

Proceedings

of the Marine Safety Council

Vol. 37, No. 8

December 1980



U.S. Department of Transportation
U.S. Coast Guard

CG-129

Proceedings

of the Marine Safety Council

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. All inquiries and requests for subscriptions should be addressed to Commandant (G-CMC/24), U.S. Coast Guard, Washington, DC 20593. 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. Use of funds for printing this publication has been approved by the Director of the Office of Management and Budget through May 31, 1984.

Admiral J. B. Hayes, USCG
Commandant

The Marine Safety Council of the
United States Coast Guard:

Rear Admiral Clifford F. DeWolf, USCG
Chief Counsel, Chairman

Rear Admiral Wayne E. Caldwell, USCG
Chief, Office of Marine Environment
and Systems, Member

Rear Admiral H. W. Parker, USCG
Chief, Office of Boating, Public, &
Consumer Affairs, Member

Rear Admiral H. H. Bell, USCG
Chief, Office of Merchant Marine Safety,
Member

Rear Admiral John D. Costello, USCG
Chief, Office of Operations, Member

Rear Admiral Donald C. Thompson, USCG
Chief, Office of Engineering, Member

Rear Admiral Richard A. Bauman, USCG
Chief, Office of Navigation, Member

Commander A. D. Utars
Executive Secretary

Julie Strickler
Editor

DIST. (SPL No. 112)

A: acde(2); fghiklmntuv(1)

B: n(50); e(16); e(5); f(4);

g(3); r(2); bklq(1)

C: eglnp(1)

D: adgklm(1)

E: mn(1)

F: abedehjklqst(1)

List TCG-06

Please pass this
magazine along
when you have
finished reading it.

Contents

features

Navigation and Vessel Inspection Circulars . . . 174

"Safe for workers" means "Safe for
marine inspectors" 162
by CDR Fred H. Halvorsen and
LT Thomas J. Haas

Statistics of Casualties 1979 166

departments

Maritime Sidelights 155

Keynotes 158

Marine Safety Council Membership 173

Chemical of the Month 176

Nautical Queries 178

Merchant Marine Safety Publications 179

cover

After a marine chemist has certified that it is safe for him to enter, a marine inspector checks the integrity of a tank. The marine inspector depends on the marine chemist and his expertise to ensure his own safety. To find out more about the relationship between these two men, see the article beginning on page 162.

Season's Greetings

As another year draws to a close, our hearts go out to the many friends and relatives of the Merchant Mariners who were aboard the M/V POET. May this sobering reminder that the sea still claims many lives serve to renew our dedication to the goal of safe voyages for all. May we also share the joy of those whose loved ones will be able to spend this and many holiday seasons at home with their families. The Marine Safety Council wishes you all health, hope, peace, and happiness during this holiday season.



CLIFFORD F. DEWOLF
Rear Admiral, U.S. Coast Guard
Chairman, Marine Safety Council

Maritime Sidelights

MarAd Opens New Fire Training Center in New Orleans

The Maritime Administration completed the third phase in its

plan to offer regional firefighting courses to seafarers throughout the country on November 19, 1980, with the dedication of its new Merchant Seaman Fire Training Center

at 13200 Old Gentilly Road in New Orleans.

MarAd, an agency of the Department of Commerce, in cooperation with the Navy's Military Sea-

lift Command, has been sponsoring marine firefighting facilities for several years. A facility was opened in Earle, New Jersey, in 1975, and MarAd signed a formal agreement in 1979 to send 1200 people a year to the facility at Treasure Island (San Francisco), California. A fourth facility, to serve the Great Lakes maritime community, is scheduled to open in Toledo, Ohio, next spring.

The New Orleans training center provides practical or "hands-on" instruction to all persons engaged in waterborne commerce, enabling them to meet proposed training requirements for certification or endorsement as U.S. merchant seamen. Classroom courses are prerequisites to the hands-on training. This instruction is provided at designated educational institutions in MarAd's Central Region, which embraces the Gulf Coast area and the Mississippi River basin.

Separate courses are offered in fighting fires aboard barges and merchant ships. The barge course requires 8 hours of classroom instruction and 8 hours of practical training at the New Orleans center, while the ship course requires 16 hours of instruction in each of the categories.

Bruce A. McAllister, deputy assistant secretary of commerce for maritime affairs, hailed the dedication as "significant" for the U.S. maritime industry "in its historic effort to safeguard the lives of seafarers and reduce the great loss in property due to fires at sea."

McAllister said fire losses have been increasing in merchant shipping throughout the world; shipboard fires in U.S.-flag vessels alone currently cause average property damage of \$75 million a year. In 1975, a MarAd study showed, 20 seafarers lost their lives in fires aboard U.S.-flag vessels. If nothing is done to stem the rise in casualties, McAllister said, indications are that dollar losses will rise to \$100 million and deaths will nearly double (to about 40) annually in the U.S. commercial fleet by the year 2000.

American Petroleum Institute Releases New Manual

The American Petroleum Insti-

tute has just released the "Manual of Petroleum Measurement Standards, Chapter 11.1--Volume Correction Factors." The manual, a collection of volume correction factor tables and related tables, is used worldwide in custody transfer and accounting operations to adjust bulk volumes of crude oil and products measured at temperatures other than base temperature.

The new edition is available in four formats: plasticized paper, magnetic tape, card deck, and microfiche. The 10 printed volumes may be purchased individually for \$45.00 each or as a full set for \$450.00. The magnetic tape, card deck, and microfiche are available only as full sets, with Volumes I-IX in the preferred mode and Volume X in paper, for \$450.00 per set.

Postage will be billed on each order. Orders may be placed with the American Petroleum Institute, Publications and Distribution Section, 2101 L Street NW, Washington, DC 20037. Questions about the tables and their use should be directed to Measurement Coordination, API, at (202) 457-7055.

(Reprinted from the *American Waterways Operators, Inc. "Weekly Letter"* of September 27, 1980, Volume XXXVII, No. 39)

New Law Revises Able Seaman Standards

On October 6, 1980, Congress passed a new law reducing the number of previously existing categories of Able Seaman within the Coast Guard's licensing and seaman's documentation structure from six to four. The new categories and their service requirements are as follows:

(1) Able Seaman--Any Waters, Unlimited. This is equivalent to the old endorsement and requires 3 years' service on deck on vessels operating on the oceans or the Great Lakes.

(2) Able Seaman--Limited. This incorporates Able Seaman--Great Lakes--18 months and requires 18 months' service on deck on vessels of 100 gross tons or over operating in a service not exclusively confined to the rivers and smaller inland lakes of the United States.

(3) Able Seaman--Special. This

incorporates Able Seaman--Any Waters--12 months, Able Seaman--Tugs and Towboats--Any Waters, Able Seaman--Bays and Sounds--12 months, vessels 500 gross tons or under not carrying passengers, and Able Seaman--Seagoing Barges--12 months and requires 12 months' service on deck on vessels operating on the oceans or the navigable waters of the United States, including the Great Lakes.

(4) Able Seaman--Special (OSV). This is a new category limited to service on offshore supply vessels and requires 6 months' service on deck on vessels operating on the oceans or the navigable waters of the United States, including the Great Lakes.

Individuals holding a merchant mariner's document with any of the old endorsements may, upon request, have the document endorsed to reflect the new standardized endorsements or may serve within the equivalent capacity noted above without further endorsement.

In addition to revising the categories, the statute's provisions reduce the minimum qualifying age for an Able Seaman's endorsement from 19 to 18.

Coast Guard May Get Fleet of Airships

The U.S. Coast Guard's familiar racing stripe may one day be seen on a fleet of modern blimps, if a research project proves that airships can be effective in patrol operations.

On April 30 the Coast Guard signed an agreement with the National Aeronautics and Space Administration to develop technology that could lead to an operational lighter-than-air machine by late in this decade or early in the 1990s.

According to Commander Kenneth Williams, chief of the Coast Guard's conservation and technology branch in Washington, DC, the service is looking for a vehicle that can be used in search and rescue, law enforcement, and other patrol functions.

Williams envisions a machine that would be two to three times larger than the Goodyear blimp and could carry 8 to 11 people. It would have a cruising speed of 50

to 60 knots, a maximum speed of 100 knots, a 2-day patrol range of 2,500 miles, and an altitude range of between 5,000 and 6,000 feet.

The craft would have to be able to take off and land vertically and hover in a small circle for rescue operations.

The Coast Guard has awarded a contract for development of a sub-scale prototype to the Naval Air Development Center. If the prototype is successful in its test missions, development of a full-scale model will proceed.

Coast Guard Publishes Consumer Program

The Coast Guard's final Consumer Program was published in the Federal Register on December 1, 1980, and is now available from U.S. Coast Guard Headquarters. The program was prepared in response to Executive Order 12160 and is designed to increase consumer/citizen participation in the review and development of rules, policies, and programs. "Consumer" is defined as one who uses or purchases marine products or marine transportation services. The Executive Order requires the agency to appoint an identifiable and accessible consumer affairs officer who will represent the consumer perspective, develop and distribute information materials for consumers, provide consumer affairs training for agency personnel, and develop systematic procedures for consumer complaint handling.

For further information contact: Commander Neal Mahan, Office of Boating, Public, and Consumer Affairs (G-BA), Room 4224, U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202) 426-1080. Office hours are from 6:30 a.m. to 5:00 p.m. Monday through Thursday.

Department of Transportation Establishes Fees for Yacht Documentation

On October 20, 1980, a final rule went into effect requiring yacht owners to pay a fee for documentation of yachts used exclusively for pleasure.

The Department of Transporta-

tion Fiscal Year 1981 Appropriation Act contains a provision prohibiting any funds provided by the Act from being used for expenses related to yacht documentation, except to the extent fees are collected from yacht owners.

The rule establishes a fee of \$75.00 for documenting a yacht and \$15.00 for the renewal of a document or endorsement of a change of master on the document. These figures were derived from the cost of documenting yachts during 1979.

Establishment of the above fees enables the Coast Guard to continue its documentation service. Federal documentation is not mandatory (yacht owners may obtain a certificate of number from a state boating authority), but documentation renders a vessel eligible for financing under the Ship Mortgage Act, thus making the vessel secured under it an attractive investment for lenders, affords greater protection for a vessel in many foreign ports, and offers a vessel marking system preferred by yacht owners. A vessel's document can be maintained even if the location of principal use changes from state to state.

Annual Boating Safety Seminar Set for Tampa

Representatives from national boating organizations, the boating industry, and the U.S. and Canadian governments as well as others interested in boating will meet March 10-12, 1981, in Tampa, Florida, to exchange ideas on boating education and safety.

The occasion is the Sixth Annual Boating Education Seminar, co-sponsored by the National Safe Boating Council, Inc. and the U.S. Coast Guard. This year's theme is "Handling Emergencies."

Six workshops are scheduled on such topics as fast-water rescue, rough-weather sailing and navigation, risk management, and fire and explosion prevention. In addition, the program will include time and space for participants to display the latest developments in boating education and safety.

The seminar will be held at the Admiral Benbow Inn, 1300 Westshore Boulevard, Tampa, Florida; (813) 879-1750. Anyone interested

in boating safety and education is invited and encouraged to attend. There will be a registration fee of \$35.00. Additional information may be obtained by contacting Lieutenant Commander William R. Ladd, U.S. Coast Guard Headquarters, 2100 Second Street SW, Washington, DC 20593; (202) 472-2373.

New Law Unifies Inland Navigational Rules

On December 24, 1980, the President signed into law a bill passed by Congress to unify the rules for preventing collisions on the inland waters of the United States.

The various sets of Rules of the Road (previously, seven sets of rules governed the navigation of vessels on the Inland Waters, Great Lakes, and Western Rivers of the United States) have not undergone comprehensive revision since 1895. Attempts to consolidate the rules date back to 1964. When it became evident in the late 1960s that a new set of international rules was in the offing, action on the inland rules was deferred.

Following the adoption of the Convention on the International Regulations for Preventing Collisions at Sea, 1972, the Coast Guard assigned the task of developing proposed revisions to its Rules of the Road Advisory Committee, a body representing a cross-section of maritime interests that used, or were familiar with, the United States' various inland waterway systems. The new rules, which are based on that committee's recommendations, were written to conform as closely as possible to the international regulations.

