-yet-fully-explained explosions on the three supertankers, *Marpessa, Mactra, and Kong Haakon VII* (all over 200,000 d.w.t.) in 1969, as well as on other vessels has resulted in an increased concern for safety on large crude vessels. Part of this concern has led to a 1973 IMCO resolution that inerting be required on crude tankers of over 100,000 d.w.t. and combination carriers of over 50,000 d.w.t. (IMCO resolution A.271 (VIII) adopted on 20 November 1973). This inerting system was basically required to prevent the possible explosions that occurred during ballast voyages and believed related to static discharges of charged mists in the huge tanks. The IMCO resolution also requires that the inerting system be capable of supplying inert gas equal to 125 percent capacity of the cargo pumps. Thus, the inert gas system can be used during cargo transfer.

The U.S. Coast Guard has recently proposed that the United States adopt this IMCO resolution. An advance notice of proposed rulemaking was published in the Federal Register on 5 September 1974. The Coast Guard's proposed regulations mirror the IMCO resolution.

It is of interest to note neither IMCO nor the U.S. Coast Guard will at this time require that vessels of the size of *Elias* and *Corinthos* install an inert gas system.

ADDITIONAL CONSIDERATIONS

There are two groups of reasons for inerting cargo tanks: Economic reasons and safety reasons.

The economic rationale for inerting tanks is outlined succinctly in a classic article on tanker inerting in which several test cases were compared as well as observations made from routine studies on inerted tankers. [The Development and Operation of an Inert Gas System for Oil Tankers, *Journal of the Royal Institution of Naval Architects,* January 1972 by C. F. Day (and others)]. The reasons include:

a. Corrosion reduction.—Corrosion within tanks is greatest in structural members at a point about 3 inches below the deck. Unprotected, this area would generally require renewal sometime during the expected life of the vessel. Modern practice has been to protect these areas by coating. The authors feel that the savings in capital cost for the deletion of this coating would pay for an inert gas system. The inert gas system, by reducing oxygen content in the vulnerable area has been found to significantly reduce corrosion. Corrosion on inerted vessels in the British Petroleum fleet has been reduced from 28 to 58 percent over unprotected, noninerted tanks.
b. Reduction in tank scale.—A reduction in tank scale of about 25 percent was noted during inerting tests and in practice.
c. Increased cargo discharge rates.—Discharge pressure can be increased by pressurizing the vapor space above the liquid with inert gas while discharging cargo. This amounts to only a few inches of water gage pressure and modest improvements in discharge rates would be expected. However, the benefits of the higher pressure were found in practice to be especially important during stripping operations. Pressure provided by the inert gas was very significant in relation to the net positive suction pressure of the pump—much lower liquid levels could be achieved before stripping became necessary. Loss of suction with positive suction heads for volatile cargoes is caused by cavitation of the pump due to flashing of the volatile components. The few inches water gage of tank overpressure reduced the liquid level at which loss of suction would occur by preventing flashing and resultant pump cavitation.
d. Reduction in insurance premiums from a better safety record.

The safety reasons for inerting cargo tanks are the most compelling. First, inerting cargo tanks will prevent the explosions on ballast voyages in large crude tankers by reduction of oxygen concentration to less than that required for combustion. The flammable gas concentrations are still present. Probably present also is the unknown ignition source, but the tank is inherently safe from fire and explosion.

Loading.—Prior to loading, inert gas is present in the tanks. As the liquid level rises, the inert gas and flammable gas mixture is vented from the tank. Once this gas mixture is released to the outside environment, and mixes with air, a flammable gas mixture may result. However, this is external to the cargo tanks and the cargo tanks are effectively isolated. A fire or explosion would have to actually cause penetration of a tank top or hull before a cargo tank could be involved. The effectiveness of a closed tank in preventing fire or explosion there was graphically demonstrated by the *Queeny* remaining immediately adjacent to *Corinthos* throughout 10 minutes of violent explosions without the cargo tanks becoming involved.

Offloading.—During offloading, the safety benefits again include a closed system and an inert atmosphere in the tank above the cargo liquid level. An open system, in which flame screens over tank openings are the only barrier between the tank interior and the outside environment does not seem completely satisfactory. Flame screens are easily removed and can be dislodged by a shock wave. A flame screen is designed to stop a flame front or a low order deflagration. A high order deflagration or detonation can easily

Continued on page 88.

IMCO URGES TRIAL USE OF STANDARD MARINE NAVIGATION VOCABULARY

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

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

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

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

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

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

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

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

[ ] brackets indicate that the part of the message enclosed within the brackets may be added where it is relevant.

