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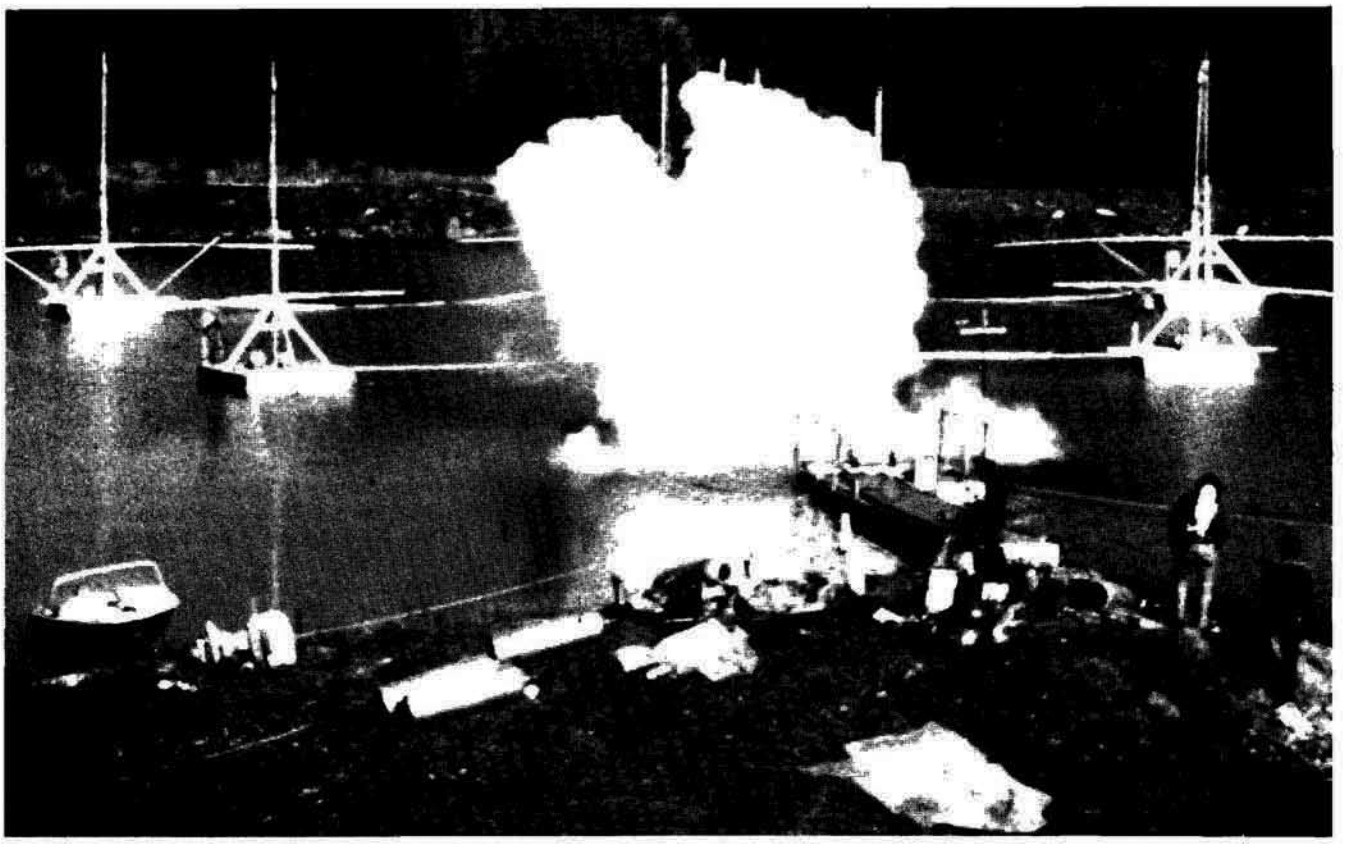

U.S. Department of Transportation
U.S. Coast Guard

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Proceedings

of the Marine Safety Council

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As is evident from this test spill, anhydrous ammonia vaporizes and forms a cloud when it is spilled onto water. A Coast Guard Petty Officer conducting a routine inspection died when he was engulfed in such a cloud. "Anhydrous Ammonia--A Killer" begins on page 152.

Hazardous Material Conference Set

The sixth biennial national conference on the control of hazardous material spills will be held April 19 - 22, 1982, at the Exposition and Convention Center in Milwaukee, Wisconsin. Government, industrial, and academic experts will look at the many aspects of hazardous material handling and more specifically will focus on the broadened legislative and regulatory authority brought about because of the "Superfund" law.

The conference is being cosponsored by the Coast Guard, the U.S. Environmental Protection Agency, the Chemical Manufacturers' Association, and the Bureau of Explosives. For further details, contact: 1982 Hazardous Material Spills Conference Headquarters, Suite 700, 1629 K St. NW, Washington, DC 20006; (202) 296-8246.

Reference Guide to Hazardous Materials Available

A new reference guide has been prepared for Coast Guard units and people in the maritime industry involved with the shipment of hazardous cargoes. Navigation and Vessel Inspection Circular (NVC) 5-81, Literature Concerning Hazardous Cargoes, is a list of suggested references containing data on the physical properties (such as vapor pressure, boiling point, and flash point), toxicological effects, firefighting techniques, and safe handling procedures for most hazardous cargoes subject to regulation.

The NVC can be ordered from: Commandant (G-MP-4), U.S. Coast Guard, Washington, DC 20593.

Applicants Sought for RORAC

The Coast Guard is seeking applicants who are interested in being appointed members of the Rules of the Road Advisory Council (RORAC). Creation of RORAC, to become effective not earlier than October 1, 1981, was mandated in Section 5 of Public Law 96-591, The Inland Navigational Rules Act of 1980.

The Council, which will advise the Secretary of Transportation on matters relating to the Inland Rules and the International Regulations, is to consist of 21 members. To assure balanced representation, members shall be chosen, insofar as practical, from the following groups: (1) recognized experts and leaders in organizations having an active interest in the Rules of the Road and vessel and port safety, (2) representatives of owners and operators of vessels, professional mariners, recreational boaters, and the recreational boating industry, (3) individuals with an interest in maritime law, and (4) Federal and State officials with responsibility for vessel and port safety. In order to ensure the balance of membership required by the Federal Advisory Committee Act, the Coast Guard is particularly interested in receiving applications from minorities, women, and public interest representatives. Selection will be based on expertise in the subjects under consideration.

Interested persons should apply to: Commandant (G-WWM-2), U.S. Coast Guard, Washington, DC, 20593, before August 1, 1981. Supplemental information will then be forwarded. For further information contact Ensign Edward G. LeBlanc of the Waterways Safety Branch at the above address or call (202) 426-4958.

ABS to Inspect New Vessel Construction

The Coast Guard and the American Bureau of Shipping (ABS) have signed a Memorandum of Understanding concerning plan approval and inspection for new vessel construction. On Tuesday, June 9, Admiral J. B. Hayes, Commandant of the Coast Guard, and Mr. William N. Johnston, President and Chairman of the American Bureau of Shipping, signed the memorandum at ABS Headquarters in New York.

"We are exploring ways in which we can place a greater responsibility on the industry and on the masters and chief engineers on certification of some things," Admiral Hayes said. "But in no way will we delegate our law enforcement responsibilities."

He also said the agreement undoubtedly will result in financial savings to the fund-strapped Coast Guard, but it was too soon to estimate how much.

The memorandum provides for Coast Guard acceptance of ABS plan review and inspection of certain items on vessels under construction which are to be classed by ABS and certificated by the Coast Guard. These items include hull structure of conventional ships and barges, inert gas systems, crude oil washing systems, and certain piping systems. Coast Guard procedures regarding the approval and inspection of non-conventional vessels, certain machinery, and electrical systems, as well as traditional safety aspects such as stability, lifesaving, fire protection, and pressure vessels remain unchanged. The Coast Guard will maintain an oversight role to fulfill its statutory mandates.

Copies of the memorandum may be obtained by contacting Commandant (G-MMT-4/13), U.S. Coast Guard, Washington, DC 20593; (202) 426-2197.

OMEGA Meeting Set

The Sixth Annual Meeting of the International OMEGA Association will be held August 18 - 20, 1981, in Montreal, Canada. The program includes the following sessions: System Status, Plans and Approaches, Unconventional Applications, User Group Meetings, Applied Air and Marine Navigation, and Propagation. Further details can be obtained by writing to the International OMEGA Association, Inc., P.O. Box 2324, Arlington, Virginia 22202. ‡

The following items of general interest were published between May 27, 1981, and June 25, 1981:

Final rules: CGD 8-81-801 Safety Zone, Mississippi River Gulf Outlet; interim final rule, June 4, 1981. CGD 81-001 Standards for Boats and Associated Equipment; Applicability to the "OMC Sea Drive" Power System; interpretive rule, June 25, 1981.

Proposed rules: CGD 79-120 Regulated Navigation Areas—Chesapeake Bay Entrance, June 4, 1981. CGD 81-034 Drawbridge Operation Regulations; Passaic River, New Jersey, June 8, 1981. CGD 79-026 Ports and Waterways Safety; Conditions for Vessel Operation and Cargo Transfers; supplemental notice of proposed rulemaking, June 11, 1981. CGD 81-025 Drawbridge Operation Regulations; Kennebec River, Maine, June 11, 1981. CGD 1-80-9-R Establishment of a Special Anchorage Area in Boston Inner Harbor, Boston, Massachusetts, June 15, 1981. CGD 80-096 COLREGS Demarcation Lines; withdrawal of a proposed rule, June 25, 1981. CGD 81-024 Drawbridge Operation Regulations; Bayou Plaquemine Brule, Louisiana, June 25, 1981.

Notices: CGD 81-041 Qualification of Bunge Corp. as a Citizen of the United States, June 4, 1981. CGD 81-047 Rules of the Road Advisory Council; Request for Applicants for Membership, June 15, 1981. CGD 81-049 Memorandum of Understanding Between the U.S. Coast Guard and The American Bureau of Shipping Concerning Plan Approval and Inspection Activities for New Vessel Construction, June 18, 1981.

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 74-125A

These rules will constitute a general revision and updating of the electrical regulations to conform with the latest technology. They will include steering requirements for vessels other than tank vessels. The rules will apply to new Coast Guard-certificated U.S. vessels; no retrofitting will be required.

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

An initial notice of proposed rulemaking (NPRM) was published on June 27, 1977 (42 FR 32700). A supplemental NPRM was published on March 3, 1980 (45 FR Part VII). The earliest possible publication date for the final rule is September 1981.

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.

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 advance notice of proposed rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank barge construction 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 informed the public of a deferment in the rulemaking 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 was chosen to conduct the study. Part of the study, a two-day workshop, took place April 15 and 16, 1980. The study is to be completed soon. 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.

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

These rules will reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of the rules is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, the new rules will help clarify the existing rules. Finally, the new rules cover 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 rules, an additional NPRM is scheduled for publication in October 1981.

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

These rules will amend the current regulations by including the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk" adopted by the Inter-Governmental Maritime Consultative Organization (IMCO). As the use of liquefied gas has increased, so have the problems associated with it. These new rules take into account the unique properties and dangers associated with liquefied gas.

The environmental impact statement and regulatory analysis were completed in February 1979. An NPRM on the rules is tentatively scheduled for December 1981.

Licensing of Pilots CGD 77-084

These rules take 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 shiphandling 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). The following public hearings have been held in 1981: January 14 in Cleveland, Ohio, January 27 in Washington, DC, February 3 in New Orleans, Louisiana, and February 10 in San Francisco, California. Because of the public comments received, substantial revisions to the proposed rules are being considered.

Revision of 46 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 78-041

These rules govern the operation of tank vessels in the Puget Sound area. They were 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

These rules will establish health and safety requirements for installations of companies engaged in oil field exploration and development. They will provide more comprehensive protection for personnel employed on oil industry vessels and installations on the Outer Continental Shelf (OCS). A great deal of controversy originally surrounded this project because of confusion over who was responsible for these operations, the Coast Guard or the Department of Labor's Occupational Safety and Health Administration (OSHA). The Outer Continental Shelf Lands Act of 1978 (P.L. 95-372) assigned the Coast Guard authority for promulgating and enforcing safety and health standards for working conditions on the OCS of the United States. The enactment of the aforementioned OCS Lands Act of 1978 and the signing of a Memorandum of Understanding (45 FR 9142) by the Coast Guard and OSHA have eliminated much of the controversy. As a result, the Secretary of Transportation has approved the Coast Guard's request to downgrade this project from "significant" to "non-significant." A target date has not yet been set for publishing an ANPRM.

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

These rules 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 substances should be specified.

New NPRMs have been approved by the Secretary of Transportation and were published on December 18, 1980 (45 FR 83268 and 83290). The following public hearings have been held in 1981: January 21 in St. Louis, Missouri, February 4 in New Orleans, Louisiana, February 18 in Long Beach, California, February 25 in Washington, DC, and April 1 in Washington, DC. Because of the public comments received on this project, substantial revisions are being considered. A target date for a supplemental NPRM has not yet been set.