The new law will go into effect one year after enactment. More detailed information on the new rules will be published in a future issue of the Proceedings. *J*





Since our readership increases every month, some of our new readers might not be familiar with the process of rulemaking or some of the terms used to describe regulations in their various stages of development. We would like, therefore, to preface this month's edition of the Keynotes with the following "layman's guide":

THE COAST GUARD PROCESS FOR PROMULGATING REGULATIONS

The process by which the Coast Guard promulgates regulations is slow and methodical. Each proposal is reviewed, opened for public comment, and discussed and reviewed again before becoming final.

There are three identifiable stages in this process: the conceptual stage, the proposal stage, and the final rule stage.

The impetus for the regulation can come from various sources: public awareness of a problem area, a Presidential directive, a statute calling for regulations (such as the Port and Tanker Safety Act of 1978) or, most sadly, a maritime casualty.

Once the need for corrective action is demonstrated, a project manager is selected at Coast Guard Headquarters. The project manager examines the problem and looks at alternative solutions. He decides whether a regulation is the proper solution or whether some other answer might be more appropriate. Most problems which come to the Coast Guard for consideration are handled in some other way than by regulation. If a regulation seems to be the best answer, however, the project manager develops a work plan.

The project manager sets forth the following points in his work plan: 1) the need for the regulation--i.e., what prompted the regulatory activity; 2) the objectives to be accomplished and the means of accomplishment, stated as explicitly as possible; 3) the alternatives considered and the various impacts the proposed alternatives will have on the economy, the en-

vironment, small businesses, the cities, local governments, consumers, the regulated parties, and the general public; 4) the major problems or issues expected to be encountered in preparing the regulation; 5) the authority for the regulation; 6) how the public input will be accommodated; and 7) recommended priority and proposed timetables for preparation.

The work plan is given a preliminary and legal review to determine whether there appears to be statutory authority to carry out the proposal; it is then reviewed by the officials responsible for the program area concerned. When the program director of the regulation--a Coast Guard admiral--is satisfied that there is a need for the regulation and that the proposal is the best of the available alternatives, the work plan is submitted to the Marine Safety Council for consideration.

The Marine Safety Council consists of seven admirals and is chaired by the Chief Counsel. Included on the Council are the program directors responsible for the major regulatory areas--Merchant Marine Safety, Marine Environmental Protection, Boating, Public, and Consumer Affairs, and the other offices which have an interest in regulations development.

The Marine Safety Council reviews all the factors considered in the work plan. Each member brings to bear the expertise of his staff and the particular concern of his office. Only when the Council is convinced that a genuine need for the regulation exists and that the concept represents the best available alternative in terms of accomplishing the desired objectives does it give its approval to proceed with the project.

If the proposal involves a significant regulation, the work plan must receive the Commandant's approval and eventually be reviewed by the Secretary of Transportation and his staff. A significant regulation is one which will have extensive economic impact, usually on the order of \$100 million or more, or otherwise

be of substantial public interest.

Once a work plan is approved, the second stage of the regulatory process begins: the preparation of a proposal. A project team is assigned for this task, and a docket is opened. The project team usually consists of the project manager and a project counsel, although in more complex projects additional individuals also participate.

The first task of the project team is to draft proposed regulations which would apply to the area of concern. The proposal may take two forms: an advance notice of proposed rulemaking (ANPRM) or a notice of proposed rulemaking (NPRM). An advance notice of proposed rulemaking is usually a tentative suggestion of possible approaches which might be taken in regulating an area of concern. Even though detailed specific proposals may be made at this step, an advance notice of proposed rulemaking is published solely to generate more informed comment regarding a specific issue. All comments received are carefully reviewed to determine whether there is sufficient cause and justification to proceed with further rulemaking. A notice of proposed rulemaking is published in lieu of an advance notice when the Coast Guard has a good idea of how the final rule should be stated.

There are various administrative laws and regulations which set forth the regulatory procedure that must be followed in preparing regulatory proposals. Basically, these laws and regulations say that the public must normally be given the opportunity to comment before a regulation can be made final and effective. There are very few exceptions to this rule.

Once the regulatory proposal is completed by the project team, it is sent out for internal Coast Guard clearance. Interested parties are given an opportunity to review and revise the proposal before it is published. When all required clearances have been received, the appropriate Coast Guard officer signs the proposal and it is printed in the Federal Register for public comment.

Because most people do not follow the daily Federal Register, the Coast Guard also publishes notice of regulatory actions in the Keynotes section of the Proceedings. By doing this, the Coast Guard is able to reach many more interested parties than it would if it adhered only to the requirement to publish in the Federal Register.

The comment period is a most important one. Parties view the proposed regulation for the first time and can tell the Coast Guard what they think. Responsive comment by the public, particularly by affected parties, is necessary if the final product is to be an effective, meaningful regulation. Comments are usually in the form of a written response to the proposal published in the Federal Register; however, public hearings may also be held to allow oral comments to be presented.

After comments have been received, they are analyzed in detail by the project team. After all applicable inputs have been reviewed and considered, the next stage is entered.

If the proposal was an advance notice of proposed rulemaking, a notice of proposed rulemaking is drafted. If the proposal was a notice of proposed rulemaking, a final rule is prepared. If a notice of proposed rulemaking receives sufficient negative comment, however, the Coast Guard may withdraw the proposal entirely or may amend the notice so extensively that another notice will be published and more public comment solicited. Most regulations are published first as notices of proposed rulemaking and then as final rules.

Once the final rule is prepared, it goes through the same screening process as the notice. It is more closely scrutinized during the review, however. All input in response to a notice of proposed rulemaking is seriously considered.

Once a final rule is signed by the Commandant or other appropriate official, the final regulation is published in the Federal Register. It should be noted that the project team drafts a preamble to accompany the regulation. In the preamble, the comments received after publication of a notice are discussed. It explains why some parts of the regulation were changed and

why some were not. The thoughts and policy behind the regulation will be explained. It is a good idea to retain this part of the Federal Register, as this information will not be published in the Code of Federal Regulations.

Usually, the regulation will become effective thirty days after publication.

That is the regulatory process in a nutshell. The public should become familiar with the advance notice and notice stages and their respective comment periods. It cannot be emphasized too much: the greater the involvement of industry and other interested members of the public, the better the regulation that will be produced.

The following were published between October 21, 1980, and December 8, 1980:

Final rules: CGD 79-148 Electronic Relative Motion Analyzer (correction), October 30, 1980. CGD 78-041b Puget Sound VTS (correction), November 10, 1980. CGD 76-170a Casualty Reporting Requirements and CGD 75-170 Casualty Reporting Requirements (interim rule), November 24, 1980.

Proposed rules: CGD 78-027 Manning of Vessels, October 27, 1980. CGD 78-121 Aluminum Hatch Covers, October 27, 1980. CGD 76-193a Radar Observer Endorsement, November 6, 1980. CGD 79-081b Manning Levels for Foreign Tank Vessels, November 17, 1980 (see pertinent section of the Keynotes). CGD 77-084 Licensing of Pilots, November 28, 1980, corrected December 8, 1980 (see pertinent section of the Keynotes).

Notices: CGD 80-130 Omega Radionavigation System Change, November 6, 1980. CGD 80-062 Coast Guard Consumer Program, November 28, 1980.

Any questions regarding regulatory dockets should be directed to Commander A. D. Utara (G-CMC), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202) 426-1477.

* * *

Revision of Electrical Regulations CGD 74-125(A)

This regulation will constitute a general revision and updating of the electrical regulations to conform with the latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is necessary because industrial standards for electrical engineering have changed in the past few years and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on June 27, 1977 (42 FR 32700). A supplemental NPRM was published as CGD 74-125A on March 3, 1980 (Part VII).

New Tank Barge Construction CGD 75-083 Upgrade of Existing Tank Barge Construction CGD 75-083a

This action comprises two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of March 17, 1977, directing a study of the tank barge pollution problem. One project will address new barge construction, while the other will pertain to existing barges. Joint public hearings were held, and regulatory documents for both will be published at the same time.

In July 1977 the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An ANPRM was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction, withdrawing the prior NPRM, and the ANPRM for existing tank barges were published as part VI of the Federal Register of June 14, 1979 (44 FR 34440 and 44 FR 34443, respectively).

Public hearings on the dockets were held as follows: August 2, 1979, Washington, DC; August 15, 1979, Seattle, Washington; August 23, 1979, New Orleans, Louisiana; September 5, 1979, Washington, DC; and September 7, 1979, St.

Louis, Missouri. The comments made at the hearings have been incorporated in the docket.

On Thursday, November 8, 1979, a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to December 1, 1979.

A Supplementary Notice was published as Part III of the Federal Register of March 13, 1980 (44 FR 16438). This notice informs the public of a deferment in the rule-making process for these dockets. The comments received have raised significant questions concerning these proposals. It was decided that the entire tank barge pollution problem warranted a carefully considered study by a recognized independent body. The National Academy of Sciences/National Research Council will conduct the study. Part of the study, a two-day workshop, took place April 15 and 16, 1980. The study will be completed by the end of January 1981. The Coast Guard will defer any further rulemaking on these proposals until completion of the study, and the dates in the proposals of June 14, 1979, are no longer valid. If the Coast Guard should pursue further action on these proposals, a new timetable will have to be developed.

Anyone wishing to obtain copies of the rulemaking may do so by contacting Commander A. D. Utara, Marine Safety Council (address is given in the introduction to the Keynotes section).

**Pollution Prevention,
Vessels and Oil Transfer
Regulations
CGD 75-124a**

This regulation will reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

An NPRM was published on June

27, 1977 (42 FR 32670), and a supplemental NPRM was published on October 27, 1977 (42 FR 56625). Because of substantive changes in the regulation, there is currently no scheduled publication date for the final rule.

**Segregated Ballast and
Tank Cleaning Regulations
CGD 77-058(b)**

This regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards which would include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations were changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published on May 16, 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on February 12, 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, California; 265 comments were received on the docket and analyzed. The final rules were published on June 30, 1980.

**Construction and Equipment
Existing Self-propelled
Vessels Carrying Bulk
Liquefied Gases
CGD 77-069**

These regulations will amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk" adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Because of its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979, and an NPRM on these regulations is anticipated in

April 1981.

**Licensing of Pilots
CGD 77-084**

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal will require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. The NPRM was published on November 28, 1980 (45 FR 79258), and corrected on December 8, 1980 (45 FR 80843). A calendar of scheduled public hearings appears at the end of the Keynotes.

**Revision of 48 CFR 157.20-5
Division into Three Watch
Regulation
CGD 78-037**

This revision will require an adjustment in vessel manning requirements to bring them into line with current legislation. It will change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 has been deferred pending legislative action in Congress.

**Tank Vessel Operations--
Puget Sound
CGD 76-041**

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day interim rule on March 14, 1978, prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in

the Federal Register of March 23, 1978 (43 FR 12257). An ANPRM was published on March 27, 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled for June 11 and 12 in Seattle, Washington, June 13 in Mt. Vernon, Washington, and June 14 in Port Angeles, Washington, have been completed, and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published on June 21, 1979 (44 FR 36174). This extension became effective July 1 and will be in effect until the Coast Guard prints notice of its cancellation. A supplemental NPRM was published on July 21, 1980 (45 FR 48827). Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in December 1981.

**Personnel Job Safety
Requirements for Fixed
Installations on the
Outer Continental Shelf
CGD 79-077**

This regulation is concerned with the health and safety requirements for installations engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf (OCS) legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade.

**Qualifications of the
Person in Charge of
Oil Transfer Operations,
Tankerman Requirements
CGD 79-116 and 79-116A**

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

It has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting sub-

stances should be specified.

New NPRMs have been approved by the Secretary of Transportation and will be published in mid-December 1980. A calendar of scheduled public hearings appears at the end of the Keynotes.