/ oblique stroke indicates that the items on either side of the stroke are alternatives.

– – – indicate that the relevant information is to be filled in where the leaders occur.

PART III
PHRASE VOCABULARY

CONTENTS

[1] C.I.P.—Calling in point.

SECTION A

DANGERS TO NAVIGATION, WARNINGS—ASSISTANCE

1 WARNINGS

1.1 [2] You are running into danger—
- Shallow water ahead of you.
- Submerged wreck ahead of you.
- Risk of collision imminent.
- Fog bank ahead.
- Bridge will not open.
- _____
- _____

1.2 Dangerous obstruction or wreck reported at _____

1.3 Unkoown object(s) in position_____

1.4 Floating ice in position _____ (considered hazardous to navigation)

1.5 Mine(s) reported in position_____

1.6 Navigation is closed (prohibited) in area_____

1.7 There has been a collision in position _____ keep clear/stand by to give assistance.

1.8 [2] It is dangerous—
- To stop.
- To remain in present position.
- To alter course to starboard.
- To alter course to port.
- To approach close to my vessel.
- _____
- _____

1.9 Vessel _____ is aground in position_____

1.10 Vessel _____ is on fire in position_____

1.11 Large vessel leaving. Keep clear of approach channel.

1.12 Go to emergency anchorage.

1.13 Your navigation lights are not visible.

1.14 You are going to run aground.

1.15 Keep clear—
- I am jettisoning dangerous cargo.
- Vessel is leaking dangerous (inflammable/noxious/poisonous) cargo in position_____
- You are crossing a towing line.
- You are crossing my nets.
- _____
- _____

2 ASSISTANCE

2.1 I need help—
- I am sinking.
- I am on fire.
- I have been in collision.
- I am aground.
- _____
- _____

2.2 I am on fire and have dangerous cargo on board.

2.3 I am on fire—
- In the engine room.
- In the hold/cargo tanks.
- In the accommodation/living spaces.
- _____
- _____

2.4 I have lost a man overboard (at _____). Please help with search and rescue.

2.5 I require a tug/ _____ tugs.

2.6 What is your position?

2.7 What is the position of vessel in distress?

2.8 I am coming to your assistance.

[2] If at all possible the originator must give further advice using phrases from the vocabulary.

2.9 I expect to reach you at _____ hrs.
2.10 Please send a boat/raft.
2.11 I am sending a boat/raft to you.
2.12 Make a lee for me/the boat/the raft.
2.13 I will make a lee for you/the boat/the raft.
2.14 I cannot send a boat.
2.15 I will attempt rescue by Breeches Buoy.
2.16 Is it safe to fire a rocket?
2.17 It is/is not safe to fire a rocket.
2.18 Please take command of search and rescue.
2.19 I am/vessel _____ is in command of search and rescue.
2.20 Assistance is not/no longer required. You may proceed.
2.21 You must keep radio silence in this area unless you have messages about the casualty.

NOTE.—Further messages should be made using the International Code of Signals and the Merchant Ship Search and Rescue Manual (MERSAR).

SECTION B

GENERAL

3 ANCHORING

3.1 I am anchored (at _____).
3.2 I am heaving up anchor.
3.3 My anchor is clear of the bottom.
3.4 You must anchor at _____ hrs.
3.5 You must anchor (at _____).
3.6 You must anchor until pilot arrives.
3.7 Do not anchor.
3.8 Anchoring is prohibited.
3.9 I will anchor (at _____).
3.10 Vessel _____ is at anchor (at _____).
3.11 I am/you are dragging anchor.
3.12 My/your anchor is dragging.
3.13 Do not dredge anchor.
3.14 You must heave up anchor.
3.15 My anchor is foul.
3.16 You are obstructing fairway/other traffic.
3.17 You must anchor in a different position _____
3.18 Anchor position _____ has been allocated to you.
3.19 You must anchor clear of the fairway.
3.20 What is the anchor position for me?
3.21 You have anchored in the wrong position.

4 ARRIVAL, BERTHING AND DEPARTURE

4.1 My ETA (at _____) is _____ hrs.
4.2 What is your destination?
4.3 My destination is _____.
4.4 What are my berthing/docking instructions?
4.5 Your berth is/will be clear at _____ hrs.
4.6 You will berth/dock at _____.
4.7 May I enter?
4.8 You may enter (at _____ hrs.).
4.9 May I proceed?
4.10 You may proceed (at _____ hrs.).
4.11 Is there any other traffic?
4.12 Vessel _____ will turn at _____.
4.13 There is a vessel turning/maneuvering at _____.
4.14 Vessel _____ will leave _____ at _____ hrs.
4.15 Vessel _____ is leaving _____.
4.16 Vessel _____ has left _____.
4.17 Vessel _____ has entered fairway at _____.
4.18 Your orders are/are changed to _____.
4.19 Vessel _____ inward/outward in position _____.
4.20 Are you underway?
4.21 I am ready to get underway.
4.22 I am not ready to get underway.
4.23 I am underway.
4.24 Get underway.
4.25 I am making way through the water.
4.26 I have/have not steerage way.
4.27 Vessel in position (makefast).
4.28 Move ahead/astern (_____ feet/metres) let go head/stern/spring/tow rope.