Shipboard Noise Abatement Standards CGD 79-134

These standards will establish a maximum daily noise exposure level for shipboard personnel and industrial personnel on Outer Continental Shelf facilities. The standards will not restrict sound levels in specific compartments but only require that the personnel exposure during a 24-hour period not exceed a certain limit. An exception to this would be the specification of a maximum sound level in berthing spaces of 75dB(A), as envisioned. The limits would be more stringent for units contracted after 1988.

Development of this proposal has been aided by a Coast Guard-contracted study performed by the U.S. Naval Ocean Systems Center (NOSC), San Diego, California. The study evaluated sound levels aboard several U.S. merchant vessels along with other available information and made recommendations on standards to control and/or eliminate the noise hazard. Copies of the study are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; NOSC technical documents numbers 243, 254, 257, and 267 and technical report number 405 should be requested.

The Coast Guard is contemplating applying these regulations to "uninspected" vessels (e.g., towboats less than 300 G.T.). Although it is widely recognized that noise reduction on these vessels is quite complex, it is imperative that efforts be made to introduce current noise control technology on these vessels to begin to reduce noise exposure.

An NPRM is scheduled for September 1981.

Personnel and Manning Standards for Foreign Vessels CGD 79-081b

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

The public comments on this project are currently under review. The Coast Guard anticipates the development of a resolution to the IMCO convention on "Standards of Training, Certification, and Watchkeeping for Seafarers, 1978" (STW). Since the resolution may affect this project, no further action will be taken until IMCO acts on the STW resolution.

Damage Stability and Flooding Protection Standards for Great Lakes Bulk Dry Cargo Vessels CGD 80-159

This project has as its primary objective the prevention of further loss of life or property on the Great Lakes as a result of loss of buoyancy on bulk dry cargo vessels. As the project is envisioned, this will be achieved mainly through design requirements. Other solutions are also being considered, however. The need for protection against flooding on bulk dry cargo vessels on the Great Lakes was noted as far back as 1928. Recent casualties, most notably the sinking of the SS EDMUND FITZGERALD in 1975 with the loss of all hands, have added new impetus to efforts to correct this problem.

Two ANPRMs were previously published under a different docket number (CGD 77-162), one on March 16, 1978 (43 FR 10946), and the other on August 14, 1980 (45 FR 54095). These advance notices proposed subdivision requirements as a solution to the safety problem. Public comments on the ANPRMs *indicated that the costs of meeting* subdivision standards might place bulk dry cargo vessels in an uncompetitive position vis-a-vis the railroad and trucking industries. The thrust of the project has thus shifted from subdivision requirements only to a more comprehensive scheme including methods of reducing flooding and providing for crew safety. Alternative approaches being considered include:

a. Bad-weather warning system
b. Vessel traffic service system
c. Inspection of hatch covers and clamps before each sailing
d. Increased freeboard (i.e., reduced draft)
e. Restricted shipping season
f. High-water alarms and dewatering pumps
g. Collision avoidance systems and/or improved maneuvering characteristics
h. Improved lifesaving devices.

In approving the workplan for this project in January, the Marine Safety Council agreed to label it "significant." Publication of an NPRM is tentatively scheduled for November or December 1981.

* * *

On September 1, 1981, there will be a **public hearing** on CGD 80-113 Lifesaving Equipment: Improved Standards for Stability of Liferafts. The hearing will be held from 9:30 a.m. to 12:00 noon at Coast Guard Headquarters, 2100 Second St. SW, Washington, DC, in Room 3201. Anyone wishing to speak at the hearing should contact the Marine Safety Council at the address shown in the introduction to the Keynotes section. An ANPRM was published on this subject in the Federal Register on June 29, 1981.

A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Thursday, April 2, 1981 Federal Register (46 FR 20035).

Actions of the
Marine Safety Council

June Meeting

CGD 81-010 Requirements for Approval and Servicing of Inflatable Liferafts

The present requirements for liferaft servicing are considered an economic burden on the shipping industry. A change in regulations would permit independent inspection organizations to perform the inspection and evaluation of proposed servicing facilities and servicing personnel on behalf of the Coast Guard, in foreign countries as well as in the U.S. Raft servicing would be witnessed by an inspector of the independent organization. The regulations would also require liferaft manufacturers to maintain a closer relationship with their authorized servicing facilities. An NPRM is expected to be published in about six months.

CGD 81-030 Automated Main and Auxiliary Machinery

Navigation and Vessel Inspection Circular (NVC) 1-69, "Automated Main and Auxiliary Machinery" is in need of updating. Rather than issue a new NVC, the Coast Guard will incorporate the revision in Title 46 of the Code of Federal Regulations, Part 62 (46 CFR 62). An NPRM will be published toward the end of the year. ‡

Concern Grows Over Improper Servicing of Inflatable Liferafts

The Coast Guard continues to receive reports of improper servicing of inflatable liferafts: rafts whose annual overhaul and repair has been performed by parties not authorized by either the raft manufacturer or the Coast Guard. (Coast Guard supervision of liferaft servicing is normally required only when the liferaft comes from a vessel inspected and certificated by the Coast Guard.) Several reports stated that the rafts would have malfunctioned in an emergency.

Because different types of rafts require different replacement parts and packing procedures, servicing of rafts ashore should be limited to facilities and depots recommended by the raft manufacturer. Unless rafts are overhauled and recertified by authorized firms, mistakes in packing can occur. Manufacturers waive responsibility for the operation of their rafts unless they are serviced by authorized stations.

In an effort to improve this situation, the Coast Guard issued Navigation and Vessel Inspection Circular (NVC) 9-80, which describes the precautions to be observed by vessel operators, masters, and persons responsible for the annual servicing of inflatable liferafts. The facilities affiliated with each manufacturer are listed in the Coast Guard publication Equipment Lists, COMDTINST M16714.3 (old CG-190). This publication can be obtained by writing to: Commandant (G-MMT-3), U.S. Coast Guard, Washington, DC 20593.

IMCO, the Inter-Governmental Maritime Consultative Organization, has once again expressed its concern about improper servicing of liferafts in Circular 300, dated February 2, 1981. This circular says, in part, that "the major cause (of the problem) was servicing carried out by stations not authorized by the Administration (Government) or manufacturer to service the type of liferaft concerned. As a result, the personnel carrying out the servicing did not have the proper experience, training, spares, materials, or servicing instruction."

At its 43rd session, IMCO's Maritime Safety Committee approved a Recommendation on Servicing of Inflatable Liferafts (Annex 6 of MSC XLIII/18). The Committee noted that many Member Governments had expressed concern that inflatable liferafts throughout the world were not, in many cases, being properly maintained. The Committee described as "acceptable" only those servicing stations which had been approved and inspected by the Government and also accredited by the manufacturer of the liferaft which was to be serviced. Manufacturer accreditation should be in the form of a certificate to the servicing station authorizing such work on specific manufacturers' inflatable products by named qualified technicians for a fixed period of time.

Member Governments of IMCO are urged to require servicing stations operating within their jurisdiction to hold permits. These permits, issued by the Government when it has satisfied itself that the inspection and maintenance services are adequate, would allow those servicing stations to carry out such work on specific manufacturers' inflatable products upon authorization of the manufacturer. To ensure that the list of servicing stations is known worldwide, manufacturers should compile and regularly update such a list and circulate it to the Member Governments and the shipping industry. Shipowners, who are responsible for seeing that their liferafts are serviced at the proper intervals, are urged to send their liferafts only to approved servicing stations. ‡

Coast Guard Reviews Boating Safety Regulations

by Lysle Gray
Standards Development Branch

At its May meeting, the National Boating Safety Advisory Council (NBSAC) recommended that 95 percent of the Coast Guard's boating safety regulations continue to be enforced with very minor changes. Despite all the rhetoric about deregulating industry and getting the government off the public's back, this group of boating experts from the public, the industry, and the States found that most of the Coast Guard regulations were not only needed but also reasonable.

NBSAC is the watchdog group established by Congress under the Federal Boat Safety Act of 1971 to consult with the Coast Guard on boating safety matters. NBSAC's membership is divided equally among the boating industry, the boating public, and State Boating Law Administrators. The 21 members of the Council, who are appointed to three-year terms, tend to be conservative and safety-conscious. Most of them are company presidents, chief executives, or top management people who are also active in a variety of boating and community organizations.

The members of NBSAC had approximately six weeks to review the present regulations before the meeting. Members of NBSAC from the boating industry took special care to learn from affected manufacturers about those regulations which they considered objectionable. An issue of the National Marine Manufacturers Association (NMMA) newsletter, Interport, asked boat manufacturers to write in with any complaints about the regulations. In addition, engineers from several boat manufacturing companies met with the boating industry members of NBSAC all day prior to the meeting.

On the first day of the meeting NBSAC was divided into three committees to study regulations in the following general groups: operator requirements, loading-related requirements, and requirements involving protection against fire and explosion. Each committee had approximately equal representation from industry, public, and State interest groups. All of the committee meetings were open to the public, and a free interchange with those present was encouraged.

Mr. Robert O. Cox, of Fort Lauderdale, Florida, a member representing the industry, reported for the committee studying operator regulations. These regu-

lations deal with, among other things, visual distress signals, life jackets, fire extinguishers, backfire flame arrestors, and some administrative requirements. His committee recommended that boats in some additional geographical areas be exempted from the requirement for carrying visual distress signals, that some existing flare pistols be accepted by the Coast Guard even though they are not marked with the required Coast Guard approval number, that manufacturers be given the option of selling pyrotechnic devices (flares and smokes) with longer usable lives (the present limit is three years), and that the Coast Guard provide information to the public on the disposal of outdated pyrotechnic devices.

Mr. Cox's committee also made a potentially controversial recommendation. It recommended that boaters on vessels less than 16 feet in length no longer be given the option of using seat cushions and other throwable lifesaving devices but instead be required to use wearable life jackets. This same issue was brought before the Council several years ago. The proposal was rejected at that time.

In the administrative area, the committee recommended that the procedures for obtaining regatta permits be simplified and that these permits not be required for any activity that did not block a navigable channel. Finally, in keeping with the general concept of user charges, the committee recommended that the Coast Guard increase the amount it charges for boat registration in those States where there is no State-controlled numbering system (Alaska, New Hampshire, and Washington).

Mr. A. Newell Garden, of Lexington, Massachusetts, a member from the public sector, was Chairman of the committee reviewing loading-related requirements. His committee discussed capacity labels, safe loading, safe powering, flotation, and the administrative requirements of certification, hull identification, and defect notification. This group did not recommend any changes in the regulations but did recommend that the Coast Guard study additions to the regulations which would give the manufacturers a wider choice of means by which to comply with the regulations.

In computing the horsepower for an outboard boat the manufacturer is presently limited to using a formula which includes the length and beam of the boat. The committee recommended as an alternative the use of a performance test course method in which a boat with a certain motor is driven through a specified maneuver. The American Boat and Yacht Council has developed several maneuvering courses which can be used to rate a boat for stability at speed. The Coast Guard has been reluctant to adopt that approach because of its reliance on the skill of the test boat driver. Underwriters' Laboratories, Inc., of Tampa, Florida, and Ideamatics, Inc., of Washington, DC, are currently doing research on powering for the Coast Guard. A report is expected in October 1981.

Mrs. Margaret C. Mercado, the State Boating Law Administrator from Sacramento, California, reported on the regulations for fuel systems, electrical systems, ventilation, and outboard motor start-in-gear protection. The largest group of changes was to the fuel systems regulations, where the committee suggested that 20 individual items be changed or eliminated. They were mostly minor details in the regulations which the committee believed to be more related to workmanship and quality than to identifiable safety hazards. Several people commented that compliance with voluntary safety standards, which most of the manufacturers follow, would ensure that these systems would continue to be manufactured in a manner very similar to that which is required by the present regulations.

Mrs. Mercado's committee held a lengthy discussion of a problem which boat owners and dealers have with the anti-siphon valves which are presently required by the fuel systems regulations. These valves sometimes restrict the flow of gasoline, causing the engines to stop or burn out pistons. Many dealers, mechanics, and owners routinely remove the anti-siphon valves to solve this problem. The NBSAC committee recommended that the Coast Guard study the problem and be prepared to discuss the possible elimination of the requirement at the next meeting of the Council.

The committee recommended that five items in the electrical systems regulations be either changed or eliminated. Again, these are minor requirements which do not have a significant effect on hazards associated with electrical systems, and all of the items recommended for elimination from the Federal standard are currently required by voluntary standards. For example, the Coast Guard electrical systems regulations require the positive terminal of a battery to be marked. Mr. Dan Stemper of the Mirro Boat Company commented that this was an unnecessary requirement because all manufacturers of batteries currently mark both the positive and the negative terminals.

Coast Guard representatives attending the meeting and Mr. Donald I. Reed of the NMMA held a heated discussion concerning the industry's proposal that two requirements be eliminated: the requirement for limiting the amount of current in a given size of wire and the requirement that wires be of a recognized type. The industry's position was that the voltage drop in conductors is the more usual design parameter and that, in the typical low-voltage application, a conductor reaches its limit for voltage drop long before it reaches its limit for current capacity. While acknowledging the importance of voltage drop in low-voltage circuits, the Coast Guard contended that without the requirement for regulation of current capacity some conductors would be exposed to as much as a 50 percent excess of current, which would heat the conductor and cause eventual deterioration of the insulation.