**Shipboard Noise
Abatement Standards
CGD 79-134**

These standards will establish acceptable sound levels for each of the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, specify acceptable methods of compliance, and establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California, was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, study the data obtained, and define the extent of the noise problem. NOSC was asked to use this data and other information available to recommend a set of noise levels to be included in the proposed standards for the control and/or elimination of the shipboard noise problem.

This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267, and 405.

**Personnel and Manning
Standards for
Foreign Vessels
CGD 79-081(B)**

This regulation, deemed necessary to reduce the probability of oil spills, will establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It will also establish procedures for the verification of training, qualification, and watch-keeping standards. An NPRM was published in the Federal Register on November 17, 1980 (45 FR 75712).

**Personnel Safety and Health
Requirements for
Industrial Vessels
CGD 80-15**

This regulation is similar to CGD 79-077 and covers vessels engaged in exploration, supply, and support on the Outer Continental Shelf (OCS). Inasmuch as the safety of the workers on construction vessels will be covered largely by CGD 79-065, Marine Personnel Safety Standards, this project has been withdrawn.

* * *

A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Monday, August 25, 1980 Federal Register (45 FR 56538).

**ANY COMPANIES OR
INDIVIDUALS WISHING TO SPEAK
AT PUBLIC HEARINGS SHOULD
CONTACT LIEUTENANT DONALD
M. JOHNSON, JR., (G-CMC), U.S.
COAST GUARD HEADQUARTERS,
2100 SECOND ST. SW,
WASHINGTON, DC 20593; (202)
426-1477. THE COAST GUARD
HAS SCHEDULED THE
FOLLOWING PUBLIC HEARINGS
(ALL HEARINGS BEGIN AT 10:00
A.M.):**

JANUARY 1981

- 14: CGD 77-084 Licensing of
Pilots
Bond Court Hotel (Ritz
Room)
777 St. Clair
Cleveland, Ohio
- 21: CGD 79-116 and 79-116A
Qualifications of the Per-
son in Charge of Oil
Transfer Operations,
Tankerman Requirements
Holiday Inn Downtown
(Rooms 1 and 2)
2211 Market Street
St. Louis, Missouri

(Continued on page 165)

"Safe for workers" means "Safe for marine inspectors"

by

CDR Fred H. Halvorsen
Chief, Marine Safety School
U.S. Coast Guard Reserve Training Center
Yorktown, Virginia

LT Thomas J. Haas
Chief, Hazard Evaluation Branch
U.S. Coast Guard Headquarters
Washington, DC

In his article "The Marine Chemist and the Marine Safety Inspector" (*Proceedings of the Marine Safety Council*, Vol. 33, No. 4, April 1976, pp. 70-72), then Lieutenant Commander Fred H. Halvorsen pointed out that the importance the U.S. Coast Guard attaches to the marine chemists' expertise, knowledge, and experience is best illustrated by the fact that their inspection services are required by regulation. Commander John E. Lindak continued the theme in "Upgrading the Marine Chemist Program" (*Proceedings of the Marine Safety Council*, Vol. 35, No. 7, October 1978, pp. 100-102), where he discussed regulatory developments affecting National Fire Protection Association (NFPA) marine chemists and Coast Guard marine inspectors and further described improvements in the marine chemist program. The following article, adapted from a paper presented by Commander Halvorsen and Lieutenant Haas at the Twenty-Second Annual Marine Chemists' Association Seminar held in Boston, Massachusetts, July 13 - 16, 1980, is the third in the series. It focuses on the marine safety inspector's perception of the role played by the marine chemist and treatment of that role in safety courses for Coast Guard marine inspectors.

The Marine Chemist

Briefly put, the role of the marine chemist, as perceived by a Coast Guard safety inspector, is to evaluate and eliminate health, explosion, and fire hazards in marine industries. The chemist's job can be broken down into three areas: hazard identification, hazard evaluation, and hazard control.

Hazard Identification

There are certain hazards inherent in the maritime work environment that must be recognized, especially in confined space entry. Marine chemists, Coast Guard marine inspectors, and ship and shipyard workers are only a few of the individuals required to enter cargo tanks, void spaces, cofferdams, and pump rooms to carry out their duties.

The hazards associated with these operations include:

- (1) oxygen deficiency;

- (2) acute/chronic toxicity; and

- (3) flammable/explosive atmospheres.

An atmosphere containing less than 16 percent oxygen is considered immediately dangerous to life (normal air contains 21 percent oxygen), and an atmosphere containing 16 to 19.5 percent oxygen is marginally supportive of human life. Variables such as the person's activity in the confined space, his age, weight, state of health, and his smoking habits may well determine the individual's ability to work and survive in an atmosphere with less than 21 percent oxygen without protective respiratory equipment.

A confined space can become oxygen-deficient in several ways:

- (1) Oxygen in confined spaces may be depleted if corrosion is taking place.

- (2) Spaces may be inerted. The oxygen that may have been present prior to inerting is replaced by the inerting gas. Inerting can be provided by a flue gas scrubber, an inert gas generator, or a nitrogen tank.

- (3) Certain cargoes or residues of cargoes, such as scrap iron, fresh fruit, molasses, and various drying oils, absorb oxygen. The tanks then may not contain sufficient oxygen to support life.

- (4) Tanks which have been coated with preservatives or other materials require oxygen for the curing process and thus deplete the oxygen supply.

Toxic vapors in tanks and spaces may result in immediate death or injury; this is referred to as acute toxicity. High concentrations of toxic vapors are immediately dangerous to life, and one breath of some vapors could render a person helpless instantly. Even after the cargo is completely offloaded, the residue left in the tank may vaporize, causing high airborne concentrations of the cargo.

Many toxic cargoes in low vapor concentrations may not have an immediate effect. Repeated exposure to low concentrations of certain chemical vapors may produce harmful effects that will not become apparent for years afterward. This is termed chronic toxicity. Exposure to certain chemicals may lead to cancer. Exposure to vinyl chloride, for example, may lead to liver cancer; exposure to benzene vapors may lead to leukemia.

A tank atmosphere that is extremely flammable may yet contain sufficient oxygen and not be toxic. The hazard in this case is the possibility of fire and explosion; the tank is considered to be "safe for

workers--not safe for hot work." If the atmosphere of the tank is within the flammability limits of the chemical vapor in question, the tank may be entered; extreme caution must then be exercised. The tank should be ventilated until the vapor concentrations are well below the lower explosive level (LEL). Ten percent below the LEL is the recommended level.

Hazard Evaluation

The marine chemist is perceived as being the leading expert in this area. The coastguardsman assumes that when a certificate is placed on a confined space and it states "safe for workers," IT IS. He also assumes that if the marine chemist's present equipment or techniques are insufficient, he will quickly improve them or will not certify the confined space as safe.

To evaluate the total magnitude of the environmental factors and stresses existing in a confined space, appropriate instruments must be used to measure the hazards. Sampling is performed to identify contaminants present and their sources, determine the amount of worker exposure, and measure the effectiveness of controls installed to minimize exposure.

The type of monitoring instrument used depends on the strategy employed. Samples may be taken to obtain an area average concentration or may be taken at breathing zones to obtain a worker exposure concentration. The chemicals to be monitored, the duration of sampling, and the type of standards to which the result will be compared will determine the choice of instrument. There are two basic types of monitoring instruments, real-time and continuous. The first type, real-time--also called short-time or grab--, employs a glass syringe, hand-held pump, or squeeze bulb to draw a sample through impregnated filter paper, or a gas detection tube. Direct reading instruments (electronic sensors) also yield short-time readings. The second type, continuous--also called long-term--, employs bubblers with reactive or absorbing solutions, adsorption tubes, or slowly reacting gas detection tubes. An air sample is slowly drawn through the bed of adsorption tubes filled with silica gel or charcoal to "trap" the chemical of interest.

After the sampling has continued for a specific period of time, the collected material is desorbed and channeled through an analytical instrument such as a gas chromatograph, infrared analyzer, or other device yielding quantitative results. Additionally, qualitative detection of some gases and vapors may be obtained by indicator badges designed to be worn on the individual. These badges either change color upon exposure to the substance or can be subsequently analyzed in a laboratory. The radiation badge used in hospital X-ray rooms was a prototype for these gas and vapor badges.

Another relatively new method of monitoring toxic gases uses chemically impregnated paper tapes which carry color-producing reagents on an almost completely dry strip of filter paper to conduct spot testing. Continuous monitoring may be performed by pulling the impregnated paper tape through an optics block (after a metered sample of gas has been drawn over it) to read the concentration of the detected gas.

Once an evaluation has been performed, a comparison with certain standards is made to ascertain safe-

ty. Regulations such as those of the Coast Guard and OSHA, NEPA 306, and the Threshold Limit Values guide are among the standards usually relied upon. The Coast Guard marine safety inspector expects all standards to have been met before the chemist issues his certificate.

One thing must be said generally about detection instrumentation: there is no one instrument which can measure every substance of interest. Each instrument has inherent limitations (i.e., calibration, cost, and the analytical methodology employed). Also, the work practice, the precision necessary to make a comparison with a standard, and time, among other factors, must always be taken into account when a device is being selected.

Hazard Control

The Coast Guard marine safety inspector probably relies more on the marine chemist's certificate than any other control measure to ensure his own safety and health. With this in mind, the marine chemist can understand why the coastguardsman may question him, sometimes to an extreme, if there is any doubt regarding the condition of an enclosed space or an ambiguous certificate. He is not trying to "hassle" the marine chemist; in most cases, he is interested in his own safety.

Corrective measures, when necessary to protect health and safety, are based on the marine chemist's experience, knowledge, and corrected quantitative data and are aimed at eliminating, controlling, or reducing the hazards identified.

Marine chemists, the Coast Guard, and the maritime industry have three general means of control: engineering, administration, and personnel protection.

The classical industrial-hygiene means of engineering control include:

(1) Substitution--toxic material, equipment, or processes that create hazardous exposure can often be replaced to reduce the exposure potential;

(2) Isolation--a material, process, or operation can be isolated physically to eliminate or reduce hazardous exposure;

(3) Enclosure--an entire process or portion can be enclosed to prevent the release of contaminants into the working environment;

(4) Local exhaust ventilation--toxic substances released into a work area can be effectively controlled by means of exhaust ventilation applied at a point as close to the source of emission as possible;

(5) Dilute ventilation--ventilation can be provided to dilute low-toxicity solvent vapors;

(6) Wet method--water can be added to reduce dusting when friable material is handled and the water does not interfere with the process.

A vapor control seminar was jointly sponsored by the Coast Guard and the Environmental Protection Agency in December 1978. It provided a forum for an exchange of technical ideas regarding the effectiveness and safety of vapor recovery applied to barges and tankships. For some cargoes with special hazards, the following engineering controls are being contemplated.

(1) Requiring cargo tank segregation from the sea;

(2) Changing present gauging requirements from open to closed;

(3) Requiring B/3 vent heights or vent heights of three meters, whichever is greater, for tankships;

(4) Requiring 3.6-meter vent heights for tank barges; and

(5) Purging cargo lines with water or an inert gas prior to disconnecting.

Administrative controls include:

(1) Limiting the number of people in a work area;

(2) Limiting the number of hours spent performing a single function;

(3) Good housekeeping; and

(4) Training.

Use of the marine chemist's certificate (an additional administrative control) can minimize both acute and chronic hazards found in confined spaces.

Personnel protection includes:

(1) The wearing of protective clothing, gloves, hard hats, and shoes; and

(2) The use of respirators:

(a) emergency escape breathing apparatus;

(b) self-contained breathing apparatus; and

(c) intermediate levels of respiratory protection (i.e., filters, half- and full-mask devices).

The marine chemist's certificate is in itself an important administrative control, as stated above, but it can also include important engineering control recommendations, such as ventilation to be employed to minimize or eliminate hazards. Personnel protective equipment recommendations may also be included where appropriate. The coastguardsman expects the engineering and personnel protection controls on the certificate along with all appropriate signatures and a recertification in 24 hours, if necessary.