5 COURSE

5.1 What is your course?
5.2 My course is _____.
5.3 Your course is correct.
5.4 What course over the ground do you advise?
5.5 Advise you make course over the ground _____.
5.6 Advise you keep your present course.
5.7 You are steering a dangerous course (to be followed by indication of danger or advice for further action).
5.8 I am keeping my present course.
5.9 I cannot keep my present course.
5.10 I am altering course to _____.
5.11 I am altering my course to port/starboard (left/right).
5.12 Advise you alter course to _____ (at _____).

6 DRAUGHT

6.1 What is your draught?
6.2 My draught is _____.
6.3 What is your draught forward/aft?
6.4 My draught forward/aft is _____.
6.5 Vessel _____ is of deep draught.
6.6 Do you have any list?

6.7 I have a list to port/starboard of _____ degrees.

NOTE.—When necessary it must be specified whether salt or fresh water draught is given.

7 FAIRWAY NAVIGATION

7.1 There is a vessel entering the fairway (at _____).
7.2 There is a vessel moving out of the fairway (at _____).
7.3 I will proceed by _____ fairway/route.
7.4 Proceed by _____ fairway/route.
7.5 I will turn before anchoring/berthing at _____.
7.6 I am proceeding at reduced speed.
7.7 I am crossing the fairway from _____ to _____.
7.8 I am passing_____.
7.9 Buoy _____ distance ahead.
7.10 I am stopped (at _____).
7.11 The vessel ahead/astern of you is _____ (*to be followed by action indicated;* stopping/turning/et cetera).
7.12 The vessel to port/starboard of you is _____ (*to be followed by action indicated;* stopping/turning/et cetera).
7.13 Fairway speed is _____ kts.
7.14 You must keep to _____ side of the fairway.
7.15 You are _____ side of the fairway.
7.16 You must leave the fairway clear.
7.17 You are in the centre of the fairway.
7.18 Do not overtake.
7.19 Do not cross the fairway.

8 MANEUVERING

The use of these messages does not relieve ships of their obligation to comply with local bylaws and the International Regulations for Preventing Collisions at Sea.

8.1 Advise you alter course to port/starboard.
8.2 I will alter course to port/starboard.
8.3 Keep well clear of me.
8.4 Do not overtake me.
8.5 Do not pass ahead/astern of me.
8.6 Do not pass on my port/starboard side.
8.7 Ship astern wishes to overtake on your port/starboard side.
8.8 I wish to overtake (_____).
8.9 You may overtake (_____).
8.10 I will overtake (_____).
8.11 _____ will overtake you.
8.12 You must pass ahead/astern of me/vessel_____
8.13 I will pass ahead/astern of you/vessel_____
8.14 Wait for _____ to cross ahead of you.
8.15 I will wait for _____ to cross ahead of me.
8.16 Advise you pass North/South/East/West of _____ vessel/mark.
8.17 I will pass North/South/East/West of _____ vessel/mark.
8.18 Wait for _____ to clear (_____ mark/position) before entering fairway/getting underway/leaving berth.
8.19 I will wait for _____ to clear (_____ mark/position) before entering fairway/getting underway/leaving berth.
8.20 I am not under command.
8.21 I am a hampered vessel.
8.22 I have a long tow.
8.23 You are heading towards my tow.
8.24 I am maneuvering with diffculty. Keep clear of me.

9 PILOTAGE

9.1 I require a pilot.
9.2 Do you require a pilot?
9.3 Is the pilot boat on the station?
9.4 Where can I take pilot?
9.5 You can take pilot at point _____/near _____ (at _____ hrs.).
9.6 At what time will the pilot be available?
9.7 Is pilotage compulsory?
9.8 You may navigate by yourself or wait for pilot at at the road/point/anchorage _____.
9.9 Pilot is coming to you.
9.10 Pilot boat is approaching your vessel.
9.11 Please rig pilot ladder on port/starboard side.
9.12 Pilot ladder is rigged on port/starboard side.