Neither side offered an agreeable compromise, and in the end the NBSAC committee voted to retain the present regulation on current capacity. The members also agreed to retain the requirement for conductors of recognized types because of the Coast Guard's contention that, in the absence of a Federal regulation, various unsuitable conductors (such as lamp cord) might be used in boats.

Mr. William Shaw, Vice President of Pearson Yachts in Portsmouth, Rhode Island, presented the industry's view that the Coast Guard requirements covering installation of devices producing sparks—such as motors and switches—are unnecessarily complex

and expensive. He said that, because of the need to rearrange bulkheads and purchase special equipment, it costs as much as $ 500.00 per boat to comply with the Coast Guard requirements. The Coast Guard countered this by stating that, while compliance for some large boats, such as those built by Pearson Yachts, might cost $ 500.00, the average for all boats to which all the regulations apply was somewhat less than $ 100.00 per boat. However, the Coast Guard did agree with Mr. Shaw that the regulations on isolation of ignition sources were complex and not easily understood by any person who had not worked previously with these regulations in designing boats.

The Coast Guard contended that the complex parts of the regulation are actually those parts which provide loopholes to permit a boat to be built without explosion-proof electrical devices. Mr. Reed accepted that statement but asked why the Coast Guard could not have a simpler, more easily understood criterion for isolation. He suggested that all spaces requiring ventilation should be exempt from the ignition protection requirements. Since it was obvious that this question could not be quickly resolved, the committee voted to recommend that the Coast Guard report back on the pros and cons of a simpler regulation at the next meeting of NBSAC.

Ventilation of gasoline-powered boats, the last item discussed by the committee, illustrates the problems and paradoxes involved in any effort to rescind safety regulations. The industry representatives cited Coast Guard research and comments to the effect that the natural ventilation produced by the normal air flow around the boat was unreliable and perhaps totally ineffective in eliminating explosive vapors inside boats. The industry does support the Coast Guard's recent requirement that some form of powered ventilation be installed in all engine rooms.

The Coast Guard pointed out that, while it was essentially in agreement with the industry's stand, that stand was based on experimental data and deductive reasoning which might not be representative of the real world. The Coast Guard believes that many in the boating public, in particular the marine surveyors, would adamantly oppose elimination of a Federal requirement for natural ventilation. It surmises that even in the absence of a Federal regulation most boat builders would be forced to continue installing a natural ventilation system in order to have their boats approved by marine surveyors for insurance purposes.

Some of the committee members stated that the engine room of a boat required a large area of ventilation in order for the engine to operate and that, while boats inspected under the Coast Guard's Subchapter T for small passenger vessels (46 CFR 175 to 187) require constantly running powered ventilation, there is no requirement for natural ventilation. The committee decided to add this question to the list of items to be discussed at the next meeting and expressed the desire to hear from all sides on the question of eliminating the natural ventilation regulations.

On the second day of the meeting all three committees delivered their reports at a plenary session of the Council. Rear Admiral H. W. Parker, Chief of the Office of Boating, Public, and Consumer Affairs, complimented the Council for accomplishing a difficult task. He said that not only had the Council been required to read and try to understand thousands of words in Federalese, it also had to carefully balance the need for safety on the water with the cost and inconvenience of achieving that safety through Federal regulations.

The Admiral reminded the Council that the recommendations had to be put into the form of a Notice of Proposed Rulemaking for publication in the Federal Register so that the public would have a chance to comment before any final action was taken. It would appear that it takes a regulation to eliminate a regulation.

The meeting of the National Boating Safety Advisory Council was a unique and instructive experience. The most informed representatives of a regulated public and industry reviewed the Boating Safety regulations in detail. Out of approximately 7000 lines of regulations they decided that only about 300 lines, or fewer than five percent, needed to be changed. ⚓

TSAC Meets for First Time

The first meeting of the Towing Safety Advisory Committee was held on May 27 and 28 at Department of Transportation headquarters, 400 7th Street SW, Washington, DC. Rear Admiral Clyde T. Lusk, Chief of the Office of Merchant Marine Safety and a member of the Marine Safety Council, represented the Coast Guard at the meeting.

Rear Admiral Lusk opened the meeting by talking briefly about problems in the regulatory process. Commander A. D. Utara, Executive Secretary of the Marine Safety Council, followed and provided the committee with some background on the recent changes affecting the development of regulations. Specifically, he discussed the Regulatory Flexibility Act of 1980 (P.L. 96-354), the Paperwork Reduction Act of 1980 (P.L. 96-511), and Executive Order 12291 (a directive of the present Administration intended to

reduce regulatory costs to the public).

The meeting was then turned over to Mr. Frank Stegbauer, Chairman of TSAC. Following Mr. Stegbauer's remarks on the towing industry's past relationship with the Coast Guard, the committee members received status reports from the managers of various Coast Guard regulatory projects. The members also heard a report on the Coast Guard's current Roles and Missions study from Captain B. F. Hollingsworth, Chairman of the Roles and Missions Study Group. The committee ended the day by establishing temporary subcommittees to work on the projects of most concern to the Coast Guard and the committee.

Discussion on regulatory projects continued on the second day of the meeting. The afternoon session consisted primarily of committee business. Chairmen were appointed and members assigned to the subcommittees established the previous day. Also, the subcommittees were assigned topics for discussion and review.

The Commandant of the Coast Guard, Admiral John B. Hayes, appeared during the second day to welcome the committee members. After giving a brief overview of Coast Guard regulatory policy, Admiral Hayes responded to questions from the audience and the committee members.

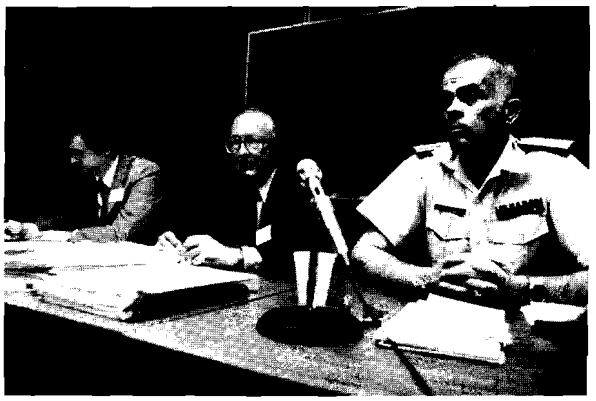
The final order of business for the committee was the establishment of a tentative schedule for upcoming meetings of the full committee. The next meeting has been set for August 25 - 26, 1981, in Room 3201 of Coast Guard Headquarters, 2100 Second St. SW, Washington, DC.

The temporary subcommittees established by the Towing Safety Advisory Committee, the topics assigned them, and the members appointed to them are as follows:

Subcommittee on:

PORT FACILITIES AND OPERATIONS:
Hazardous Substance Pollution Prevention (CGD 78-032). Milton Barschdorf (Chairman), James Free, Peter Brix, Robert Patrick

Rear Admiral Clyde Lusk (far right at the head table) delivers the opening remarks at TSAC's first meeting.



TSAC Chairman Frank Stegbauer (middle) and Rear Admiral Clyde Lusk (right) consider a point made by a member of the audience. At left is Steven Scalzo, Vice Chairman of TSAC.

TANK BARGES—SUBCHAPTERS "O" AND "D," CONSTRUCTION, OPERATION, AND RETROFIT:
Tank Stop Valves (CGD 79-159); Bridge Visibility on Commercial Vessels (CGD 80-134). Robert Patrick (Chairman), Lobie Stone, Charles Lehman, Lester Sutton, Palmer Hamilton

PERSONNEL—LICENSING, CERTIFICATION, AND MANNING
New Tankerman Regulations (CGD 79-116 and 79-116a); Performance Standards for Pilots (CGD 77-084); Standards of Training, Certification, and Watchkeeping for Seafarers, IMCO; Tonnage Measurement of Ships, 1969; the future of radio officers. Thomas Magliocca (Chairman), Robert Younge, John Brady, Palmer Hamilton, William Stevens, Richard Currence

PERSONNEL—SAFETY STANDARDS AND WORKING PLACE STANDARDS
Noise level standards; asbestos standards; other vessel emissions harmful to vessel personnel. William Stevens (Chairman), Neil Diehl, Robert Younge, John Brady, Charles Lehman, Thomas Magliocca, Richard Currence

REVIEW AND RESTRUCTURE OF EXISTING REGULATIONS
Vessel Casualty Reporting (CGD 76-170); Port and Tanker Safety Act Delegations (CGD 79-026). Neil Diehl (Chairman), Richard Currence, Robert Younge, Robert Patrick

ROLES AND MISSIONS FOR THE UNITED STATES COAST GUARD
Plan review and vessel inspections by the American Bureau of Shipping; Roles and Missions (input to this study due at Coast Guard by August 1, 1981). Charles Lehman (Chairman), Neil Diehl, Lester Sutton, Peter Brix, John Brady, Lobie Stone, Milton Barschdorf

The Chairman of TSAC, Frank Stegbauer, and the Vice Chairman, Steven Scalzo, are both ex officio members of all subcommittees. ‡

A Look at the New Inland Navigation Rules

(Part 5 of a 5-part series)

This is the last article in a series discussing the major provisions of the new Inland Navigation Rules. These Rules go into effect on December 24, 1981 (except on the Great Lakes, where they will go into effect on April 1, 1982). The new Inland Rules follow the format and numbering system used in the 72 COLREGS. This article covers Part E (Exemptions) and the five regulatory technical annexes. Unless otherwise indicated, all references to "Inland Rules" are to the newly unified rules promulgated by the Inland Navigational Rules Act of 1980.

PART E--Exemptions

This Part contains only one rule, Rule 38--Exemptions. It is similar to and retains the intent of Rule 38 of the 72 COLREGS. Rule 38, which applies to vessels existing on December 24, 1980, the date of enactment of the Inland Navigational Rules Act of 1980, contains temporary and permanent exemptions from certain light and sound signal appliance requirements.

TECHNICAL ANNEXES

While the main body of the new Inland Rules is statutory, i.e., a law passed by Congress, the more flexible regulatory route was chosen for the technical annexes, since regulations are more easily updated. Section 3 of the Inland Navigational Rules Act requires the Coast Guard to establish four annexes:

Annex I.	Positioning and Technical Details of Lights and Shapes
Annex II.	Additional Signals for Fishing Vessels Fishing in Close Proximity
Annex III.	Technical Details of Sound Signal Appliances
Annex IV.	Distress Signals

Section 3 goes on to say, "These annexes shall be as consistent as possible with the respective annexes to the International Regulations." Section 3 also authorizes the publication of pilot rules, which will be contained in Annex V.

By the time you read this article, the five annexes should have been published in the Federal Register as proposed rules. Publication in final rule form is expected in the fall. The discussion that follows is based on the proposed regulations. Provisions may be changed in the final rule.

Annex I. Positioning and Technical Details of Lights and Shapes

The proposed Annex I is based on Annex I to the 72 COLREGS but has been changed to reflect the special conditions found on U.S. inland waters. The proposal also incorporates minor amendments to Annex I to the 72 COLREGS which are now in process but have not yet become effective.

Annex I would supplement the Inland Navigation Rules covering lights and shapes by specifying the vertical and horizontal positioning and spacing of lights, details of location of direction-indicating lights for fishing vessels, dredgers, and vessels engaged in underwater operations, requirements for screens for sidelights, color and dimensions of shapes, color of lights, intensity of lights, requirements for horizontal and vertical sectors, and details of the optional maneuvering light.

It would incorporate the pending 72 COLREGS amendment to the definition of "height above the hull," which clarifies that the height should be measured beneath the light in question. The proposal defines "practical cut-off" separately for lights used on vessels under 20 meters in length and lights used on larger vessels (the term "practical cut-off" is used but not defined in Annex I to the COLREGS). The definitions used for the two vessel classes reflect the characteristics of the lights suitable for the two size ranges.

§84.03 prescribes vertical positioning and spacing of lights. The minimum requirements for masthead light height and spacing have been reduced from those specified in the 72 COLREGS to account for the low bridges over inland waterways. The reduced heights and spacings would not detract from the mariner's ability to detect and assess another vessel at night because the distance at which other vessels are first encountered on inland waters is generally much less than on the open ocean.

The section would also permit the sidelights to be carried higher than is allowed by the 72 COLREGS. It is important for the sidelights of towing vessels pushing ahead to be seen over their barges because Western Rivers towboats are not required to carry masthead lights when towing. The 72 COLREGS call for the sidelights to be displayed no higher than three-quarters the height of the forward masthead light above the hull. The vertical separation between masthead light and sidelights would commonly be at least 3 meters under this requirement. The proposed minimum separation for the Inland Rules is 1 meter.

§84.03(d) prescribes the vertical positioning for the masthead light or optional all-round light for vessels less than 12 meters in length. This paragraph also contains a requirement for screening of the masthead or all-round light if the light would otherwise interfere with the operator's night vision. A frequent complaint of operators of small open boats is that the bright white navigation light, especially the stern pole-mounted all-round light, illuminates the interior of the boat and reflects off the inside of the windshield, substantially impairing night vision. To combat this problem, operators sometime extinguish the light or cover it or otherwise mask it to reduce the glare. A much safer solution is a screen installed to limit the vertical dispersion of the light so that it does not illuminate the boat's interior. The requirement comes into play only if glare is a problem. If a masthead light and sternlight are used instead of the optional all-round light, there is normally no glare problem.