The Coastguardsman

The formal training of Coast Guard Marine Safety personnel is undertaken at the Marine Safety School, U.S. Coast Guard Reserve Training Center, Yorktown, Virginia. Both officers and petty officers are given introductory, intermediate, and some advanced level training at Yorktown in all aspects of their assignments over the span of their marine safety careers. Less formalized training and on-the-job training is given on a continuous basis at each field office.

MESPOC

At the Marine Safety School, introductory training for petty officers is given in the five-week Marine Environment and Systems Petty Officer Course (MESPOC). The petty officer is given a basic introduction to regulations, Coast Guard policy and practices, pollution response, and basic personal safety. Basic personal safety includes a definition of hazardous respiratory environments, such as oxygen deficiency or the presence of flammable and/or toxic vapors. The petty officer is also introduced to vapor and gas measuring devices. The primary emphasis of the course is personal safety when boarding vessels and especially when entering pumprooms on petroleum tank vessels. Introductory training is also given in the area of emergency response to discharges of oil and

hazardous substances; this section includes contact protection (protective clothing), vapor/gas hazards, and measurement devices.

MSBIC

Introductory training for junior and mid-grade officers and a few specially selected senior petty officers is given in a 12-week resident course, the Marine Safety Basic Indoctrination Course (MSBIC). This course covers all aspects of the Coast Guard's Marine Safety Program and emphasizes commercial vessel inspection, port safety and law enforcement, and oil pollution and hazardous substance response. Basic personal safety information is included throughout the course, but the emphasis is on safe entry into below-decks spaces during routine Coast Guard biennial commercial ship and barge inspections. An introduction to emergency response is also given, including the subjects of respiratory protection, contact protection, and measurement devices. For MSBIC students, entry into below-decks spaces is covered in approximately three hours of lectures. The student is introduced to the NFPA 306 Standard, the OSHA 29 CFR 1915 Standard, and Coast Guard policy regarding the use of these standards. The personal safety aspects of the standards are emphasized. The point is made that the OSHA tank entry standards are applicable to Coast Guard marine inspectors working in a shipyard environment, i.e., the OSHA competent person can certify a space as safe if the tank last contained flammable or combustible vapors or is a potentially oxygen-deficient environment. As indicated by 29 CFR 1915(b), the competent person cannot certify a space as safe for entry if the tank last contained corrosives or toxic materials.

For hot work, the marine inspector is made cognizant of the fact that only an NFPA-certified marine chemist can make the determination that hot work can be done safely under both the requirements of 29 CFR 1915 and the NFPA 306 Standard (46 CFR 35.01) adopted (by reference) by the Coast Guard. The marine inspector is made aware of the fact that the NFPA marine chemist can be replaced in only two instances:

(1) If, in a port area under Coast Guard jurisdiction (nominally a U.S. port), the services of a marine chemist are not reasonably available, the Coast Guard Officer in Charge, Marine Inspection, can select an individual to function in the stead of a marine chemist on a one-time basis only. This is done only on an extremely limited basis. The authors are aware of this being done on a routine basis only in Alaska, where competent persons are routinely permitted to function as marine chemists under 46 CFR 35.01-1(c)(1).

(2) Under 46 CFR 35.01-1(c)(2), a marine chemist can be replaced at sea, and the senior officer present can certify a tank as gas-free.

Coast Guard policy regarding the proper receipt and signature of a responsible shipyard employee is also discussed. Basically, if a shipyard representative does not countersign and acknowledge receipt of the marine chemist's certificate, the certificate is not acceptable. During this three-hour period, the marine inspector is apprised of the fact that the historical function of a marine chemist was to limit or prevent

fire and explosion on tank vessels carrying combustible and flammable liquids. The Coast Guard, however, has come to depend on the marine chemist to provide toxicological testing in a confined space a marine inspector may have to enter. It is thus incumbent on Coast Guard personnel to be vitally aware of, and concerned with, the marine chemist's duties and responsibilities. The point is emphasized that it is best for the inspector to make his inspection as soon after the tank is certified gas-free as possible. During the period, three accidents are discussed at length with the students. The first accident involves the death of a Coast Guard warrant officer in a below-decks space in 1974. This death was caused by simple oxygen deficiency in a confined space. There was not a current marine chemist's certificate on the barge, nor had a competent person checked the space prior to entry. The second accident discussed is the 1975 Greenville accident, where a marine chemist and three shipyard workers died in a barge explosion while doing hot work. The third accident occurred while hot work was being performed on a barge containing crude oil residues. Neither a marine chemist nor a competent person had checked the barge, and the resultant explosion killed two, injured ten, and caused over \$1 million damage.

HCTC

More advanced training of officers and petty officers in all aspects of the transportation of hazardous materials is given in the three-week Hazardous Chemicals Training Course (HCTC). In the area of marine chemist information, the OSHA and NEPA standards and designations are reviewed and discussed. Additionally, about six hours are spent discussing general chemical hazards, (including vapor-liquid equilibria), basic toxicology, specialized emergency response techniques, and the use of protective equipment. Hands-on training is given with vapor/gas measuring devices, protective clothing, and various types of respirators. Students are also taught the basics of

respirator selection and care and maintenance of respirators and detection/measurement devices.

Conclusions

The purpose of this article was to establish and strengthen the professional relationship between the Coast Guard marine inspector and the NEPA marine chemist. On the Coast Guard side, it has been recommended at the Marine Safety School in Yorktown that the local Coast Guard Marine Inspection Offices invite the marine chemists who practice in their areas to speak to a meeting of Coast Guard personnel. Traditionally, a bimonthly "payday" meeting is held at Marine Safety Offices, and guest speakers are often invited to address the assembled group. At this meeting, the marine chemist could explain his testing procedure, demonstrate the use of his test apparatus, discuss what is entailed in a "Safe for workers" or "Safe for hot work" designation, review the conditions he insists upon before he will issue a gas-free certificate, and discuss the various operations in the area.

The Coast Guard also recommends that its personnel make an attempt to view the marine chemist during an actual inspection. The idea is not to judge the adequacy of the inspection, but merely to see what the marine chemist does. If Coast Guard personnel have questions regarding the inspection, they are encouraged to ask them. Questions by Coast Guard personnel should be regarded as curiosity rather than as an indictment of the marine chemist's methods.

Insofar as action by the marine chemist is concerned, the Coast Guard recommends that marine chemists plan to routinely meet with Coast Guard personnel to discuss methods, techniques, and inspections. If a marine chemist meets Coast Guard personnel in the field, the Coast Guard recommends that he introduce himself and explain what he is doing. Any information is appreciated--personal safety is a topic everyone is interested in.

Keynotes (from page 161)

- 27: CGD 77-084 Licensing of
Pilots
Nassif Building (DOT)
(Room 2232)
7th & D Streets SW
Washington, DC

- 4: CGD 79-116 and 79-116A
Qualifications of the
Person in Charge of Oil
Transfer Operations,
Tankerman Requirements
International Hotel
(French Room)
300 Canal Street
New Orleans, Louisiana

- 18: CGD 79-116 and 79-116A
Qualifications of the
Person in Charge of Oil
Transfer Operations,
Tankerman Requirements
Queen Mary Hotel (King's
Grill)
Pier J
Long Beach, California

FEBRUARY 1981

- 3: CGD 77-084 Licensing of
Pilots
International Hotel
(French Room)
300 Canal Street
New Orleans, Louisiana

- 10: CGD 77-084 Licensing of
Pilots
Holiday Inn Financial Dis-
trict (Lotus Room)
750 Kearny Street
San Francisco, California

- 25: CGD 79-116 and 79-116A
Qualifications of the
Person in Charge of Oil
Transfer Operations,
Tankerman Requirements
Nassif Building (DOT)
(Room 2232)
7th and D Streets SW
Washington, DC

Statistics of Casualties 1979

The U.S. Coast Guard annually presents a statistical summary of commercial vessel casualties that were investigated by Coast Guard marine inspectors during the previous fiscal year. The public, industry, and the Coast Guard have used the findings of these investigations to establish standards and determine the need for legislation to improve the protection of safety of life and property at sea.

The master of a vessel is required by law to report a marine casualty as soon as possible after its occurrence to the Coast Guard Officer in Charge, Marine Inspection. Casualties involving commercial vessels are required to be reported to the Coast Guard whenever the casualty results in any of the following:

- (a) actual physical damage to property in excess of \$1,500;
- (b) material damage affecting the seaworthiness or efficiency of a vessel;
- (c) stranding or grounding (with or without damage);
- (d) loss of life;
- (e) injury causing any person to remain incapacitated for a period in excess of 72 hours, except injury

to harbor workers not resulting in death and not resulting from vessel casualty or vessel equipment casualty.

The statistical summary on the following pages represents casualties to commercial vessels which meet the above criteria. It is important to note that the summary represents casualties reported to Coast Guard Headquarters in fiscal year 1979, which ended September 30, 1979. Statistics concerning noncommercial recreation boating accidents will be published separately in a future issue of the Proceedings.

This summary also includes those casualties serious enough by reason of dollar damage or death/injury to personnel to warrant the convening of a Marine Board of Investigation (specifically, the collision between the USCG CUYA-HOGA and the Argentine M/V SANTA CRUZ on Chesapeake Bay, which resulted in the loss of 11 lives).

Every event involving a vessel or her personnel which meets any of the conditions of a reportable casualty is of great concern to the Coast Guard. A number of report-

able casualties are not investigated by the Coast Guard each year simply because they are not reported. Thus it is of primary importance that the masters of all vessels ensure that all casualties are reported and investigated. With the cooperation of the masters, owners, and agents of commercial vessels, many of the unreported casualties can be investigated.

This statistical tabulation is intended to summarize the casualty experience for the entire commercial fleet. Because this summary is so all-encompassing, the use of the statistics may lead to erroneous conclusions unless the limitations of the data are well understood.

The Information and Analysis Staff of the Office of Merchant Marine Safety will gladly assist in quantifying those limitations for each specific need. Comments and recommendations for changes or improvements to these statistics should be addressed to the Commandant (G-MA/16), U.S. Coast Guard, Washington, DC 20593.