10 POSITION

10.1 What is your position (and ship's name)?
10.2 What is my position?
10.3 Your position is _____.
10.4 You are bearing _____ distance _____ from _____.
10.5 You are passing_____.
10.6 You are entering area _____.
10.7 What is your present position, course and speed?
10.8 My present position, course and speed is _____.
10.9 What is the course to _____?
10.10 The course to _____ is _____.
10.11 What is the course to reach you?
10.12 Course to reach me is _____.
10.13 Do not arrive at _____ before _____ hrs.
10.14 Do not arrive at _____ after _____ hrs.
10.15 Say again your position to assist identification.
10.16 Has your position been obtained by radar/decca/astronomical observation/et cetera?
10.17 My position has been obtained by radar/decca/astronomical observation/et cetera.

REVIEW OF MARITIME CASUALTIES

Continued from page 83

pass through a flame screen into a cargo tank. Thus, using an open system, as on *Elias,* once an explosion occurred, there was nothing to prevent subsequent explosions in other tanks.

CONCLUSION

Logically, the vessel owner is in business for profit and the greatest incentive for installing a nonrequired system aboard a vessel is obviously economically motivated. The rationale for inerting in this instance is summarized in a recent study done for the Maritime Administration [(Crude Oil) *Tanker Tank Cleaning Research Program,* 11 March 1974 (report No. MA–RD–900–7401)]:

> From one point of view, the cost of such safety measures as cargo tank atmosphere control may be considered as simply a cost burden to be weighed against the difficult-to-assess and argumentative probability of catastrophic accident. In this extreme, the attitude of "she hasn't blown up yet" can lead to rejection of any costly safety measures.
>
> A more logical and farsighted point of view would be to accept any avoidable catastrophe as undesirable and then compare the relative costs of control. Viewed in this fashion, inert gas systems provide the greatest degree of operational safety of currently available alternatives.

CORRECTION

The table below revises information printed on page 12 of the January 1975 issue of the *Proceedings of the Marine Safety Council.* These statistics should have appeared in the "Summary of Deaths on Board Commercial Vessels (Not Involving a Vessel Casualty)" in that issue.

STATISTICAL SUMMARY OF DEATHS ON BOARD COMMERCIAL VESSELS

(Not Involving a Vessel Casualty)

July 1973 to 30 June 1974 Fiscal year 1974	Natural cause	Homicide	Suicide	Disappearance	Slips and falls—Ladders	Slips and falls—Gangways	Slips and falls—On deck	Slips and falls—Other	Falls from vessel—Into water	Falls into holds or tanks	Struck by objects: falling, dropped or moving	Exposure and asphyxiation	Struck against, crushed, bumped into objects	Operating machinery and tools	Burns and scalds (other than electrical)	Electrical shock and burns	Caught in lines, chains, or wire ropes	Pinching and crushing	Heavy weather	Overexertion, sprains and strains	Cuts, lacerations, bruises and punctures	Altercations and misconduct	Unknown or insufficient information
Status or capacity on vessel:																							
32 Passenger	19	....	....	....	....	....	....	....	13	....	....	....	....	....	....	....	....	....	....	....	....	....	....
17 Longshoreman-harbor worker	1	....	1	....	....	....	....	1	7	1	....	....	....	....	....	1	....	1	....	....	1	....	3
234 Crewmember	86	2	6	3	4	....	2	5	84	2	14	6	1	....	2	....	2	4	....	....	1	3	7
13 Other	2	....	....	....	....	....	....	....	3	....	1	2	1	....	....	....	1	2	....	....	....	....	1
Activity engaged in:																							
7 Off duty	2	....	2	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
153 Deck department duties	52	2	3	1	3	....	1	5	60	2	9	4	....	....	....	....	2	1	....	....	1	1	6
40 Engine department duties	23	....	1	....	1	....	1	....	6	....	3	....	1	....	2	....	....	1	....	....	....	....	1
21 Stewards department duties	7	....	....	1	....	....	....	....	9	....	1	....	....	....	....	....	....	1	....	....	....	2	....
17 Handling cargo	1	....	1	....	....	....	....	1	7	1	....	....	....	....	....	1	....	1	....	....	1	....	3
20 Fishing	8	....	....	....	....	....	....	....	9	....	1	1	....	....	....	....	....	1	....	....	....	....	....
1 Drills	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
24 Passenger	14	....	....	....	....	....	....	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
13 Other and unknown	1	....	....	....	....	....	....	....	3	....	1	3	1	....	....	....	1	2	....	....	....	....	1

COAST GUARD RULEMAKING
(Status as of 1 April 1975)