The proposal also incorporates a pending change to the 72 COLREGS permitting a towing vessel having forward and after masthead lights to display the additional masthead lights for towing (Rule 24(a)) on either the forward or after mast. The 72 COLREGS now require them to be on the forward mast.

§84.03(f) of the proposal adopts a pending amendment to the 72 COLREGS. The amendment would allow greater flexibility in the placement of masthead lights.

Several pending editorial amendments to Annex I to the 72 COLREGS have also been incorporated in this section, as well as throughout the proposed Annex.

§84.05 prescribes the horizontal positioning and spacing of lights. As with the vertical positioning and spacing, the requirements for horizontal positioning and spacing have been made more flexible than those in the 72 COLREGS to accommodate the special characteristics of inland waterways vessels and the shorter distances at which vessels are first encountered. A pending 72 COLREGS Annex I amendment has been incorporated which requires that the special lights for a vessel restricted in its ability to maneuver be placed at least 2 meters off centerline when those special lights are postitioned between the forward and after masthead lights. This is so they do not interfere with the use of the two masthead lights as a range.

§84.07 gives the details of location of direction-indicating lights for fishing vessels, dredgers, and vessels engaged in underwater operations. The new Inland Rules 26(c) and 27(b) contain the requirements for these special purpose lights. This section is identical to the corresponding 72 COLREGS Annex I section.

§84.09 gives the requirements for screens for sidelights. This section incorporates the pending 72 COLREGS amendment relaxing the requirement for screens for sidelights used on vessels less than 20 meters in length.

§84.11 gives the color and dimensions of day shapes and is identical to that section of the 72 COLREGS.

§84.13 sets out the color specifications (chromaticity) for the white, green, red, and yellow lights prescribed by the Inland Rules. The requirements in this section are identical to those in the 72 COLREGS.

The license examinations will reflect the new rules beginning in December, when the rules become effective.

§84.15 follows the 72 COLREGS Annex I section for intensity of lights. Intensity requirements are given in candelas for corresponding ranges of visibility.

§84.17 gives the requirements for horizontal sectors of lights, that is, it prescribes the intensity of light emitted in a horizontal plane at every point within the sector where the light should be visible and the rate at which the intensity should drop off at the ends of the sectors (cut-off). The section is essentially the same as its counterpart in the 72 COLREGS, but a non-obscuration requirement for the optional Great Lakes all-round light (Rule 23(d)) has been added.

§84.19 prescribes vertical sectors for lights, or how far above and below the horizontal a light should be visible. This section is essentially the same as its counterpart in the 72 COLREGS.

§84.21 is identical to §84.21 of the 72 COLREGS. It recognizes that non-electric navigation lights will probably not be able to meet the standards for electric lights but nevertheless permits their use.

§84.23 gives the location for the optional maneuvering light (Rule 34(b)). The minimum vertical spacing requirement is less than that in the 72 COLREGS because of inland waterways bridge clearances and the close distances at which other vessels are first encountered.

Annex I would provide the technical and performance specifications which would have to be met for compliance with the configuration and range requirements set out in the statutory Inland Navigation Rules. This Annex would apply only to U.S. inland waters. Vessels using International Rules waters must comply with Annex I to the 72 COLREGS and need not be concerned with the requirements of the proposed Annex I to the Inland Rules, even while operating on inland waters. Rule 1(b)(ii) of the new Inland Rules states that "All vessels complying with the construction and equipment requirements of the International Regulations are considered to be in compliance with these Rules." The proposed Annex I would apply only to vessels operating exclusively on U.S. inland waters.

Annex II. Additional Signals for Fishing Vessels Fishing in Close Proximity

Annex II would provide trawlers and purse seiners with standardized light signals to indicate when they were setting their nets, hauling their nets, pair trawling, or hampered by purse seine gear, or when a net had come fast on an obstruction. The use of these signals would be voluntary. The proposed Annex II to the Inland Rules would be identical to Annex II to the International Rules. These signals would aid vessels fishing in groups to coordinate their movements.

Annex III. Technical Details of Sound Signal Appliances

The proposed Annex III is based on Annex III to the 72 COLREGS. Changes were made in response to problems with the 72 COLREGS Annex III and to reflect the special situation of the inland waters towboats. The problems in Annex III to the 72 COLREGS are being discussed by the Inter-Governmental Maritime Consultative Organization (IMCO), and changes are expected to result, but these would not become effective for at least several years. Many of the changes from Annex III to the 72 COLREGS proposed for the Inland Rules were generated by the IMCO discussions. The Coast Guard intends to propose to IMCO that certain provisions of the international Annex III be made consistent with the proposed Annex III for U.S. inland waters.

§86.01 gives the fundamental frequency limits for sound signals and the frequency range in which sound signal intensity may be measured to determine range of audibility. The upper limit for fundamental frequency would be lowered from that specified in the 72 COLREGS, and the frequencies which could be measured to determine audibility would be expanded. These changes are being proposed to reduce hearing impairment on the source vessel and to more accurately reflect audibility ranges. The changes would affect (for the better) primarily vessels less than 75 meters in length which have higher frequency sound signals and lower required audibility ranges. The 72 COLREGS Annex III does not now adequately recognize the importance of the higher frequency component for these smaller vessels. Even though the higher frequencies do not carry as far as the low frequencies, the human ear is more sensitive to them, and, for shorter distances, the higher frequencies are relatively more easily heard. The changes would allow a reduction in overall sound intensity while requiring the same audibility range, reducing hearing impairment on the source vessel. This is especially important on small vessels, where it is difficult to put much distance between the sound signal appliance (whistle) and the listening post.

§86.03 assigns fundamental frequency ranges to different sizes of vessels, giving the longer vessels the lower tone whistles. The upper frequency limit for vessels between 12 and 20 meters long would be reduced from that in Annex III to the 72 COLREGS. This may preclude the use of the smallest and highest pitched hand-held gas-operated whistles by vessels over 12 meters in length. Whistles used on vessels less than 12 meters in length are not covered by the proposed Annex III or by Annex III to the 72 COLREGS. Rule 33 requires only that such small vessels ". . . be provided with some other means of making an efficient sound signal." Such means include, of course, but are not limited to, those whistles which are acceptable for larger vessels.

§86.05 gives the sound pressure levels in decibels (dB) for each class of vessel. The minimum sound pressure levels are being modified (as discussed above) to account for the variation in propagation and hearing sensitivity characteristics produced by different frequencies. For each class of vessel, alternative minimum sound pressure levels have been given in accordance with the frequencies being measured.

§86.07 covers directional properties of whistles and has been changed from the 72 COLREGS so as not to penalize a whistle for having a louder than minimum required intensity in the forward direction.

§86.09 concerns positioning of whistles, and §86.11 provides that widely separated whistles not be sounded simultaneously. Both of these sections are the same

as the corresponding 72 COLREGS Annex III provisions.

§86.13 prescribes the rule for combined whistle systems. The corresponding 72 COLREGS provision has been rewritten to make clear that the multiple horn whistles used on many Western Rivers towboats are acceptable and are treated as a single whistle.

§86.15 is not found in Annex III to the 72 COLREGS. This section permits towing vessels to use a whistle appropriate for the length of their longest tows, even when they are not towing or are pushing shorter tows.

Subpart B of the proposed Annex III contains the rules for bells and gongs and is the same as its counterpart in the 72 COLREGS.

Annex III would provide the technical and performance specifications which would have to be met for compliance with the sound signal requirements set out in the statutory Inland Navigation Rules. Like Annex I, Annex III would apply only to vessels operating solely on U.S. inland waters. Vessels using International Rules waters must comply with Annex III to the 72 COLREGS and need not be concerned with the requirements of the proposed Annex III to the Inland Rules, even while operating on inland waters.

Annex IV. Distress Signals

Annex IV would provide mariners on inland waters with a variety of standardized signals to be used exclusively for indicating distress and the need for assistance. The mariner would be free to choose from the different signals listed. The proposed Annex IV to the Inland Rules contains all of the signals listed in Annex IV to the International Rules and, in addition, lists what is commonly called the strobe light.

This addition is proposed in response to the widespread use of strobe lights to indicate distress and the need for assistance, both on inland and on international waters. Strobe lights are now used for other purposes as well, such as to attract attention. This proposed rule specifies the characteristic of the strobe signal to indicate distress; other uses of strobe lights would have to adopt different signal characteristics. The proposed characteristic to indicate distress in 50 - 70 flashes per minute. This characteristic was chosen because the small "personal" strobe lights used most frequently in man-overboard situations have this simply produced characteristic.

Annex V. Pilot Rules

The scope of the proposed pilot rules is severely reduced from that of the pilot rules now in use. Most of the provisions of the old pilot rules are either covered by the new Inland Rules or are simply outdated. Other provisions were dropped in response to the Administration's policy of minimizing Federal regulations.

The table below lists the proposed substantive pilot rules and the corresponding regulations in the Inland Rules, Western Rivers Rules, and Great Lakes Rules now in effect. The latter three sets of regulations will automatically become void when the Inland Navigational Rules Act of 1980 goes into effect (December 24, 1981, except for the Great Lakes, where it will go into effect on April 1, 1982).

This concludes the series on the new Inland Navigation Rules. As noted in the last issue, copies of the new Inland Navigational Rules Act are available for $1.50 from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; (202) 783-3238 (specify P.L. 96-591, Stock Number 022-003-92759-0). A new edition of CG-169, Navigation Rules, International--Inland, will be prepared late this year and will also be available for purchase from the Government Printing Office.

TITLE 33, CODE OF FEDERAL REGULATIONS

Proposal	Inland	Great Lakes	Western Rivers
§88.05 Copy of rules	§80.13(b)	§90.15(b)	§95.23
§88.07 Cross Signals	§80.2	§90.3	§95.09(a)
§88.09 Exemption from light and shape requirements when operating under bridges	§80.40	—	§95.75
§88.11 Law enforcement vessels	§80.45	§90.46	§95.80
§88.13 Lights on barges at bank or dock	§80.16a(h)	—	§95.36
§88.15 Lights on dredge pipelines	§80.23 §80.23a	§90.27 §90.27a	§95.57 §95.57a

Anhydrous Ammonia—A Killer

by
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Hazard Evaluation Branch
Cargo and Hazardous Materials Division

"Ammonia" is a household word. Ammonium hydroxide, or ammonia diluted in water, is a chemical that we all have smelled and used and that most of us have in our homes. In its undiluted, or anhydrous, form, however, ammonia can be dangerous. Unfortunately, it is a frequently misunderstood commodity. Anhydrous ammonia can kill—it killed a Coast Guard Petty Officer in September 1979 during a vessel inspection.

Lessons from this tragedy may help to reduce the chances of future losses. The only good that could come of this accident would be a greater understanding of ammonia's dangers.

The following article discusses the incident and describes the dangers of anhydrous ammonia, including the toxic and fire hazards. A discussion of the applicable Coast Guard regulations completes the story. But it is really you, the reader, who will determine whether there will be more accidents and more deaths in the future.

Situation

On the morning of September 27, 1979, a U.S. Coast Guard Petty Officer died as a result of a massive overexposure to liquid and gaseous anhydrous ammonia. The ammonia was vented through safety relief valves during the offloading of three barges in Pine Bend, Minnesota. The Petty Officer was conducting a routine vessel inspection. What happened?

Three barges, each carrying two tanks of refrigerated anhydrous ammonia at atmospheric pressure, and a tug were involved. The three barges were moored parallel to each other and perpendicular to the dock, and the tug was located aft of the port outboard barge. On the morning of the casualty, the bargeman started discharging cargo from the outboard barges. He then started the pumps on the center barge but had difficulty keeping the diesel engines operating. The problem was a faulty three-way solenoid which controlled, among other things, the hydraulic shutdown for the cargo pumps. He decided to bypass this solenoid so that the pumps would continue to run. Apparently, the bargeman felt that other emergency shutdown procedures could be relied upon.

After a brief conversation with the dockman, the Coast Guard Petty Officer boarded one of the outboard barges for a routine inspection of the barge papers. After the Petty Officer completed his paperwork, both he and the bargeman started across the center barge. As they crossed the port tank of the center barge, two of the three relief valves lifted, venting liquid and gaseous anhydrous ammonia. Both men ran, the Petty Officer towards the dock, via the center barge, and the bargeman towards the towboat, via the port outboard barge. The bargeman reached a safety station on the port outboard barge, donned a gas mask, and activated the remote shutdown, which stopped the pumps on the outboard barges. Unfortunately, the pumps continued to run on the center barge because of the inoperative hydraulic shutdown.

The Petty Officer, attempting to reach the deck, was overcome by the effects of the anhydrous ammonia and fell to the deck of the center barge, which was covered by an ammonia cloud. He was carrying a Robertshaw Emergency Escape Breathing Apparatus but never used it. This device is designed to provide five minutes of escape air and is approved for use on ammonia barges.