Casualties to Commercial Vessels

October 1, 1976, to September 30, 1979

Partial Year 1978

	Collisions crossing, meeting and overtaking	Collisions while moored, docking, or undocking	Collision, fog	Collisions with dams and bridges	Collisions all others	Explosion and/or fire—cargo	Explosion and/or fire—vessel's fuel	Explosion and/or fire—pressure vessel, boiler	Explosion and/or fire—structure, equipment, all others	Grounding with damage to vessel	Grounding without damage to vessel	Foundering, capsizing, and floodings	Heavy weather damage	Cargo damage	Material failure—structure and equipment	Material failure—machinery and engineering equipment	Casualty not otherwise classified	Total
Number of casualties	337	313	10	650	371	4	9	7	189	450	755	547	1	1	333	540	157	4465
Number of vessels involved	1203	893	26	1280	633	4	13	7	207	722	1282	673	1	3	359	547	506	8159
Number of inspected vessels involved	295	256	8	385	222	3	13	7	50	301	430	76	1	2	216	229	83	2464
Number of uninspected vessels involved	918	637	18	895	411	1	13	13	157	521	852	597	1	1	143	318	423	5695
PRIMARY CAUSE																		
Personnel fault:																		
Pilot—State	17	19	.....	34	4	.....	.....	.....	.....	8	54	2	.....	.....	.....	.....	1	139
Pilot—Federal	4	3	.....	26	3	.....	.....	.....	.....	10	22	1	.....	.....	.....	.....	.....	69
Licensed officer—Unlicensed woman	168	144	4	369	129	.....	.....	.....	4	197	273	49	.....	.....	13	9	23	1336
Unlicensed—Unlicensed persons	80	47	3	32	39	.....	.....	.....	6	78	83	42	.....	.....	7	10	10	430
All others	12	26	1	26	12	.....	.....	.....	10	10	26	14	.....	.....	.....	.....	.....	177
Calculated risk	.....	.....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11
Restricted maneuvering room	2	3	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13
Storms—adverse weather	8	8	2	15	34	.....	.....	.....	.....	26	31	64	.....	.....	.....	.....	.....	295
Unusual currents	1	3	.....	9	.....	.....	.....	.....	.....	4	3	4	.....	.....	94	3	18	20
Shore, suction, bank erosion	1	1	.....	.....	1	.....	.....	.....	.....	3	6	1	.....	.....	.....	1	1	167
Depth of water less than expected	.....	.....	.....	3	3	.....	.....	.....	.....	18	143	.....	.....	.....	.....	.....	.....	1105
Failure of equipment	.....	.....	.....	94	31	.....	.....	.....	79	44	58	75	.....	.....	147	505	23	6
Unseaworthy—lack of maintenance	1	1	.....	.....	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	118
Floating debris—submerged object	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	5	.....	.....	.....	.....	.....	.....	15
Inadequate tug assistance	.....	3	.....	9	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3543
Fault on part of other vessel or person	863	541	4	643	268	.....	.....	.....	8	399	133	.....	.....	.....	65	9	243	445
Unknown—insufficient information	22	11	.....	33	40	.....	.....	.....	89	15	37	103	.....	.....	28	20	154	.....
VESSEL TYPE																		
Inspected vessels:																		
Passenger and ferry—large	3	5	.....	8	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14
Passenger and ferry—small	23	19	.....	0	12	.....	.....	.....	12	25	8	.....	.....	.....	.....	.....	.....	177
Freight	57	68	3	95	69	1	.....	.....	13	28	70	27	.....	.....	108	97	23	584
Cargo barge	15	14	.....	22	25	.....	.....	.....	.....	10	27	.....	.....	.....	.....	.....	.....	130
Tank barge	55	56	.....	37	20	.....	.....	.....	.....	15	12	.....	.....	.....	59	73	13	351
Public	161	92	5	217	61	2	.....	.....	5	114	296	12	.....	.....	18	1	37	941
Miscellaneous	1	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21
Uninspected vessels:	7	14	.....	9	31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	102
Tug/Towing	100	93	6	25	56	1	.....	.....	74	118	145	259	.....	.....	.....	.....	.....	1372
Tug/Towing	323	217	5	495	184	.....	.....	.....	47	223	369	139	.....	.....	37	28	38	2109
Tug/Towing	86	120	4	88	41	.....	.....	.....	15	34	112	4	.....	.....	10	23	29	558
Other	212	207	1	274	118	.....	.....	.....	21	146	227	195	.....	.....	16	11	321	1756
GROSS TONNAGE																		
300 tons or less	529	455	16	514	341	1	13	.....	140	351	508	520	.....	.....	106	339	24	4972
Over 300 to 1,000 tons	201	151	8	328	94	.....	.....	.....	21	196	307	117	.....	.....	28	12	192	1646
Over 1,000 to 10,000 tons	180	154	4	291	132	3	.....	.....	25	119	203	29	.....	.....	66	52	10	1390
Over 10,000 tons	93	121	4	147	65	.....	.....	.....	24	58	163	7	.....	.....	129	144	50	1416
LENGTH																		
Less than 100 feet	425	384	18	357	267	1	9	.....	120	295	424	457	.....	.....	103	318	190	3415
100 to less than 300 feet	449	320	6	876	266	2	4	.....	52	348	615	204	.....	.....	82	46	257	3328
300 to less than 500 feet	35	55	4	47	30	.....	.....	.....	8	26	56	3	.....	.....	27	13	19	320
500 feet and over	84	137	4	160	70	1	.....	.....	27	53	187	9	.....	.....	14	170	43	1088
AGE																		
Less than 10 years	421	371	10	524	290	1	5	.....	72	307	534	167	.....	.....	141	203	147	3254
10 to less than 20 years	280	205	6	349	128	2	4	.....	45	202	318	167	.....	.....	73	87	119	1986
20 to less than 30 years	91	125	.....	175	66	1	.....	.....	38	98	190	120	.....	.....	44	74	57	1045
30 years and over	158	192	10	225	148	.....	.....	.....	62	115	245	210	.....	.....	88	183	183	1614

Casualties to Commercial Vessels -- Continued

October 1, 1978, to September 30, 1979 Fiscal Year 1979													
LOCATION OF CASUALTY	Collisions, grounding, meeting and evacuating		Collisions while anchored, docking, or undocking		Collision, fire		Collisions with piers and bridges		Collisions, all others		Explosion and/or fire—cargo		Total
Inland—Atlantic	26	53	1	115	61	2	2	46	84	212	74	40	808
Inland—Gulf	180	114	3	191	95	2	2	40	98	308	108	1	1128
Inland—Pacific	20	32	1	42	42	4	4	26	39	54	47	12	418
Ocean—Atlantic	6	13	2	14	34	1	1	17	28	70	77	94	418
Ocean—Gulf	19	18	2	11	51	1	1	22	26	10	57	19	289
Ocean—Pacific	14	11	2	11	13	1	1	3	20	40	23	2	511
Great Lakes	5	11	1	44	24	4	4	24	26	7	7	39	251
Western Rivers	51	44	1	183	34	4	4	86	178	85	1	5	732
Ocean—other	3	13	16	15	15	1	1	4	19	3	3	18	111
Foreign waters	1	3	3	2	2	2	2	3	3	1	1	2	20
TIME OF DAY													
Daylight	165	185	7	351	180	9	4	4	101	178	383	390	9479
Nighttime	152	108	3	259	146	1	3	3	80	204	518	199	1780
Twilight	19	32	40	45	2	2	2	18	48	54	59	53	432
ESTIMATED LOSSES (IN THOUSANDS OF DOLLARS)													
Vessel	22470	10175	4446	16183	8055	125	4421	504	41212	32978	404	44331	229782
Cargo	290	1228	288	3834	437	5	1385	827	1385	827	13	15138	4172
Property	3718	12511	110	24432	1425	5	3219	1289	3219	1289	61	1900	49492
VESSELS TOTALLY LOST													
Inspected	2	17	3	13	1	1	1	1	4	2	15	1	29
Uninspected	13	17	3	13	1	1	1	1	36	33	1	159	301

Death/Injuries Due to a Vessel Casualty

October 1, 1978, to September 30, 1979 Fiscal Year 1979																		
	Collisions, grounding, meeting and evacuating	Collisions while anchored, docking, or undocking	Collision, fire	Collisions with piers and bridges	Collisions all others	Explosion and/or fire—cargo	Explosion and/or fire—vessels Aft	Explosion and/or fire—pressure vessels, boilers	Explosion and/or fire—structure, equipment all others	Grounding with damage to vessel	Grounding without damage to vessel	Foundries, engine/ing, and flooding	Heavy weather damage	Cargo damage	Material failure—structure and equipment	Material failure—machinery and engineering equipment	Quantity not otherwise classified	Total
Number of casualties	24	7	2	5	9	3	1	1	24	4	3	57			11	8	8	165
Number of inspected vessels involved	15	6	3	2	7	3	1	1	20	4	3	34			7	5	35	
Number of uninsured vessels involved	15	6	3	2	7	3	1	1	20	4	3	34			7	5	6	130
Number of persons deceased/injured	24/24	4/8	1/1	7/12	6/12	3/1	7/7	7/7	23/30	8/4	2/2	104/115			8/8	4/3	5/8	100/115
PRIMARY CAUSE																		
Personnel faults																		0
Pilots—State																		0
Pilots—Federal																		0
Licensed officer—Documented seaman	8	4	2	2	1			1	2			3				1		21
Unlicensed—(Un)documented persons	8	4	2	2	2			1	1		1	10						25
All others						1		1							1			6
Calculated risk																		0
Restricted maneuvering room																		0
Storm—adverse weather									1			8			1		3	13
Unusual currents				1														1

Deaths/Injuries Due to a Vessel Casualty -- Continued

October 1, 1978, to September 30, 1979
Fiscal Year 1979

	Collisions, crossing, meeting and overtaking	Collisions while anchored, docking, or undocking	Collisions, fog	Collisions with piers and bridges	Collisions with all others	Explosions and/or fire—cargo	Explosions and/or fire—vessel's (Net)	Explosions and/or fire—pressure vessels, boilers	Explosions and/or fire—structure, equipment, all others	Grounding with damage to vessel	Grounding without damage to vessel	Foundering, capsizing, and flooding	Heavy weather damage	Cargo damage	Material failure—structure and equipment	Material failure—machinery and engineering equipment	Casualty not otherwise classified	Total
Where, action, bunk, cushion, Depth of water less than expected, Failure of equipment, Unseaworthy—lack of maintenance, Floating debris—submerged object, Inadequate tug assistance, Fault on part of other vessel or person, Unknown—insufficient information	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0 0 25 2 0 18 51
VESSEL TYPE																		
Impacted vessels:																		
Passenger and ferry—large	1/1	.....	.....	1/8	.....	.....	.....	.....	.....	.....	.....	1/1	.....	.....	.....	1/1	.....	1/10
Passenger and ferry—small	1/3	2/	.....	.....	1/3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/	.....	4/7
Freight	2/2	.....	.....	.....	1/	.....	.....	4/8	.....	.....	.....	.....	.....	.....	3/	1/	.....	8/9
Cargo Barge	.....	.....	.....	.....	.....	.....	.....	.....	1/	.....	.....	.....	.....	.....	2/	2/	.....	0/9
Tanker	1/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/6
Tank Barge	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2/2
Public	2/2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2/2
Miscellaneous	.....	.....	.....	.....	.....	.....	.....	.....	2/	.....	.....	.....	.....	.....	1/1	.....	.....	2/3
Unimpacted vessels:																		
Fishing	1/9	3/	1/	.....	4/1	.....	.....	3/6	6/4	1/1	27/4	.....	.....	.....	.....	1/	1/	92/23
Tug/Towing	1/4	2/	.....	1/4	1/3	.....	.....	3/8	.....	1/1	12/2	.....	.....	.....	.....	.....	.....	19/21
Foreign	1/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19/10
Other	21/7	1/3	1/	.....	1/5	.....	.....	2/3	.....	.....	14/4	.....	.....	.....	1/3	3/	3/1	51/25
PARTICULARS OF PERSON DECEASED/INJURED																		
Papers of deceased/injured:																		
Licenses—Coast Guard	1/5	2/	.....	2/	3/	.....	.....	.....	.....	.....	.....	5/3	.....	.....	.....	.....	.....	8/19
Document—Coast Guard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3/13
No license or document	25/13	2/6	1/1	2/10	6/9	3/1	1/	15/12	6/4	2/2	87/9	.....	.....	.....	3/4	6/2	4/	170/79
Other—unknown—foreign	1/	.....	.....	.....	.....	.....	.....	7/8	.....	.....	.....	.....	.....	.....	.....	.....	.....	9/9
Status or capacity on vessel:																		
Passenger	7/8	2/	1/	.....	1/8	5/5	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/1	2/	15/26
Longshoreman—harbor worker	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9/2
Crewmember	17/13	2/3	1/	1/3	6/7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	157/61
Other	.....	2/1	.....	.....	1/	.....	.....	1/6	.....	.....	1/	.....	.....	.....	.....	3/	.....	9/9
Activity engaged in:																		
Off duty	4/2	2/	.....	.....	2/2	.....	.....	10/4	.....	.....	.....	.....	.....	.....	.....	.....	.....	21/10
Deck department duties	5/9	1/1	.....	.....	3/3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39/38
Engine department duties	3/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4/10
Steward department duties	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/1
Handling cargo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3/1
Pushing cargo	4/	2/1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31/4
Drills	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/4
Passenger	3/8	2/2	1/	.....	1/5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12/26
Other and unknown	5/2	1/	1/	2/	1/2	2/1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81/23
Location of vessel:																		
Great Lakes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7/4
Western Rivers	7/4	2/	.....	1/1	3/2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20/13
Inland	15/12	5/	1/	1/1	1/10	2/1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	113/88
Oceans	.....	2/1	1/	.....	3/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	92/8
Foreign and other	5/1	.....	.....	.....	1/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10/5
PART OF BODY INVOLVED																		
Head	9/2	1/	1/	.....	3/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17/36
Back	1/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/12
Chest	7/8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/14
Extremities	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/2
Blind	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/
Drowning	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1/
Unspecified and miscellaneous	13/	4/	1/	3/	5/	1/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	146/1
	2/8	1/4	.....	.....	1/3	2/	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25/93