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
1972 PUBLIC HEARING							
Tailshaft inspection and drawing (67–71, 4–71)	3–1–72	3–27–72	4–3–72	X			
ANCHORAGE REGULATIONS							
Beverly and Salem Harbors, MA (CGD 74–189)	12–18–74		1–20–75			2–11–75	3–14–75
Los Angeles & Long Beach Harbors, CA (CGD 75–022)	2–4–75		3–7–75				
BOATING SAFETY							
Lifesaving devices on white water canoes & kayaks (CGD 74–159) comment period extended 4–22–75	2–4–75		5–31–75				
Safe loading and safe powering standards (CGD 73–250)	3–6–75		4–21–75				
Inboard safe loading standard (CGD 74–83)	3–6–75		4–21–75				
BRIDGE REGULATIONS							
Sacramento R: et al., CA (CGD 73–142)	5–24–74		7–2–74	X			
Cheesequake Ck., NJ (CGD 73–162)	8–10–73		9–11–73	X			
AIWW, Mile 342, Lauderdale By The Sea, FL (CGD 74–180)	8–7–74		9–6–74	X			
Stony Ck., MD (CGD 73–242)	10–12–73		11–20–73	X			
San Joaquin River, Georgiana Slough, Sacramento River, CA (CGD 73–142)	5–24–74		7–2–74			4–1–75	5–5–75
AIWW, Hillsboro Inlet, FL (CGD 74–22)	1–25–74		3–1–74	X			
Chesapeake & Del. Canal, Del. (CGD 74–72)	3–29–74		4–30–74	X			
New River, FL (CGD 74–114)	4–22–74		5–20–74	X			
Manatee River, FL (CGD 74–101)	4–22–74		5–20–74			3–10–75	4–14–75
Chicago River, IL (CGD 74–137)	6–3–74		7–16–74	X			
Columbia and Snake Rivers, WA (CGD 74–223)	9–20–74		10–22–74			2–4–75	3–7–75
Bayou Dularge, LA (CGD 74–234)	10–9–74		11–12–74	X			
Franklin Canal, LA (CGD 74–235)	10–9–74		11–12–74			3–10–75	4–14–75
AIWW, Hallandale, FL (CGD 74–257)	11–5–74		12 –5–74	X			
North Miami Beach, FL (CGD 75–013)	1–21–75		2–21–75	X			
Coney Island Creek, NY (CGD 74–300)	1–29–75		3–4–75	X			
Matanzas River, FL (CGD 75–024)	1–29–75		3–4–75	X			
Fox River, WI (CGD 75–035)	2–6–75		3–7–75	X			
Oklawaha River, FL (CGD 75–062)	3–27–75		4–29–75				
Mystic River, MA (CGD 75–053)	3–27–75		4–29–75				
West Palm Beach Canal, FL (CGD 75–070)	3–27–75		4–29–75				
Illinois River, IL (CGD 75–060)	4–1–75		5–6–75	X			
Kent Narrows, MD (CGD 75–081)	4–1–75		5–6–75	X			
Passaic River, NJ (CGD 75–052)	4–4–75		5–6–75	X			
Back Bay of Biloxi, MS (CGD 75–088)	4–30–75		6–10–75				
Lake Okeechobee, FL (CGD 75–076)	4–30–75		5–29–75				
Peace River, FL (CGD 75–086)	4–30–75		6–3–75				
Snake R. & Clearwater R., Lewiston ID & Clarkston, WA (CGD 75–099)	4–30–75		6–10–75				
HAZARDOUS MATERIALS							
Miscellaneous Dangerous Cargoes (CGD 72–182)	11–11–72	12–12–72	12–29–72	X			
Dangerous Cargo Regulations, miscellaneous (CGD 73–249)	1–16–74		3–4–74	X			
Sodium sulfide solution and sulfur dioxide (CGD 73–275)	7–16–74 Corrected 9–5–74		12–5–74	X			
Vinyl chloride (CGD 74–167); supplementary notice 9–19–74	7–23–74	8–15–74	9–6–74			4–16–75	7–16–75
Unmanned barges carrying certain bulk dangerous cargoes (CGD 74–275)	1–15–75		2–28–75	X			
Unslaked lime in bulk (CGD 74–225)	1–29–75	2–25–75	3–17–75	X			

Coast Guard Rulemaking—Continued

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

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

MERCHANT MARINE SAFETY PUBLICATIONS

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

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

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

CHANGES PUBLISHED DURING APRIL 1975

The following have been modified by Federal Registers:

CG–123, Federal Register of April 16, 1975.

CG–169, 172, & 184, Federal Registers of April 16 & 28, 1975.

CG–239 & 259, Federal Register of April 22, 1975.

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