The bargeman tried unsuccessfully to rescue the Petty Officer, but the latter was engulfed in the ammonia vapor cloud. Upon seeing the Petty Officer struggle, the dockman called in personnel from the

*LT Haas is currently teaching at the U.S. Coast Guard Academy

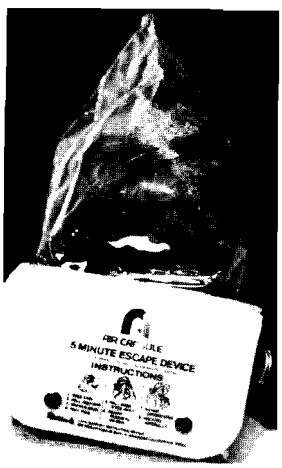
local fire department. They, too, were unable to rescue the Petty Officer.

The pumps could not be stopped because the manual shutdown was located just below the discharging relief valves. The bargeman donned protective clothing provided by the fire department and boarded the barge to secure the diesel engines, almost an hour after the ammonia venting began. The body of the Petty Officer was recovered and taken to a local hospital, where he was pronounced dead on arrival. In all probability he had died within minutes of being exposed.

An investigation team including representatives of the Coast Guard, the shipper, and the towing company studied the accident. The team concluded that the actual cause of the accidental release of anhydrous ammonia from the port cargo tank of the center tank barge was the overfilling of that tank. The most likely cause of the overfill was that the loading valves on that tank were not fully closed, i.e., that at least one of the other tanks offloading cargo was actually loading the tank in question. Contributing to the casualty were the bargeman's inattention to the liquid level gauges on the cargo tank and the fact that the manual emergency shutdown was not accessible (as stated above, the shutdown was located directly under the emergency vent and was therefore covered by the ammonia cloud). Also contributing to the casualty was the fact that, because the three-way solenoid was not operating properly, the bargeman had made it inoperable; had the solenoid been operable, the bargeman would have been able to stop the pumps, which would have ended the ammonia release. The Petty Officer might have been rescued in time.

In hindsight, it can be said that the Petty Officer should have donned his emergency breathing apparatus rather than try to outrun the cloud. Unfortunately he did not. No doubt he was in great pain and was probably having difficulty seeing. Getting trapped in an ammonia cloud can cause anyone to panic, which is why practice in donning the emergency breathing apparatus until it is instinctive is so important.

The inspector who died as a result of the ammonia release had a Robertshaw Emergency Escape Breathing Apparatus like the one above attached to his belt. Had he used it properly, he would have had five minutes' breathing time. Photos by CWO Dale Puckett



Background

Anhydrous ammonia is a common chemical with the formula NH_3. Anhydrous means that there is no water present. The commonly used household ammonia is actually a very dilute solution of only a few percent ammonia in water. At room temperature ammonia is a gas, but it can be liquefied by cooling to $-33.4^{\circ}C$ ($-28.1^{\circ}F$) at atmospheric pressure or by pressurizing to 8.5 atm at ambient temperature. On earth, virtually all ammonia is produced synthetically, but vast quantities are found naturally in the atmospheres of Jupiter and Saturn, as well as in interstellar space. Ammonia salts were discovered and used by the Egyptians as early as the fourth century B.C., but the synthetic ammonia produced in large quantities dates only from the early twentieth century. Ammonia is used primarily for fertilizer, for adding nitrogen to the soil. Even though the earth's atmosphere is 78 percent nitrogen, that nitrogen is in a form that most plants cannot use, and so ammonia or ammonia-based fertilizers must be added to the soil. Ammonia is also used in the making of explosives.

Around 1910, the chemist Fritz Haber developed a way to produce ammonia from hydrogen and nitrogen at high temperatures and pressures in the presence of an iron catalyst. Haber revolutionized agriculture. Millions of people would be starving today, were it not for Haber's process. Ammonia is truly a life-giving chemical.

Anhydrous ammonia is a pure substance; NH_3 is a chemical compound rather than simply a mixture of chemicals. In most ammonia production, natural gas is used as the source of hydrogen and of energy. The nitrogen comes from the air. Very few impurities are present in commercial ammonia. Ammonia production in 1979 was exceeded only by that of sulfuric acid and lime; roughly 18 million tons were produced in that year. Its users are widely dispersed, and vast quantities are shipped from producer to user by pipeline, tank truck, railway tank car, barge, and ship.

When spilled, liquefied anhydrous ammonia vaporizes, and a cloud forms. Just how ammonia behaves after being spilled onto land and onto water is being studied by the U.S. Coast Guard at the U.S. Naval Weapons Center, China Lake, Calfornia. Some of the important questions being asked are:

1. How much ammnonia dissolves in the water after large spills?
2. Do aerosols of ammonia form during land and water spills?
3. What is the density of the ammonia vapor cloud?
4. How far does the vapor cloud travel?
5. How fast does liquid ammonia boil after spills onto land and water?

This study will probably be completed by 1982. Combustion of ammonia will not be studied, as combustion

is a much smaller problem.

The nature of the study makes it clear that, although ammonia is a common chemical, it exposes those who handle it to a number of hazards. These hazards can be severe.

Toxicity

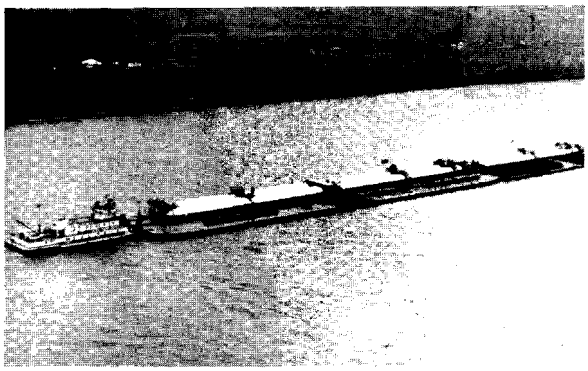
The toxicity of ammonia has been known for some time. Inhalation tests were apparently performed as early as 1886. (Despite its toxicity, ammonia is normally produced in small amounts in animals as a byproduct of protein metabolism; it is converted by the liver into urea.) Breathing ammonia vapor will damage mucous membranes, and breathing high concentrations will lead to pulmonary edema and bronchopneumonia. This means that the entire respiratory system, including the lungs and the bronchi, can be damaged and even destroyed. If the victim survives, the damage to his respiratory system can be permanent; tissue repair could take years, and even then full respiratory function may not be regained.

Both acute (short-time, high-concentration) and chronic (long-time, low-concentration) exposures are harmful. The American Conference of Governmental Industrial Hygienists (ACGIH) established the Threshold Limit Value-Short Term Exposure Limit (TLV-STEL) as 35 ppm (0.0035%) by volume. This is the maximum concentration a worker can be exposed to for up to 15 minutes before experiencing irritation, irreversible tissue change, or impairment of judgment. This short-term exposure must not occur more than four times a day, there must be at least one hour between the exposures, and the Threshold Limit Value-Time Weighted Average (TLV-TWA) must not be exceeded. The latter is the time-weighted average concentration to which a worker can be exposed during an eight-hour day, 40-hour workweek without suffering adverse effects. The ACGIH value for the TLV-TWA is 25 ppm (0.0025%).

The damaging effects of ammonia are due to its corrosive nature. Anhydous ammonia is easily dissolved in water, forming a strongly basic solution. Bases differ from acids in many ways, but, like acids, they have the ability to attack many solid substances, including certain metals and living tissue. When inhaled, ammonia gas dissolves in the liquid surrounding the cells in the upper respiratory tract. As this strong basic solution destroys living cells, intracellular fluids are released, diluting the ammonia-water solution. Eventually, the solution becomes so dilute that further damage is not possible. The more anhydrous ammonia inhaled, the greater the damage, of course.

In cases of mild vapor exposure, the upper respiratory tract is damaged only slightly, resulting only in irritation of the throat and hoarseness. Greater exposures damage the lower respiratory tract and sometimes result in pulmonary edema and brochopneumonia. Still higher exposures usually prove fatal. The table to the right gives an estimate of the damage which can result from exposures to various concentrations of anhydrous ammonia vapor.

Skin contact with liquefied or gaseous anhydrous ammonia can be very dangerous and can cause both skin corrosion (burning) and skin freeze burning. While the damage is usually confined to the skin, the kidneys can be damaged as a result of toxemia from the skin burns. Prompt flushing of the affected skin with water can reduce damage.



A tow pushes a string of tank barges. The three on the far side (note the white cylindrical tanks) are carrying ammonia.

Ammonia in the eyes can produce severe damage and may lead to blindness, although the degree of damage depends on the exposure time and concentration and on the response to the accident (immediate flushing of the eye with water will reduce damage).

Prevention of ammonia exposure is a more important safety measure than any response. In severe exposure cases the exposure is great enough to produce immediate death or permanent injury despite medical attention.

Effects of Anhydrous Ammonia Exposure

PPM	Effect
20	Odor threshold
40	Irritation threshold
100	Irritation but tolerable
150	Intolerable irritation
400	Severe, intolerable irritation but no permanent effects
700	Severe eye irritation, but no permanent effects if shorter than 1/2 hour
1700	Serious coughing, bronchial spasms; less than 1/2 hour could be fatal
2500	Could be fatal; no safe minimal time
5000	Edema, strangulation; rapidly fatal

Combustion

Even though ammonia is not used as a fuel, it can react with oxygen and burn. As a practical matter, however, the danger of fire is relatively low. The products of burning ammonia are nitrogen and water

vapor and—in small amounts—nitrogen oxides. Relatively little energy is given off by burning ammonia, half or less than that given off by burning gasoline. The burning velocity is so low that there is an excellent chance that an ammonia flame will "blow itself out." In the case of pressurized ammonia jetting from an opening, the jet velocity typically exceeds the burning velocity, and the fire will extinguish itself.

The temperature of an ammonia flame is about 1700°C (3092°F), a bit lower than the 1895°C (3443°F) for butane, a typical hydrocarbon fuel. The vapor is flammable over the range of about 16 to 25 percent by volume in air and 15 to 79 percent by volume in oxygen. These values are higher than those commonly found with hydrocarbons, which typically range from 1 to 8 percent by volume in air; (methane has one of the highest flammability ranges of the hydrocarbons and even so has an upper flammable limit of only 15 percent). The autoignition temperature, that is, the temperature at which the ammonia-air mixture ignites spontaneously, is 651°C (1204°F). This temperature is significantly higher than that of the hydrocarbons. The minimum ignition energy, 680 mj (645 BTU), also reflects the difficulty of igniting ammonia. This amount of energy exceeds that available from such common ignition sources as sparks from a motor. Any open flame, however, should suffice for ignition, given an ammonia-air mixture in the flammable range. Carbon dioxide or dry chemical can extinguish ammonia fires. Parallelling this weak burning (deflagration) behavior is ammonia's even weaker explosion (detonation) behavior. When confined, particularly at higher temperatures and pressures, ammonia can detonate, but detonations are not possible if the fuel-air mixture is unconfined. In most accidental spills, unconfined conditions are the rule. The most likely result of an ammonia release is thus an unignited vapor cloud. Unconfined vapor cloud detonations are extremely unlikely. The toxicity of anhydrous ammonia is its real danger.

Anhydrous ammonia does present some other problems, however.

Other Hazards

1. Refrigerated anhydrous ammonia is cold. Contact with it or with metals cooled to ammonia's boiling point will freeze tissue. Escaping pressurized ammonia is likely to be cold as well.

2. The jet of anhydrous ammonia escaping from a pressurized container is forceful—it could actually force its way through the skin of anyone getting in its path.

3. Anhydrous ammonia is reactive, especially with water and acids. Its reaction with water and acids produces heat and can be quite violent.

4. Above about 450°C (842°F) ammonia begins to decompose into hydrogen and nitrogen. Hydrogen is very dangerous and can explode as well as burn.

5. While no one is likely to ingest anhydrous ammonia voluntarily, ingestion would damage and perhaps destroy the alimentary canal.

6. Ammonia in high concentration is toxic to vegetation and to aquatic life.

7. Ammonia reacts with mercury to form explosive compounds.

Regulations

Because anhydrous ammonia is a hazardous substance, the Coast Guard regulates the design, construction, operation, and crewing of vessels carrying ammonia, as well as terminals in which the cargo is transferred. Anhydrous ammonia is carried fully refrigerated at atmospheric pressure or fully pressurized at ambient temperature in either ships or barges.

Spill Response

If a spill occurs, your course of action should be as follows:

Your first priority is tending to the victim. After donning the proper safety equipment to protect youself, remove the victim from the ammonia and wash any ammonia-contacted areas with large amounts of water. Apply artificial respiration if required. Call a physician immediately. Until medical help arrives, continue to flush eyes and/or skin with large volumes of water. In case of a continuous spill, stop the leak. Call the National Response Center at (202) 426-1192 or CHEMTREC at (800) 424-9300 for emergency response information.

Warn people downwind of the spill—the toxic cloud can travel significant distances before dispersing. If ignition has occurred, first stop the flow of ammonia, if any, then extinguish the flames with carbon dioxide or dry chemical; do not spray water onto the ammonia pool as this will only increase the vaporization rate and cause the fire to burn faster. All firefighters must have chemical protective equipment. If ignition has not occurred, remove all open flames and ignition sources. Water spray or water fog may be used to disperse and dilute an ammonia vapor cloud.