Deaths on Board Commercial Vessels Not Involving a Vessel Casualty

October 1, 1978, to September 30, 1979

Fiscal Year 1979

	Natural cause	Homicide	Suicide	Disappearance	Slips and falls—loaders	Slips and falls—gangways	Slips and falls—on deck	Slips and falls—other	Falls from vessel—into water	Falls into tanks or tanks	Struck by objects falling, dropped or moving	Equipment and apparatus	Struck against, crushed, bumped into objects	Operating machinery and tools	Burns (other than electrical) and welder	Electrical shock and burns	Caught in lines, chains, or wire	Placing or crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, overexertion	Alterations and misconduct	Unknown or insufficient information	Total
Number of deaths	113	7	9	4	1	1	1	14	110	10	31	14	3	1		5	3	2	1			5	9	247
Number of uninspected vessels involved	33	3	5	5	1	1	1	17	78	5	21	4	2	1		4	2	1	1			3	1	131
Number of inspected vessels involved	80	4	4	1				3	32	5	10	17	2	5		1						2	8	146
CAUSE OF DEATH																								
Intoxication	1				2				1														1	5
Physical deficiency or handicap	112								4															116
Unsafe movement or posture							1		1															3
Psychological—immaturity, insanity		7	1				1		8													5		12
Unsafe practice						1		7	5	2	2	1				2							1	25
Violation of law or regulation																								0
Human error					3			7	41	4	13	5		1		2	3	1	1					82
Decks slippery or cluttered					1				2															3
Weather conditions																								12
Poor maintenance or housekeeping								1	8															11
Inadequate lighting									1															1
Inadequate rails or guards																								0
Failure of equipment								3	4		10	2												13
Inadequate supervision																								3
Inadequate life preservers																								0
Inadequate tools or equipment																								3
Inadequate protective equipment																								0
Improper use of tools or equipment											1													1
Miscellaneous causes			8						37	2	3	7				1							7	63
TYPES OF VESSELS INVOLVED																								
Inspected vessels:																								
Passenger and ferry—large	8	1	1	1					4			2												12
Passenger and ferry—small	13	2	7						11	3	5	5												26
Freight ships and barges	32								4													2	5	81
Tankships and barges	14		2				1	7	1	1	3													30
Public	2																							2
Miscellaneous	15						2	10	1	4	5					1							1	35
Uninspected vessels:																								
Fishing	13	2	2						26		3	2					2						1	51
Tugs	13		2				1	7	19		2													38
Foreign	5	1		5	1		4	5	4	7				1				2				2		38
Miscellaneous	2		1				8	28	1	9	3					3	1						1	53
TIME OF DAY																								
Daytime	75	5	1	2			13		54	4	22	13	3	3		4	1	2	1			2	3	206
Nighttime	29	2	4	4	1		1		43	6	5	2				1	2					3	4	108
Twilight	9		3						13		4	1											2	33
PARTICULARS OF PERSON DECEASED																								
Papers of deceased:																								
License—Coast Guard	34			1		1			7	1												2		37
Document—Coast Guard	38	3	4						15	1	4		1										5	70
No license or document	47	5	5	2			13		84	6	22	15	2	3		4	3					1	3	211
Other—unknown—foreign	4	1		3	1		2		8	7	5	1						2						29
Status or capacity or vessel:																								
Passenger	31	3	9	1					7		7	1											1	43
Longshoreman—harbor worker									8	3	8													17
Crewmember	87	4	7	5	1	1	4		93	5	18	3	2			4	3	2	1			5		250
Other	5						10		4	2	7	8				1							2	37
Activity engaged in:																								
Off duty	44	2	1	1					13															65
Deck department duties	14		3	1					37	9	21	1					1	1					2	59
Engine department duties	8								5							4								19
Steward department duties	4								4															4
Handling cargo	1								4	2	6	2		1										16
Fishing	7								14		1						2							24
Drills	1								1															2
Passenger	17	3	2	1					5		3	1											1	32
Other and unknown	37	2	4	3		1	8		32	7	3	11	1					1					4	90
Location:																								
Great Lakes	6								1	1	1													9
Western Rivers	11	2		3				2	31		4	2	1											58
Inland	83	4	5	3	1	1	11		98	4	24	12	1	1		3	3	1				2	1	212
Oceans	14	1	3						5															24
Foreign and other	13		3						4		2	2				1		1				2		39

Deaths on Board Commercial Vessels Not Involving a Vessel Casualty -- Continued

October 1, 1978, to September 30, 1979
Fiscal Year 1979

PART OF BODY INVOLVED

Head
Back
Chest
Extremities
Illness
Drowning
Unspecified and miscellaneous

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 (other than electrical) and scalds	Electrical shock and burns	Caught in lines, chains, or wire ropes	Pinning or crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Alterations and miscellaneous	Unknown or insufficient information	Total
3	1	3	7	3	1	7	2	5	11	9	3	1	1	1	1	1	1	1	1	1	1	1	40
106	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	144
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	36

Personnel Injuries on Board Commercial Vessels Not Involving a Vessel Casualty

October 1, 1978, to September 30, 1979
Fiscal Year 1979

Number of injuries
Number of uninspected vessels involved
Number of inspected vessels involved

CAUSE OF INJURY

Intoxication
Physical deficiency or handicap
Unsafe movement or posture
Psychological--immaturity, insanity
Unsafe practice
Violation of law or regulation
Human errors
Deck slippery or cluttered
Weather conditions
Poor maintenance or housekeeping
Inadequate lighting
Inadequate rails or guards
Failure of equipment
Inadequate supervision
Inadequate life preservers
Inadequate tools or equipment
Improper use of tools or equipment
Miscellaneous causes

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 (other than electrical) and scalds	Electrical shock and burns	Caught in lines, chains, or wire ropes	Pinning or crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Alterations and miscellaneous	Unknown or insufficient information	Total
5	1	1	1	131	17	251	136	18	5	306	4	114	50	43	6	60	47	3	205	64	47	46	1536
1	1	1	1	12	15	14	12	12	1	45	4	5	8	4	27	27	6	3	19	10	6	12	197
4	1	1	1	99	17	236	122	4	4	261	4	109	42	39	6	33	41	3	188	54	41	34	1339
2	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10
5	1	1	1	12	19	28	1	1	1	11	2	15	1	1	4	4	17	17	1	3	1	3	34
1	1	1	1	21	8	21	1	1	1	48	7	1	6	11	15	5	82	82	4	1	1	1	164
1	1	1	1	37	12	141	57	3	2	177	3	73	38	26	37	35	12	5	12	5	3	3	46
1	1	1	1	8	3	57	1	1	1	3	2	2	2	2	37	35	1	75	37	16	16	16	603
1	1	1	1	5	13	3	3	1	1	18	12	1	1	1	2	1	2	6	4	4	4	4	82
1	1	1	1	1	1	1	1	1	1	5	1	1	1	1	1	1	1	1	1	1	1	1	65
1	1	1	1	2	1	3	8	11	1	31	2	2	3	1	1	1	1	1	1	1	1	1	7
1	1	1	1	1	1	1	1	1	1	3	1	2	1	1	1	1	1	1	1	1	1	1	68
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
1	1	1	1	1	1	1	1	1	1	6	1	1	1	1	1	1	1	1	1	1	1	1	9
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	42

Personnel Injuries on Board Commercial Vessels Not Involving a Vessel Casualty -- Continued

October 1, 1978, to September 30, 1979

Fiscal Year 1979

October 1, 1978, to September 30, 1979																								
Fiscal Year 1979																								
	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 object	Operating machinery and tools	Burns (other than electrical) and acids	Electrical shock and burns	Caught in lines, chutes, or wire ropes	Pitching or crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Alterations and manslaughter	Unknown or insufficient information	Total
TYPES OF VESSELS INVOLVED																								
Inspected vessels:																								
Passenger and ferry--large	1				1		9	4			4	1					1			5				28
Passenger and ferry--small	1				3		4	2									2		1					19
Freight ships and barges	2				74	13	162	92	3	2	163	1	91	29	19	1	19	29	2	145	41	32	24	992
Tankships and barges					11	2	46	19			34		8	7	19	3	0	7		27	8	7	8	212
Public					7	2	3	1			7		5	3	1			2		4	3	2		41
Miscellaneous					3		10	5	1		30	2	5	3	1	2	5	3		4	4		1	78
Uninspected vessels:																								
Fishing	1				3		5	5			18		3	3	1		19	4		7	5	1	4	75
Tugs					3		6	5	1		20		1	1	1		6	2		13	4	4	4	73
Foreign							1	2			2			1	2					1		1	2	12
Miscellaneous					4		3	2	11	1	4		1	3			2			3	1		2	37
TIME OF DAY																								
Daytime	3				71	8	163	94	12	3	215	5	82	40	31	5	41	36	2	152	40	33	30	1053
Nighttime	1				34	10	67	25	3	1	89		24	8	8	2	14	5	1	29	16	12	4	389
Twilight	1				8	1	19	7	1	1	12		6	2	4		3	2		24	8	2	12	133
PARTICULARS OF PERSON INJURED																								
Papers of person injured:																								
Licensed--Coast Guard	1				17	1	25	19	1	1	47	1	12	11	16	3	5	3	1	30	9	6	7	216
Documented--Coast Guard	2				81	16	200	99	3	3	201		93	29	20	3	28	37	1	180	45	38	29	1087
No license or document	2				13		25	18	12	1	56	3	8	9	8	1	27	7	1	14	10	1	8	223
Other--unknown--foreign							1	2						1						1			2	10
Status or capacity on vessel:																								
Passenger	1				6		8	4			2	1	1						1					24
Longshoreman--harbor worker																								1
Crewmember	4				103	17	239	129	6	5	249	1	110	45	40	6	58	44	2	201	62	47	44	1450
Other					2		5	3	10		16	2	3	3	3		2	3		4	2		1	61
Actively engaged in:																								
Off duty	1				14	15	32	17		1	5		11		1		2	4		13	5	18		129
Deck department duties					40	2	113	70	4	3	168		61	38	6		48	13	1	99	27	5	15	592
Engine department duties	2				36		38	28		1	41		25	28	28	3	1	9	1	37	14	2	6	317
Steward department duties					9		41	10			17		7		3	2		11		24	8	10	9	151
Handling cargo					1		3				2									1			1	8
Fishing	1						8	7			12		1		1	18	2			1	2			45
Drills					3		6	4		11			5	4	1					3	1			28
Passenger	1				6		8	4			2		1						1					21
Other and unknown					6		17	8	1		14	4	5	4	5		1	8		8	9	12	15	118
Location:																								
Great Lakes					7		6	7			15		3	3	2		1	1		12	4			63
Western Rivers					1		5	3	2	1	9		2	1	2		3	1		6		3		42
Inland	2				25	6	71	36	2	2	104	3	28	18	19	3	35	18	2	43	12	14	22	473
Oceans	1				24		81	31		1	70	1	24	8	11	2	9	13	2	48	16	7	7	387
Foreign and other	2				42	17	95	58	12	1	168		48	20	9	1	12	16		96	30	23	17	581
PART OF BODY INVOLVED																								
Head					21	3	48	20			79		19	1	10	1	1	1	1	17	4	30	5	261
Back					27	1	42	13	10	2	10	1	10	1					1	88	1		2	209
Chest					12	2	31	22	4	1	17		10	3	5		2	2	1	24	3	4	4	156
Extremities					47	11	125	74	7	3	182	2	63	44	20	3	58	42		74	55	12	20	843
Illness	5						1																2	8
Drowning																								1
Unspecified and miscellaneous					4		4	2			8	1	3		8	3	1	1		1	1		13	56

Marine Safety Council Membership

As our readers may have noticed from the masthead, the Marine Safety Council has undergone some changes in the past year. Rear Admiral Richard A. Baumann joined the Council in May 1980, when he was appointed Chief of the newly established Office of Navigation. In July 1980 the Office of Boating Safety was merged with the Office of Public and International Affairs to become the Office of Boating, Public, and Consumer Affairs; Rear Admiral H. W. Parker was appointed as the Chief of the newly consolidated office and assumed a seat on the Council. The Council continues to be chaired by Rear Admiral Clifford F. DeWolf, a profile of whom follows:



Rear Admiral DeWolf took charge of the Coast Guard Chief Counsel's Office in September of 1978.