Above all, think before you act in an emergency. You will not help an injured co-worker if, through poor judgment, you kill or injure yourself.

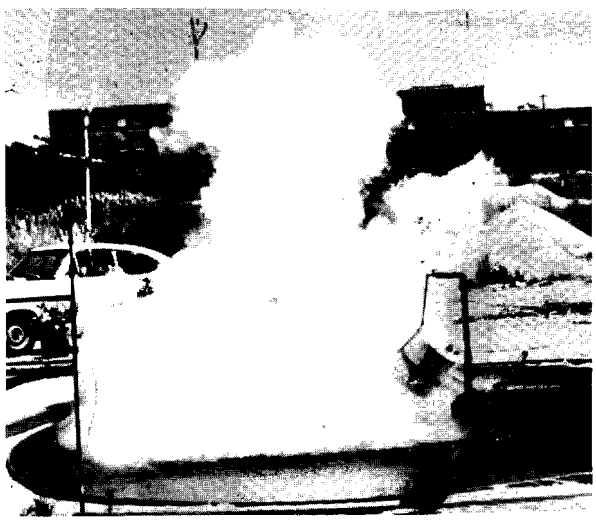
Coast Guard regulations governing ships carrying ammonia appear in Title 46 Part 154 of the Code of Federal Regulations (46 CFR 154), "Safety Standards for Self-Propelled Vessels Carrying Bulk Liquefied Gases." Those for barges carrying ammonia appear in 46 CFR 151, "Unmanned Barges Carrying Certain Bulk Dangerous Cargoes." Many of the requirements apply to some or all cargoes covered by the respective parts, but other rules apply to ammonia only. Additional rules are located in 46 CFR 98.25, "Anhydrous Ammonia in Bulk." Since much of the ammonia traveling through U.S. waters is carried in foreign-flag ships, merely regulating U.S.-flag vessels will not suffice to guarantee the safe handling of the chemical. Nor would a multiplicity of national regulations having little in common with each other solve the problem. For these reasons the United States has worked with foreign governments through the Inter-Governmental Maritime Consultative Organization (IMCO) to establish recommended international standards applying to all vessels carrying hazardous cargoes, including liquefied gases. The standards governing the design and construction of new and existing liquefied gas ships follow the Coast Guard philosophy of achieving a high level of safety. On the basis of the IMCO rules, the Coast Guard has implemented regulations governing new ships and is in the process of developing regulations for existing ships.

As serious as the dangers associated with anhydrous ammonia may be, there are a number of cargoes that are even more hazardous. Anhydrous ammonia is thus classified as a cargo with an intermediate degree of hazard. The regulations governing it are intermediate in strictness, as reflected in the type of containment system required, Type II. A major consideration in that type of containment is protection of the tank in case of collision or grounding; this is achieved by providing separation between the tank and the hull. Special rules for ammonia detail how many lifelines and sets of breathing apparatus and what types of clothing are required aboard ship. There are many other specific requirements for vessels carrying anhydrous ammonia.

The cargo transfer and shoreside facility regulations for anhydrous ammonia are applicable to all of the Cargoes Of Particular Hazard (COPH). These regulations appear in 33 CFR 126, "Handling of Explosives or other Dangerous Cargoes Within or Contiguous to Waterfront Facilities." Some of the items covered are transfer procedures, transfer equipment, the issuing of permits, and the designated waterfront facility process.

Personnel certification requirements for tankermen aboard ammonia-carrying ships are similar to those for tankermen in general. Certification as a tankerman is required for anyone performing a tankerman's duties. Evidence of good eyesight, hearing, and physical condition are a prerequisite for administration of a Coast Guard oral or written examination. Once the examination has been completed satisfactorily, the applicant will be issued a merchant mariner's document endorsed with the rating of tankerman and the grades of cargoes for which he is qualified. A licensed master, mate, pilot, or engineer is considered qualified to act as a tankerman. These requirements are found in 46 CFR 12.20, "Tankerman." Regulations now being prepared will cover chemical vessel personnel in greater detail and may change some of the above certification procedures. The regulations under development would require formalized training in the characterisics, properties, and handling of the various bulk liquid cargoes. Additionally, there would be requirements for formalized firefighting training, as well as education in the toxic hazards posed by chemical cargoes.

This swimming pool-sized ammonia test spill is typical of those conducted by the Arthur D. Little Co., Inc., which also does smaller (laboratory-sized) tests and large-scale tests (on ponds).



Conclusion

In the final analysis, safety depends on the individual. The Coast Guard can study the behavior of ammonia and strengthen the regulations governing its handling, but, as evidenced by the death of the Coast Guard Petty Officer, it cannot guarantee anyone's complete safety.

Anhydrous ammonia is a dangerous commodity. The fact that the name "ammonia" is, literally, a household word, should not lull anyone into a false sense of security. While you, the reader, may be familiar with ammonia in your everyday life, you should not be blind to the hazards associated with improper handling of the substance in its pure form. It is the authors' hope that this account of a Petty Officer's death may serve to increase awareness of the hazardous nature of anhydrous ammonia and, thus, prevent the future loss of life. ‡

The authors acknowledge the assistance of CDR John E. Lindak, who was instrumental in the development of this work, and CDR Fred Halvorsen and Mrs. Mary Williams for their helpful comments.

Oceanographic Unit Predicts the Path of Pollutants

What? Another collision? Every year countless collisions take place on our oceans and rivers. No matter who gets the blame or who's at fault, many times a spill occurs. Whether it is crude oil or refined fuel, the Coast Guard Oceanographic Unit in Washington, DC, can produce a trajectory forecast to tell where it is going and how soon it will get there. The "O" Unit not only forecasts the paths of pollutants and hindcasts them (tracks the pollutant back in time to determine the possible source), but has also tracked wreckage, bales of marijuana, downed aircraft, and even survivors in Search and Rescue (SAR) cases.

With pertinent weather information and tidal and sea current data, the Oceanographic Unit can predict the trajectory of just about anything in the water. The turn-around time for a prediction about a spill is between thirty minutes and six hours.

The "O" Unit was heavily involved in the IXTOC ONE oil spill, the largest in the world. That spill lasted for more than a year and gushed millions of gallons of oil into the Gulf of Mexico. As part of the support effort, TIROS (Television and Infrared Observation Satellite) Ocean Drifters were deployed within the oil mass to enable the Unit to track it via satellite.

More recently, on the morning of May 6, 1981, the HELLENIC CARRIER collided with the LASH ATLANTICO 25 miles southeast of Cape Henry, Virginia. Although there were no casualties, the fuel compartment of the HELLENIC CARRIER was ripped open and its contents spilled into the ocean. Of the more than 200,000-gallon capacity, an undetermined amount was spilled. Marine Safety Office (MSO) Hampton Roads contacted the Oceanographic Unit. With weather information from the Fleet Weather Center in Norfolk, Virginia, Marine Science Technicians Kevin R. Kelly and Robert T. Millikin prepared a spill forecast. The next day MSO Hampton Roads contacted the Oceanographic Unit, confirming that the oil had indeed washed ashore where it had been predicted to ground and within four hours of the forecasted time. The Oceanographic Unit is confident of its forecasting abilities and, upon request, will produce a forecast day or night, seven days a week. This operational support capability allows more effective use of Coast Guard resources whether they be in response to a pollution incident or a major SAR event.

Photos by PA2 George Stuart, Fifth District

In addition to its immediate forecasting and hindcasting response, the Oceanographic Unit offers long-term forecasting and hindcasting services using actual and climatological meteorological data. The long-term products have been used as preliminary inputs for environmental impact statements and as a basis for staging cleanup equipment during a major pollutant spill such as the IXTOC ONE incident.

Persons wishing to use the pollutant trajectory forecasting service for an immediate spill should report the spill to the nearest U.S. Coast Guard Station or the National Response Center (1-800-424-8802). Those offices, in turn, will contact the Oceanographic Unit to initiate a forecast if conditions warrant. Requests for long-term trajectories for contingency planning or trajectories not needed on an emergency basis should be made in writing to:

USCG Oceanographic Unit
Bldg. 159-E, Navy Yard Annex
Washington, DC 20593 ‡

Coast Guard Study Aims at Ending Congestion in Port Access Routes

by Christopher Young
Waterways Safety Branch
Waterways Management Division

Focus for a moment on the following situation: in the approaches to a major port, vessel traffic constantly flows both in and out of the harbor, as well as north/south along a coastal route; fishing craft drag nets; recreational boaters zigzag among ships; oil companies drill for offshore deposits of gas and oil and bid for lease rights to explore for more; environmentalists insist on the vulnerability of a species and petition for a designated marine sanctuary; and, occasionally, a ship collides with a structure or another ship.

In an effort to solve the problems caused by port activity, Congress passed the Ports and Waterways Safety Act (PWSA) in 1978. It instructed the Coast Guard to step into the middle of this congestion, conduct a Port Access Route Study, and designate routing measures for safe access into U.S. ports. The Coast Guard was given the difficult dual objective of (1) recognizing the "paramount right of navigation over all other uses" while (2) reconciling "the need for safe access routes with the needs of all reasonable uses of the area involved."

The study was initiated in April 1979 by a notice in the Federal Register (44 FR 22543). Coast Guard district commanders were assigned responsibility for gathering and analyzing vessel density data and information on use conflicts in 32 geographical areas. During the last two years, district study teams have sent out letters inviting input from interested parties, conducted interviews with masters on vessels during routine boardings, held public hearings, and tabulated answers to questionnaires. They have also analyzed vessel track line plots from the Automated Mutual Assistance Vessel Rescue System (AMVER) and vessel density printouts from the Naval Ocean Survey Information Center (NOSIC) and generally accumulated data from all feasible sources. Final reports stating conclusions and proposing routing measures will be published in the Federal Register over the next year.

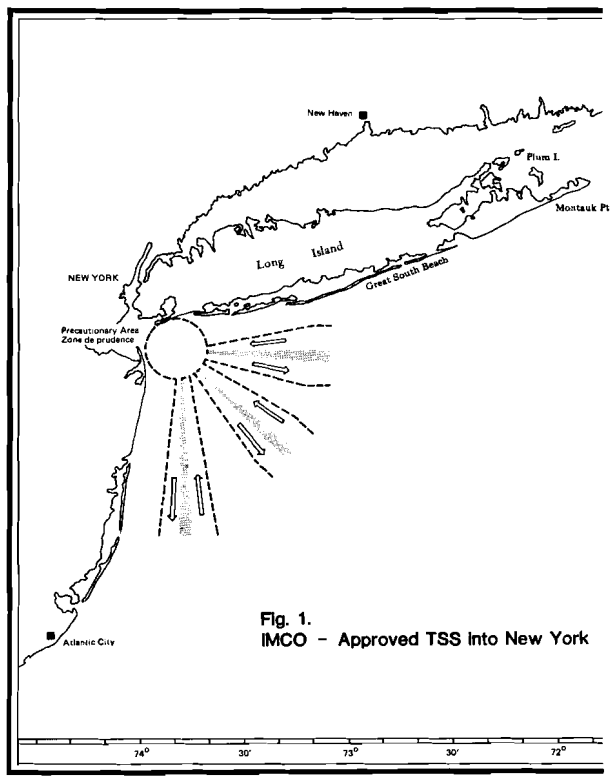


Fig. 1.
IMCO - Approved TSS into New York

The Ports and Waterways Safety Act authorizes the Coast Guard to "designate necessary fairways and traffic separation schemes" in approaches to U.S. ports. Fairways and separation schemes are two specific routing measures which have been effectively used in the past in U.S. waters.

A Traffic Separation Scheme (TSS) is an internationally recognized routing measure which is aimed at the separation of opposing streams of traffic by the establishment of traffic lanes. It can be pictured as an an imaginary divided highway on the water. A TSS can be created by Federal regulation (if it is to be located in U.S. waters) or by adoption by the Inter-Governmental Maritime Consultative Organization (IMCO) (if it is to be in international waters). The International Regulations for Preventing Collisions at Sea, 1972 (COLREGS), contain a special rule (Rule 10) for vessels operating within an IMCO-adopted TSS. This rule requires, for instance, that a vessel in a lane proceed in the general direction of the flow of traffic, avoid anchoring in the scheme, and avoid crossing the lanes as far as practicable. (See figure 1.)

A Shipping Safety Fairway, on the other hand, is simply a stretch of water, often two miles wide, in which no fixed structures are permitted. Although no special rules of the road apply within a fairway and their use by vessels is not mandatory, they tend to become a natural route as congestion from structures increases along the path. Fairways were originally devised by the Army Corps of Engineers as a way of balancing its potentially conflicting responsibilities for preserving navigation safety and issuing permits for drilling platforms in the Gulf of Mexico. The Corps designated specific routes in the Gulf as areas in which no permits would be granted. Under the authority of the PWSA, responsibility for designating all fairways will be transferred from the Corps to the Coast Guard. The existing fairways will be reviewed as part of the Port Access Route Study. (See figure 2.)