He began his career in the U.S. Coast Guard in 1950 as an ensign aboard the CGC BIBB and advanced through various capacities to Operations Officer/Navigator. Entering the Coast Guard Academy as a Cadet in July 1946, he graduated with a degree in General Engineering in 1950. He was subsequently assigned as Commanding Officer of an 83-foot patrol boat in Alaska. This led to his assignment as part of the original 95-footer precommissioning detail in Curtis Bay, Maryland. Following that tour of duty, he returned to Alaska as Commanding Officer of the CAPE CORAL, one of the first twelve 95-foot patrol boats. After being selected for legal training in 1955, he attended Georgetown University Law Center in Washington, DC. He received his Juris Doctor Degree from that institution in 1957 and was admitted to the bar. After a short postgraduate indoctrination tour in the Legal Division at U.S. Coast Guard Headquarters, he was assigned as Commanding Officer of the CGC LEGARE, a ship engaged in search and rescue out of New Bedford, Massachusetts. He next served a tour at the Coast Guard Academy as an instructor in law, seamanship, and other professional studies.

In 1963 Rear Admiral DeWolf was assigned as Staff Legal Officer in the 17th Coast Guard District at Juneau, Alaska. From there he was assigned to the CGC CHAUTAUQUA, first as Executive Officer and then as Commanding Officer on ocean station patrol between Hawaii and Japan. From 1967 to 1972 he served as the Coast Guard's principal legislative counsel during the development and drafting of the Federal Boat Safety Act, the Ports and Waterways Act, and other legislation important to the Coast Guard.

In the absence of a Coast Guard Judge Advocate General Corps, Rear Admiral DeWolf served collaterally throughout his career as counsel and Law Officer in Coast Guard courts-martial and related activities. He also served collaterally as a judge for the appellate review of courts-martial on the Coast Guard Court of Review. In 1972 he was assigned as one of two full-time Coast Guard military trial judges for the trial of general and special courts-martial. This was followed by a tour as Staff Legal Officer of the 12th Coast Guard District in San Francisco. He was advanced to Chief, Operations Division, in that District in July 1975. Rear Admiral DeWolf, as a Captain, served as Chief of Staff in the Eighth Coast Guard District from September 1976 until his promotion to the rank of Rear Admiral in June 1978. From that time until his assignment as Chief Counsel he served as Commander, Eighth Coast Guard District.

Rear Admiral DeWolf's awards include the Meritorious Service Medal, the Coast Guard Commendation Medal, the National Service Defense Medal, and the WWII Victory Medal.

Rear Admiral DeWolf was born on May 8, 1928, in New Haven, Connecticut. He is married to the former Marcia B. Staub of Waterford, Connecticut. They have five children: Keith, Janice, Christine, Kent, and Mark.

1

Navigation and Vessel Inspection Circulars

The effective Navigation and Vessel Inspection Circulars listed below can be obtained individually or by subscription, free of charge, by writing to Commandant (G-MP-4/14), U.S. Coast Guard Headquarters, Washington, DC 20593, or calling (202) 426-2163.

7-56	Manned LSTs; Structural Reinforcement and Drydocking; Hull Inspection Requirements
10-80	Placards, Forms, and Instructions Required to be Posted Aboard Vessels; Alternate Materials and Methods
12-61	Inspection Procedures for Approved Inflatable Life Rafts Held in Storage
2-62	Watertight Bulkheads in All Inspected Vessels—Maintenance of Watertight Integrity
4-62	Renewal of Deck Officers' Licenses--Great Lakes
5-62	Renewal of Deck Officers' Licenses--Western Rivers
9-62	Liquefied Compressed Gas Cargo Hose
1-63	Notes on Inspection and Repair of Wooden Hulls
2-63	Guide for Inspection and Repair of Lifesaving Equipment
11-63	LSTs as Unmanned Barges; Structural Reinforcement and Drydocking; Hull Inspection Requirements
5-64 CH-1,2	Renewal of Ocean Operators' and Operators' Licenses
7-64	Renewal of Operators' Licenses--Great Lakes
8-64	Renewal of Operators' Licenses--Western Rivers
8-64A	Renewal of Operators' Licenses--Western Rivers
1-65	24.0' x 8.0' x 3.58' Steel Lifeboats with Removable Interiors, Oar-propelled (App. No. 160.035/398/0), Hand-propelled (App. No. 160.035/411/0), and Motor-propelled (App. No. 160.035/412/0), manufactured by Welin Davit & Boat, Perth Amboy, New Jersey, Replacement of Short Breast Plates
7-65 CH-1	Renewal of Deck Officers' Licenses
10-65	Stability Determination in Capsizing Cases Involving Uninspected Vessels
12-65	Alteration or Modification of Existing Cargo or Tank Vessels; Associated Safety Improvements
1-66	Requirements for Hull Structural Steel--Structural Continuity
3-66	Dual Tonnages; Application of
1-67	Stability Test--Preparations and Procedures
3-67	Alteration of Ship's Structure Which May Affect the Adequacy of Installed Safety Devices
4-67	Application of Incombustible Insulation Requirements and Identification of Approved Materials
8-67	Fixed Mud Ballast; Procedures and Standards for its Use
3-68	Tensile Fasteners
4-68	Protective Equipment Required for Firemen's Outfits
7-68	Notes on Inspection and Repair of Steel Hulls
8-68	Classification of Vessels as Self-propelled
1-69	Automated Main and Auxiliary Machinery
2-69	Submission of Reports for the Shipment and Discharge of Seamen Not Shipped or Discharged Before a Shipping Commissioner; Information Concerning
3-69	Z Nomograph Method of Calculating Available GM
4-69	Inclusion of Social Security Numbers on Certificates of Discharge and Discharges for Masters
5-69	Carriage of Flammable and Combustible Liquids in Portable Tanks
7-69 CH-1,2,3	Hydraulic Releases with Primary Lifesaving Equipment and Alternate Float-Free Arrangements
8-69	Impulse-Projected Rocket Type Line-Throwing Appliances
11-69	Statement of Claims for Specially Exempted Water-ballast Spaces in Tonnage Calculations
12-69	Special Examination in Lieu of Drydocking for Large Mobile Drilling Units
2-70	Acceptance of Pressure Vessels Used as Decompression Chambers or for Other Purposes Related to Diving
4-70	Powder Loads for Lyle Type Line Throwing Guns

6-70	Fixed Fire Extinguishing Systems for Use in Galley Ventilating Equipment
7-70	Marine Type Portable Fire Extinguishers
1-71	Repair of Boiler Safety Valves
2-71	Pipe Stress Analysis Calculations; Procedure for Submission of
4-71	Valves Employing Resilient Material
5-71	Index to 46 CFR Part 151 (Certain Bulk Dangerous Cargoes on Unmanned Tank Barges), Subchapter 0
6-71	Monitoring Carbon Monoxide (CO) in Ship's Cargo Spaces
2-72	Coast Guard Approval of Hull Structural Plans
3-72	Portable Radio Apparatus, Training in Use of
4-72	Definition of Paraffinic Hydrocarbon Commodities
6-72 CH-1	Guide to Fixed Fire-Fighting Equipment Aboard Merchant Vessels
1-73	Pilot Ladders Used Aboard Merchant Vessels
3-73	Intact Stability Criteria for Passenger and Cargo Ships under 100 Meters in Length
4-73	American Bureau of Shipping Approval of Machinery and Electrical Plans
7-73	Main Propulsion Boiler Automation
8-73	Alternate Means of Determining the Weight of CO ₂ in Fire Extinguishing Systems
9-73 CH-1	Implementation of the Pollution Prevention Regulations (33 CFR, Subchapter 0 and Amendments to 46 CFR, Subchapter D)
2-74	Change in Administration of Ships' Stores and Supplies of a Dangerous Nature
3-74	Implementation of the Regulations Concerning Licenses for Operation of Uninspected Towing Vessels (46 CFR, Subpart 10.16 and Sections 157.10-83, 157.10-85, 157.30-45)
4-74	Stability Information Required on Inspected and Uninspected U.S. Vessels Receiving a Load Line Certificate and Foreign Vessels Receiving Form B Load Line Certificates
6-74	Elimination of Unsafe Conditions on Board Tank Barges
7-74	Oil-water Separators; Acceptance of
1-75	Fire Safety Standards for Foreign Passenger Vessels
2-75	Alteration of Existing Rafts to Comply with Improved Inflation Standards
3-75	Bulk Grain Cargoes
2-76	Damage Stability Calculations for Tank Vessels
3-76	Stability of Fishing Vessels
1-77	Unified Interpretations of the 1966 International Convention on Load Lines
2-77	American Bureau of Shipping Acceptance of Structural Fire Protection Approval
3-77	Code of Safe Practice for Ships Carrying Timber Deck Cargoes
4-77	Shifting Weights or Counter Flooding During Emergency Situations
5-77	Inspection of Hydraulic Starting Systems for Lifeboats and Survival Capsules
1-78 CH-1	Automation of Offshore Supply Vessels of 100 Gross Tons or Over
2-78	Bulk Grain Cargo Regulations (46 CFR 31.10-33, 46 CFR 74.10-12, and 46 CFR 93.20)
3-78	Cross-Reference List Between the IMCO Chemical Code and 46 CFR, Part 153
4-78 CH-1	Inspection and Certification of Existing Mobile Offshore Drilling Units
1-79	Literature Concerning Hazardous Cargoes
2-79	Aluminum Bus Bars
3-79	Lifeboat Capacity on Foreign Flag Passenger Vessels
4-79	Recommended Procedures for Using Smith & Wesson International Line Throwing Appliances
5-79	Inerting and Tank Cleaning Procedures for Alkylene Oxide Containment Systems
6-79	Coast Guard Review of Merchant Vessel Plans and Specifications
7-79	1969 Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil 1954; Operational Compliance with
8-79	Shipment and Discharge of Seamen
1-80	Inspection of Viking On-load Release Gear on Watercraft America Lifeboats
2-80	Poured Metal Socket Connections for Lifeboat Falls
3-80	Acceptance of Gel Coats and Composite Laminate Coatings Which Meet 46 CFR 177.10-5(a-1)
4-80	Installation of Retroreflective Material and PFD Lights on Lifesaving Equipment
5-80	Recommended Procedures for Control of Asbestos Hazard on Board Merchant Vessels, OCS Facilities and Deepwater Ports
6-80	Guide to Structural Fire Protection Aboard Merchant Vessels
7-80	Use of Fire Detection Systems Which Are Not Approved under 46 CFR 161.002
8-80	Fire Hazard of Polyurethane and Other Organic Foams
9-80	Servicing Requirements of Inflatable Liferafts
10-80 CH-1	Temporary Licenses and Certificates of Service for the Crews of Offshore Supply Vessels under P.L. 96-376
11-80	Structural Plan Review Guidelines for Aluminum Small Passenger Vessels
12-80	National Fire Protection Association (NFPA) Standard No. 306, "Control of Gas Hazards on Vessels 1980"
13-80	Breathing Apparatus for Tank Vessels

Chlorine: Cl₂

Physical Properties

boiling point:	-34.05°C (-29.3°F)
freezing point:	-101.00°C (-149.8°F)
vapor pressure at 46°C (115°F):	12.2 atm (180 psia)

Threshold Limit Values

time weighted average:	1 ppm (0.0001%)
short term exposure limit:	3 ppm (0.0003%)

Densities

liquid density:	1.56 (water = 1.0) at -35°C
vapor density:	2.49 (air = 1.0) at 0°C

Identities

U.N. Number	1017
CHRIS Code	CLX

Chlorine is a heavy, noncombustible gas with a pungent, irritating odor. Although chlorine does not burn, it can increase the severity of a fire because of its highly reactive nature. The gas is greenish-yellow, while liquefied chlorine is clear and amber-colored. As might be expected from the fact that it was used as a poison gas in World War I, chlorine is extremely toxic. It is liquefied for shipping and large-volume storage, since liquefied chlorine will fit into only 0.2 percent of the space occupied by the gas (the quantity of chlorine that can be carried as a liquid in one barge would require 456.8 barges if it were carried as a gas). By the same token, however, one volume of liquid expands to 456.8 volumes at 0°C and 1 atm, which means that a ruptured tank can give rise to a large vapor cloud. The chlorine vapor is dangerous; breathing a concentration of only 1000 ppm (0.10%) will result in death in minutes, and breathing a concentration of 40 to 60 ppm (0.004 to 0.006%) for 30 to 60 minutes can cause permanent lung damage. As shown above, the Workplace Time Weighted Average is a mere 1 ppm (0.0001%)—in other words, employees working a normal 8-hour day, 40-hour week may be repeatedly exposed to a concentration of only 1 ppm before suffering adverse effects. The Short Term Exposure Limit, the maximum concentration a worker may be exposed to for 15 minutes or less without suffering irritation, irreversible tissue change, or impairment of judgment (provided such exposure occurs no more than 4 times a day, the periods of exposure are spaced at least 1 hour apart, and the Time Weighted Average is not exceeded), is 3 ppm (0.0003%). Since the least detectable odor is 3.5 ppm (0.00035%), immediate action should be taken if an employee smells chlorine. Since chlorine is heavier than air, it is slow to disperse and tends to accumulate in low places. When contam-

inated with water, it will form an acid which can corrode almost all container metals. This means that if there is a leak in a tank, the hole tends to enlarge.