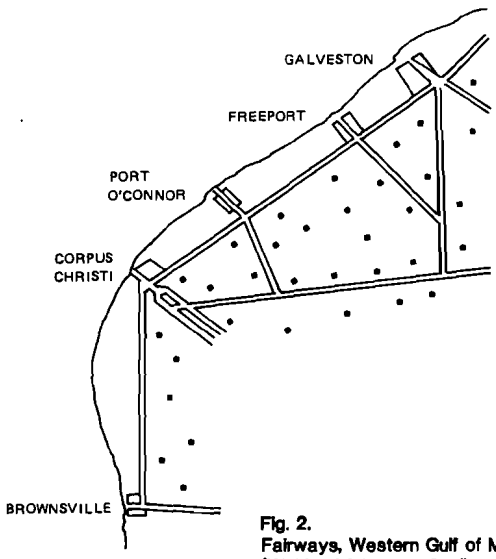


Fig. 2.
Fairways, Western Gulf of Mexico. (Width of fairways: 2 miles. Blocks at harbor entrances are fairway anchorages. Squares show drilling rigs.)

Since there is no absolute prohibition on structures within TSSs, it might sometimes prove necessary to overlay them with fairways. This would serve the double purpose of providing safe access in areas of potential congestion from both vessel traffic and fixed structures.

Generally, it is expected that the district Port Access Route Study teams will be able to moderate among conflicting interests and develop a proposal which complies with the PWSA, accommodates reasonable uses, and provides for safe navigation routes. In some of the areas studied, reaching a compromise will be very difficult. For example, in the area of one Pacific coast port, the specific conflicts revolve around the value of and access to several Outer Continental Shelf (OCS) tracts to be leased for oil and gas exploration. Some tracts lie in the traditional path of vessel traffic or in areas which are considered environmentally sensitive. Designing a port access route which does not interfere with energy development or time-efficient coastal traffic between ports and is an environmentally responsible use of the water will require complex negotiations among the interested parties.

The effect of finally establishing the routing measures based on the study results for an area will be not only to provide notice of route interferences to potential lessees of OCS tracts but also to limit to some degree the flexibility of the Coast Guard in future modifications. Its alternatives will thereafter be limited. In particular, the PWSA will not permit the Coast Guard to "deprive any person of the effective exercise of a right granted by a lease or permit" which is issued before the next study is formally announced to the public. This means, in other words, that although as of now an OCS tract is leased with the stipulation that a routing measure may interfere with exploitation of the tract, once results are final the Coast Guard will not be able to designate a routing measure where it would prevent an "effective exercise" of an existing right. These and other considerations make it imperative that a very careful study be made at this time.

The study will no doubt show that, in some areas, existing routing measures are adequate for the foreseeable future or that the estimated potential traffic densities and use conflicts do not require a designated scheme.

However, the reports for some of the areas will recommend new or modified routing measures. In these cases, it will be necessary to go further into the regulatory process before proposals can be implemented. For instance, a new fairway must be initiated by a notice of proposed rulemaking in the Federal Register with opportunity for public comment. As it goes into effect, any routing measure chosen will be announced in Notices to Mariners and incorporated in charts by the appropriate authorities, both nationally and internationally.

Further information on the Port Access Route Study can be obtained by contacting the author of this article at U.S. Coast Guard (G-WWM-2), 2100 Second St. SW, Washington, DC 20593; (202) 426-4958. ⚓

1980 Boating Statistics Now Available

Boating Statistics 1980, a report on recreational boating accidents and safety activities, as well as registration figures, has just been published and can be obtained from the Commandant (G-CMA), U.S. Coast Guard, Washington, DC 20593 (COMDTINST M16754.1B should be specified).

The data in Boating Statistics 1980 are based on reported accidents only. According to the report, fatalities declined slightly in 1980 in both absolute and relative terms. The number of fatalities declined from 1,400 (in 1979) to 1,360. The fatality rate, the number of deaths per 100,000 boats,* declined from 10.1 (in 1979) to 9.5.

As was the case in 1979 (see "The Anatomy of a Boating Accident" in the March/April 1981 issue of the Proceedings), a great number of the vessels involved in fatalities were open motorboats with outboard motors. Most were small—less than 16 feet long.

The vast majority of the 1,360 fatalities occurred in accidents categorized as capsizings (536) or falls overboard (346). These figures also parallel those of 1979, when, out of the 1,400 fatalities reported, 518 of the accidents were listed as capsizings and 327 as falls overboard. It should be noted that accidents are categorized according to the first event that occurred. A grounding followed by a sinking, for example, would be counted as a grounding, even though it may have been the sinking which was directly responsible for the drowning fatality.

*Coast Guard estimates of the number of recreational boats in use have been revised since Boating Statistics 1979 was published.

VESSEL INFORMATION

1980		TOTAL VESSELS INVOLVED	FATALITIES
	TOTALS	6,954	1,360
TYPE OF BOAT	Open motorboat	3,837	720
	Cabin motorboat	1,099	63
	Auxiliary sailboat	588	23
	Sailboat only	194	43
	Rowboat	147	118
	Canoe or kayak	186	146
	Inflatable boat	43	33
	Houseboat	50	4
	Other	124	30
	Unknown	686	180
HULL MATERIAL	Wood	675	124
	Aluminum	751	387
	Steel	57	9
	Fiberglass	4,571	484
	Rubber, vinyl, canvas	32	24
	Other	17	7
	Unknown	851	325
PROPULSION	Outboard	2,900	609
	Inboard gasoline	1,114	75
	Inboard diesel	463	25
	Inboard-outboard	1,010	47
	Jet	144	10
	Sail	187	43
	Manual (oars, paddle)	332	272
	Other	25	14
	Unknown	779	265
HORSEPOWER	No Engine	521	316
	10 hp or less	483	162
	11–25 hp	294	87
	26–75 hp	1,223	179
	Over 75 hp	3,241	234
	Unknown	1,192	382
YEAR BUILT	1980	328	38
	1979	572	54
	1977 - 1978	1,022	95
	1975 - 1976	652	62
	1972 - 1974	928	104
	1967 - 1971	866	120
	Prior to 1967	795	106
	Unknown	1,791	781
LENGTH	Less than 16 feet	1,537	606
	16 feet to less than 26 feet	3,458	398
	26 feet to less than 40 feet	851	50
	40 feet to not more than 65 feet	223	9
	More than 65 feet	18	1
	Unknown	867	296

TYPE OF ACCIDENT		
1980	TOTAL VESSELS INVOLVED	FATALITIES
TOTALS	6,954	1,360
Grounding	305	14
Capsizing	760	536
Swamping/Flooding	202	62
Sinking	287	61
Fire/Explosion (Fuel)	450	9
Fire/Explosion (Other)	0	0
Collision with another vessel	2,941	69
Collision with fixed object	709	90
Collision with floating object	268	25
Falls overboard	444	346
Falls within boat	38	7
Struck by boat or propeller	100	12
Other	377	58
Unknown	73	71

Coast Guard Invites Public Participation in Navigation Systems Design

It is the policy of the U.S. Coast Guard to tailor its short range aids to navigation systems to user needs. When establishing or changing aids to navigation, the Coast Guard relies heavily on the recommendations of knowledgeable users. Announcements of proposed changes in Local Notices to Mariners are one way the Coast Guard provides mariners with an opportunity to comment. More directly, district commanders require short range aids to navigation personnel to accompany users on their regular daytime and nighttime travels, in both good and bad visibility. The Coast Guard also participates regularly in meetings of local navigation councils and other forums reviewing aids to navigation.

User groups include pilots, masters, mates, and boat operators. Input is also invited from such maritime interests as vessel owners, owner associations, maritime trade associations, and port authorities, as well as from such public interest groups as Federal, state, and local governments and diverse citizen associations that are concerned with or might be affected by improvements to waterways.

Public participation is an essential part of the Coast Guard decision-making process. The public can contribute to the effectiveness of the aids to navigation system by helping the Coast Guard identify problems and ensuring that all changes made are appropriate.

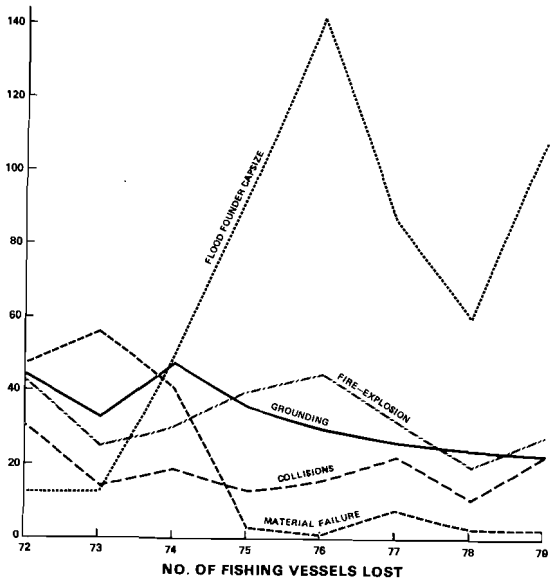
Persons with specific recommendations for improving the effectiveness or efficiency of aids to navigation are encouraged to contact their local representative on any of the organizations mentioned above or to write to the Commander of the Coast Guard District involved.

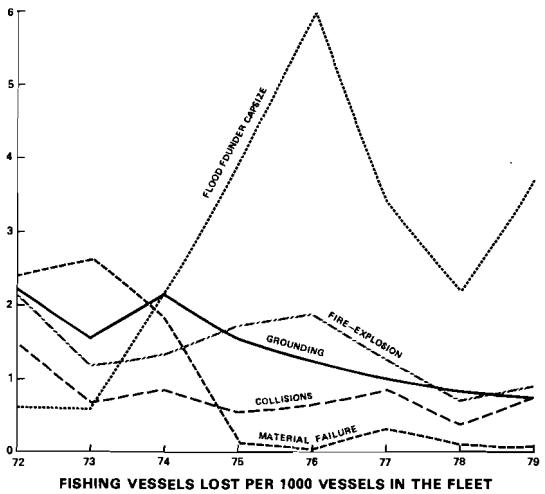
Fishing Vessel Casualties in 1978 and 1979

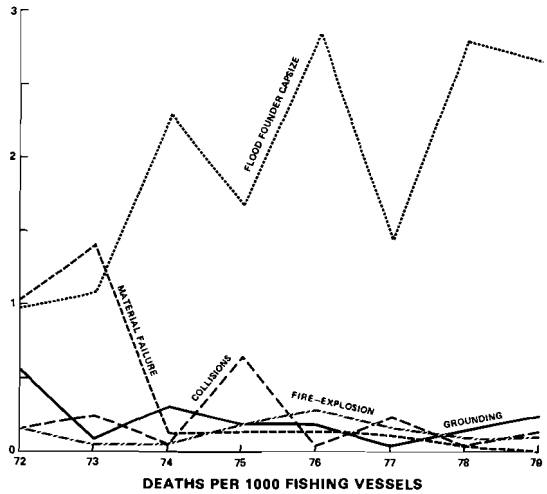
by John A. Crawford
Marine Safety Evaluation Branch

This article is based on an examination of five categories of data by type of casualty taken from the Marine Safety Evaluation Branch's automated data base. The casualty record for the years 1978 and 1979 was reviewed and compared to the data for 1972 through 1977.

It is apparent that floodings, founderings, and capsizings continue to be the major source of casualties for fishing vessels. Fires and explosions, groundings, collisions, and material failures resulted in death or loss of a vessel much less often during the seven-year period. During the two most recent years examined, 144 people lost their lives in the first category of casualties, compared to 22 in all the others combined. Floodings, founderings, and capsizings were responsible for the loss of 169 vessels, whereas fires and explosions, groundings, collisions, and material failures together caused the loss of 135. If the data are standardized, this means that for every 100 vessels lost in the first category, 85 people died, while for

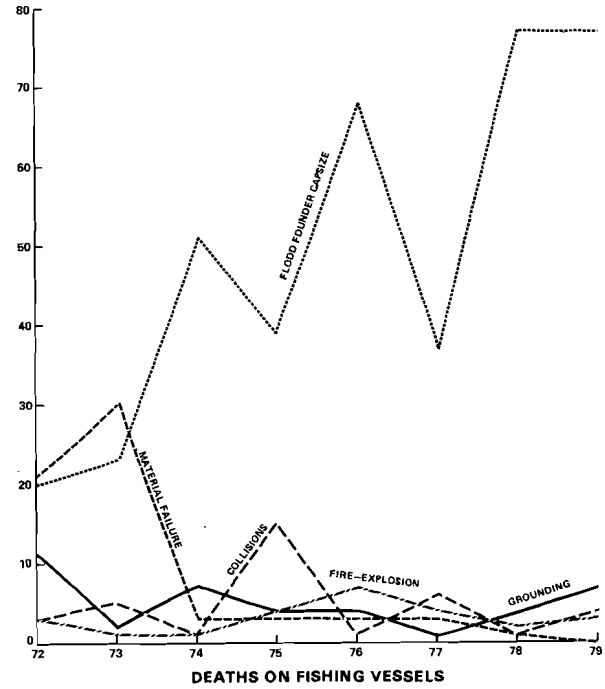






every 100 vessels lost in the other four combined, only 16 people died. Clearly, floodings, founderings, and capsizings should be a focus of concern for all fishermen. With the advances in engineering, communications, navigation, lifesaving apparel, and equipment, one would expect the personnel loss rate to be going down. Instead, the absolute number of deaths and the number of deaths adjusted to the number of fishing vessels in the United States appear to be holding steady or even rising slightly (see graphs 3 and 4). Worse yet, the number of deaths relative to the number of vessels lost seems to be rising.