Chlorine was produced by alchemists as early as the thirteenth century, but the first real study of the substance did not take place until 1774. Chlorine was first used to make bleach in 1779. Today it is used to make chlorinated cleaning solvents (carbon tetrachloride, trichloroethylene), plastics (vinyl chloride, neoprene), and acids (hydrochloric, chloroacetic). One of its few direct uses is in water purification.

Chlorine is an important commodity: in terms of volume produced, it ranked eighth among chemicals in 1979. Chlorine is usually produced by electrolyzing sodium chloride (table salt) and potassium chloride. Caustic soda and caustic potash are by-products. The electrolysis units work somewhat like primary batteries running backwards, with electricity used as the "fuel."

Chlorine is regulated by the U.S. Coast Guard (which has designated it as a Cargo of Particular Hazard), by the U.S. Department of Transportation (which classifies it as a nonflammable gas), by the U.S. Environmental Protection Agency (which assigns it to pollution category A), and by the Intergovernmental Maritime Consultative Organization (which considers it a liquefied gas). Because of chlorine's high toxicity, the Coast Guard allows it to be transported only on unmanned barges carrying no more than 1200 tons; individual tanks aboard each barge may hold no more than 300 tons.

The Coast Guard has studied liquefied chlorine spills on water and is now participating in international studies of heavier-than-air vapor dispersion, which would be applicable to chlorine. Nontoxic gases will be used in place of chlorine, however.

Those desiring more information on chlorine might wish to contact the Chlorine Institute, Inc., 34 Madison Ave, New York, NY 10173, Tel.: (212) 682-4324. The Institute is a nonprofit organization concerned with safety in the manufacture, transportation, distribution, and use of chlorine.

ALAN L. SCHNEIDER, Sc.D., and CURTIS PAYNE, B.A.
Hazard Evaluation Branch
Cargo and Hazardous Materials Division

HAZARDOUS MATERIALS
"BUGS"

Annual Index

Volume 37

At ease, Savannah: the Coast Guard's on the job	144
Calhoon MEBA Engineering School, The	56
CG 478, LNG and LPG: Views and Practices, Policy and Safety	80
Chemical of the Month	149, 176
Engineroom Ablaze! (MV MARY TURECAMO)	20
Fumigation of Ships' Holds, Unmanned Barges and Freight Containers	36
Helicopter Evacuation at Sea	14
Keynotes	4, 27, 52, 77, 96, 116, 140, 158
Lessons from Casualties	19, 41, 61, 89, 103, 130
Marine Safety Council Membership	131, 173
Marine Safety Manual	18
Marine Safety Photography Contest	9
Marine Safety Poster Contest	8
Maritime Institute of Technology and Graduate Studies, The	104
Maritime Sidelights	3, 27, 51, 75, 95, 115, 139, 155
Merchant Marine Personnel Statistics	11
Merchant Marine Safety Publications	23, 47, 71, 91, 111, 135, 151, 179
MIO New Orleans Takes to the Air	132
Nautical Queries	22, 46, 70, 90, 110, 134, 150, 178
Navigation and Vessel Inspection Circulars	34, 174
Operation Physician	86
Petaluma Experience, The	62
R.E.O. Looks at Radar, The	100
"Safe for workers" means "Safe for marine inspectors"	162
Ship Structure Reports	10
Smart Duck Club, The	108
Statistics of Casualties 1979	166
Toxic Hazard Awareness in Response to Hazardous Materials Spills	119
United States Merchant Marine Academy, The	124
Williamson Turn Tests on the EL PASO ARZEW	31
1980 International Ice Patrol Service	42

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.

DECK

(1) The primary wind belt which has the greatest effect on the set, drift, and depth of the equatorial currents is the

- A. doldrums.
- B. horse latitudes.
- C. trade winds.
- D. prevailing westerlies.

REFERENCE: Bowditch, Duttons

(2) "Priming" of the tides occurs

- A. at times of new and full moon.
- B. when the earth, moon, and sun are lying approximately on the same line.
- C. when the moon is between first quarter and full and between third quarter and new.
- D. when the moon is between new and first quarter and between full and third quarter.

REFERENCE: Bowditch

(3) Charted depth is the

- A. vertical distance from the tidal datum to the ocean bottom plus the height of the tide.
- B. vertical distance from the tidal datum to the ocean bottom.
- C. average height of water over a specified period of time.
- D. average height of all low waters at a place.

REFERENCE: Bowditch

(4) Which is true concerning the speed of fronts?

- A. Cold fronts move faster than warm fronts.
- B. Cold fronts move more slowly than warm fronts.
- C. Cold fronts and warm fronts move with equal speed.
- D. Cold fronts move more slowly at the northern end, thus allowing the warm front to overtake the northern section.

REFERENCE: Meteorology

(5) Set of current is

- A. its velocity in knots.
- B. direction from which it flows.
- C. estimated current.
- D. direction toward which it flows.

REFERENCE: Duttons

ENGINEER

(1) Which statement about copper wire sized by AWG numbers is correct?

- A. Number 12 AWG wire has a higher current rating than 10 AWG wire.
- B. Number 10 AWG wire has a higher dielectric strength than 12 AWG wire.
- C. Number 12 AWG wire is larger than number 10 AWG wire.
- D. Number 12 AWG wire at 25°C has more resistance per 1000 feet than 10 AWG wire at 25°C.

REFERENCE: Hubert

(2) "Thin-tipping" in modern reaction turbines is a procedure designed to

- A. allow for axial expansion.
- B. allow for measurement of radial misalignment.
- C. reduce tip leakage.
- D. prevent casing damage.

REFERENCE: Naval Turbines

(3) Axial thrust in a single-flow multistage impulse turbine is minimal because

- I. there is no pressure drop across the moving blades.
- II. a dummy piston and cylinder are used at the turbine inlet end.

- A. I only
- B. II only
- C. Both I and II
- D. Neither I nor II

REFERENCE: Principles of Naval Engineering

(4) In a compression refrigeration cycle, the refrigerant temperature decreases the most in the

- A. evaporator.
- B. condenser.
- C. compressor.
- D. expansion valve.

REFERENCE: Althouse

(5) The direction of a hydraulic cargo winch is reversed by reversing the hydraulic pump

- I. shaft rotation.
- II. tilting box angle.

- A. I only
- B. II only
- C. Either I or II
- D. Neither I nor II

REFERENCE: Harrington

ANSWERS

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

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

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593. Certain publications listed below are reprints of various sections of the Code of Federal Regulations. Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all Coast Guard-authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

The Federal Register may be obtained by subscription (\$75 per year) or by individual copy (\$1 each) from SupDocs, U.S. Government Printing Office, Washington, DC 20402.

CG No.

TITLE OF PUBLICATION

NOTE: This is a newly revised list; please check carefully for changes.

1	CG-101-1	Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
1	CG-101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
	CG-108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75, 9-26-77, 5-12-80.
	CG-115	Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79, 2-19-80, 4-21-80, 9-29-80.
1	CG-123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 1-3-77, 8-18-77, 9-12-77, 9-26-77, 9-29-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 12-27-79, 1-31-80, 3-3-80, 4-3-80, 4-7-80, 4-10-80, 4-14-80, 5-5-80, 5-30-80, 8-7-80, 9-29-80, 11-24-80.
	CG-169	Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-13-77, 3-16-78.
	CG-169-1	Colregs Demarcation Lines (7-15-77).
1	CG-172	Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
1	CG-174	Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
1,2	CG-175	Manual for Lifboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
1,2,4	CG-178	Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76, 7-24-78, 8-28-80.
6	CG-177	Yacht Admeasurement and Documentation (9-22).
1	CG-182-1	Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
	CG-182-2	Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
	CG-182-3	Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
1	CG-184	Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-25-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
1	OLD CG-190	Equipment Lists (8-1-79), now M18714.3.
1	CG-191	Rules and Regulations for Licensing and Certifying of Merchant Marine Personnel (11-1-76). FR 3-3-77, 5-16-77, 8-8-77, 4-9-79, 12-6-78, 10-20-80.
	CG-227	Laws Governing Marine Inspection (7-1-75).
	CG-242	International Conventions & Conferences on Marine Safety (6-51).
1,2,5	CG-257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 1-31-77, 9-26-77, 9-29-77, 12-19-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 4-10-80, 5-5-80, 9-29-80, 10-20-80, 11-24-80.
	CG-258	Rules and Regulations for Uninspected Vessels (4-77). FR 9-26-77, 9-29-77, 6-14-79, 7-2-79, 12-17-79, 2-4-80, 2-19-80, 11-24-80.
1	CG-259	Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
	CG-268	Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79, 10-20-80.
1	CG-293	Miscellaneous Electrical Equipment List (6-73).
	CG-323	Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 9-26-77, 10-25-77, 12-15-77, 7-17-78, 3-12-79, 6-1-79, 7-2-79, 12-13-79, 2-19-80, 3-3-80, 9-29-80, 10-20-80, 11-24-80.
	CG-329	Fire Fighting Manual for Tank Vessels (1-1-74).
3	CG-388	Chemical Data Guide for Bulk Shipment by Water (1976).
1	CG-403	Great Lakes Pilotage Regulations (7-76).
	CG-439	Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
1	CG-467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
	CG-474	When You Enter That Cargo Tank (3-78).
1	OLD CG-478	Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety (3-80), now M16616.4.
1	CG-480	Oil Pollution Control for Tankermen (6-75).
1	CG-482	Benzene Safe Handling Practices (12-76).
	CG-486	Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
	CG-491	Safety for Small Passenger Vessels (8-77).
	OLD CG-497	Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.
3	CG-515	Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (12-1-77). Ch-1 5-7-80. FR 4-10-80, 4-14-80, 5-5-80, 5-8-80, 5-19-80, 5-22-80, 6-26-80, 6-30-80, 7-17-80, 7-21-80, 8-7-80, 8-11-80, 8-14-80, 8-18-80, 8-28-80, 9-29-80, 10-16-80, 10-20-80, 10-23-80, 10-30-80, 11-24-80.
1	CG-526	Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
		Safety of Life at Sea: Convention, with Regulations, London, June 17, 1960.
		Specifications for Merchant Vessel Equipment (Subparts of Chapter Q, 46 CFR, parts 160 to 164. 4-10-80, 5-5-80, 7-3-80, 9-29-80, 11-10-80.

1 Temporarily out of stock

2 Under revision

3 Available only through Superintendent of Documents (SupDocs)

4 Text can be found in Title 46 of the Code of Federal Regulations, Parts 41-69

5 Text can be found in Title 46 of the Code of Federal Regulations, Parts 90-109.

6 Cancelled