The statistics indicate that the number of vessels and lives lost as a result of fires and explosions, groundings, collisions, and material failures is holding steady or diminishing somewhat. Of course, a life lost in one of these casualties is just as much a tragedy as any other and the loss of a vessel just as disastrous financially. Great care and vigilance must be exercised to prevent these types of casualties as well. However, the data clearly indicate that floodings, founderings, and capsizings present a much greater threat to the lives of the crew and the safety of the vessel. The elimination of these casualties depends on the owners and operators of the vessels. Crews must be trained properly, vessels must be equipped and maintained properly, and fishing voyages and operations must be conducted safely. Crew members must be ever alert to the conditions of vessel and sea. In view of the prominence of flooding, foundering, and capsizing, that category will be studied in greater detail and the results reported in a future article.



DEATHS ON FISHING VESSELS

Please note when studying the accompanying graphs that in 1972 - 1974 many deaths and vessel losses were coded as material failures when, in fact, the actual casualty was a flooding, foundering, or capsizing. This policy was changed for the 1975 data, and the graphs clearly reflect the new distinction. ‡

Protective Personnel Clothing May Pose Hazard

The Coast Guard recently received notice from the U.S. Navy Safety Center that certain precautions should be taken with emergency coveralls made of "piece-dyed" blue Nomex material. "Piece-dyed" means that the dye was added after the making of the fabric was completed. In order for the dyestuff to penetrate the Nomex fibers, a dye "carrier" must be used. This carrier is highly flammable and must be completely removed from the fabric after dyeing if the product is to be fire-resistant. Complete removal, however, cannot be guaranteed, since there is no way of determining whether all of the carrier has indeed been removed.

The manufacturer of the Nomex fiber has gone on record to state that it cannot be guaranted that all of the carrier will be removed in each and every case. Consequently, the wearer of a Nomex garment may feel that he is being well protected, when, in fact, this is not the case. The manufacturer further indicates that it requires between 10 and 25 launderings to completely remove any trace of residual carrier.

The Navy's Clothing and Textile Research Facility evaluated several samples of "piece-dyed" Nomex fabrics and found that one sample did indeed contain a residue of the carrier. When a flammability test was performed, that sample became engulfed in flames.

The members of a crew well trained in emergency procedures are the heroes of this incident, which took place on a small supply vessel serving the Outer Continental Shelf (OCS) in the Gulf of Mexico.

As the vessel was underway, the Captain noticed brown smoke coming from the starboard engineroom stack. He placed the engines in neutral and sounded the alarm. While several crew members rigged fire hoses, another discharged a CO_2 extinguisher into the engineroom. Flames had reached the top of the stairwell by this time. Two dry chemical extinguishers were then discharged while the hosemen stood ready. The fire appeared to subside, so the hatch and all openings to the space were closed up tight.

While the Captain made contact with the Coast Guard, the rest of the crew closed all watertight openings. One member organized the passengers, passing out life jackets and assembling emergency equipment at the life raft in case the vessel had to be abandoned. The Captain checked the engineroom once again and found that the fire appeared to have gone out. As a precaution against re-flash, the compartment was resealed. A breakdown light was rigged, and several rocket flares were fired. Within minutes a nearby vessel responded. The passengers were transferred to that vessel for their safety. A Coast Guard vessel arrived shortly thereafter, guided by a Coast Guard helicopter.

When it had been confirmed that the fire was completely out, the vessel was towed to port with no further incident. None of the crew members or passengers were injured, and the damage to the engineroom was minor. With everyone following the proper procedures, not only was the fire put out, but the safety of the vessel, crew, and passengers was ensured. All contingencies were covered, even though not all of them came to pass. The professionalism displayed by the crew effectively reduced the threat of panic among the passengers as a potential disaster was successfully averted.

A steam turbine vessel underway in the Pacific was disabled by a series of engineering failures. While the cause of the initial event can be traced to personnel error, the subsequent events posed interesting problems of a magnitude to test even the most experienced engineer.

An assistant engineer was making repairs to the #1 feed pump without assistance, against the orders of the Chief Engineer. He did not check to see that the pump, though not on the line, was still under 30 pounds of steam pressure and commenced to disassemble it. At one point, the casing broke free, and live steam escaped, scalding the engineer and quickly filling the engineroom.

When he went for help, the injured engineer erroneously told the first assistant engineer that a 600-pound steam line to the #2 feed pump in operation had carried away. The first assistant, groping his way toward the pump, closed all the valves he could find until he happened upon the #1 pump, realizing too late that this was the actual source of the steam. By the time he had secured the correct valve, the boilers were in danger of suffering from low water, since the #2 pump had been secured. To prevent a further casualty, the forced draft fans were secured along with the boiler fires through the safety interlock. Shortly thereafter, the main generator tripped off the line, and the emergency generator started up. Then, as the engineroom was being purged of steam, condensation formed in the upper areas and began falling as a "heavy rain."

Once the crew members had started to regain control of the situation, a relight of the boiler was attempted. It was found, however, that the heavy condensation had shorted out both forced draft blowers. Over the next several days the engineers tried natural ventilation, portable blowers, and a reefer compressor motor in an attempt to provide air to the boilers. The latter proved marginally successful, but the motor kept tripping off because of overload and eventually burned out. During this time, soot buildup caused a fire to start in the starboard boiler air heater, creating further delays and problems. Just as the crew was about to rig still another motor, help arrived, and a new motor for the forced draft blower was transferred aboard. During the successful installation, the final calamity occurred. The motor shifted from its temporary resting place and broke the toe of one of the engineers.

The ingenuity displayed by the crew was commendable. The frustrations and other problems not accounted for here were certainly not "all in a day's work." It must be remembered, however, that this casualty might have been avoided altogether, had the assistant engineer repairing the feed pump waited for assistance and direction from the Chief Engineer as originally ordered. ⚓

Chemical of the Month

Motor fuel anti-knock compounds containing lead alkyls

synonyms:	tetraethyl lead or tetramethyl lead compounds
Physical Properties:	
boiling point:	decompose above 100°C (212°F)
vapor pressure at 20°C (68°F):	5 to 41 mm Hg
liquid density:	1.5 to 1.7 (water = 1.0)
flash point:	32°C (89°F) to 130°C (265°F)
Identifiers	
U.N. Number:	1649
CHRIS Code:	MFA

Motor fuel anti-knock compounds containing lead alkyls (MFAKCs) are some of the most important synthetic liquids produced. Automobile and aircraft internal combustion engines work on the principle that the burning of the fuel-air mixture will take place at the end of the piston compression stroke. Premature burning of the fuel-air mixture causes "knock," which limits both the efficiency of the engine and its power. In an automobile, such "knocking" will be clearly felt and heard by the car's occupants. Octane is a measure of the anti-knock properties of fuels. The lower the octane, the more likely the engine will "knock." The cheapest way to increase the octane rating is by adding MFAKCs.

The most important ingredients in MFAKCs are the compounds tetraethyl lead (TEL) and tetramethyl lead (TML). These are organometallic, i.e., part organic (composed of carbon and hydrogen) and part metallic. Since TEL and TML decompose inside the engine during the combustion process and the lead can then coat the cylinder walls, lead scavengers such as ethylene chloride and ethylene bromide are added. They remove the lead in the form of lead chloride and lead bromide. Other ingredients in the MFAKCs include antioxidants for stability during storage, solvents to dilute and standardize the lead alkyl strength, and dyes to aid in leak detection. MFAKCs do not have a single composition, so some of the properties given in the table above are ranges rather than single values. The major ingredients, TEL and TML, typically make up 50 to 60 percent by weight. Lead alkyls were first produced commercially in 1922, a year after automotive researchers discovered their effectiveness. Production processes for TEL and TML usually employ a chemical reaction between a sodium lead alloy and ethyl methyl chloride, although recently new methods of production have been developed.

Lead compounds are typically quite toxic, and TEL and TML are especially so. These two can be absorbed by the body as a result of skin penetration or inhalation and will attack the central nervous system. Rubber gloves and boots must be worn by persons handling the substances. White or light-colored clothing is recommended, as any spills on it will be visible because of the dye in the MFAKCs. Standard safety procedures should be followed. If TEL or TML does spill on someone's skin, the affected area should be washed first with kerosene (if available) and then with soap and water. Medical attention should be sought immediately. Since the time-weighted average concentration of TEL to which a worker can be exposed during an eight-hour day, 40-hour workweek without suffering adverse effects is only 0.075 mg/m^3 and the corresponding short-term exposure limit (the maximum concentration a worker can be exposed to for up to 15 minutes before experiencing irritation, irreversible tissue change, or impairment of judgment),* is only 0.150 mg/m^3, good ventilation or breathing apparatus is required. Although MFAKCs cannot boil (they decompose or break down first), they do give off significant amounts of vapor at room temperature. This can be harmful, and any area containing vapor should be vacated by anyone not using an effective breathing apparatus. A third route of absorption is ingestion, or swallowing. Normally, ingestion is not considered a major threat to those handling chemicals, but MFAKCs can be considered an exception. It is amazing how many people accidentally swallow gasoline containing MFAKCs while siphoning. Mixing the MFAKCs with gasoline significantly reduces the lead alkyl concentration and hence the dangers associated with skin penetration and inhalation; ingestion, however, will still result in the body's absorbing toxic lead compounds.

There are also flammability hazards with MFAKCs. While overshadowed by the toxic hazard, these should not be ignored. Water, dry chemical, foam, and carbon dioxide can extinguish the fires. Since MFAKCs decompose rapidly above 93°C (200°F) and such decomposition may take place with explosive force, all containers exposed to the heat of a fire should be kept cool by spraying with water.

MFAKCs are shipped by barge, ship, tank truck, and tank car. The Coast Guard has designated these compounds a Cargo of Particular Hazard (COPH). Coast Guard regulations governing them are found in Title 46 of the Code of Federal Regulations, Parts 151 and 153 (46 CFR 151 and 153). Because of MFAKCs' toxicity and flammability, the Environmental Protection Agency and the Inter-Governmental Maritime Consultative Organization also regulate these compounds.

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HAZARD EVALUATION BRANCH
CARGO AND HAZARDOUS MATERIALS DIVISION

*Such short-term exposure must not occur more than four times a day, there must be at least one hour between the exposures, and the time-weighted average must not be exceeded.

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) Signs of racking stresses generally appear at the

A. junction of the frames with the beams and floors.
B. bow and stern shell frames and plating.
C. garboard strake, at each side of the keel.
D. thrust bearing of the main shaft.

REFERENCE: Baker

(2) Camber is normally measured in inches per foot of the

A. length of the vessel.
B. breadth of the vessel.
C. depth of the vessel.
D. freeboard of the vessel.

REFERENCE: Baker

(3) The effect of a heated bulkhead on a hygroscopic commodity is to

A. lower the vapor pressure of the commodity.
B. raise the vapor pressure of the commodity.
C. cause moisture to accumulate against the bulkhead.
D. lower the dew point of the air.

REFERENCE: Sauerbier

(4) The tendency of a flammable liquid to vaporize is indicated by its

A. ignition temperature.
B. flash point.
C. flammable range.
D. convection index.

REFERENCE: Firefighting Manual for Tank Vessels

(5) Index error of a sextant is primarily caused by

A. improperly correcting the other errors in a sextant.
B. the horizon glass's not being parallel to the horizon mirror.
C. the horizon glass's not being parallel to the index mirror.
D. human error in taking a celestial observation.

REFERENCE: Dutton

ENGINEER

(1) Quick cleaning strainers are installed in the fire main system to

A. prevent rust and foreign matter from entering the system piping.
B. prevent rust and foreign matter from entering the hoses and nozzles.
C. protect the fire pump(s) from becoming clogged with marine growth.
D. filter out some of the salt and reduce pipeline scaling.

REFERENCE: MarAd Safety

(2) If a steaming boiler begins "panting," the probable cause is

A. too much air for proper combustion.
B. excessively high furnace temperature.
C. excessively cold fuel oil.
D. insufficient air for proper combustion.

REFERENCE: Osbourne

(3) A leaking steam trap in the returns from a heating system is indicated by excessive

A. drain tank steaming.
B. scale returning from the convectors.
C. steam pressure in the convectors.
D. water in the heating system.

REFERENCE: Osbourne

(4) A steady boiler gauge glass level while the vessel is rolling in heavy seas is an indication that

A. the gauge glass is functioning normally.
B. there is most likely an obstruction in the lower valve.
C. the steam drum is adequately baffled.
D. the water level in the steam drum is too low.

REFERENCE: Osbourne

(5) The breathing bag of a canister-type oxygen breathing apparatus is used to store

A. exhaled CO_2 until the canister chemicals can begin the oxygen-making process.
B. generated oxygen, which is created faster than the wearer can use it.
C. generated oxygen, accumulated so that the wearer may replace cartridges without leaving the space.
D. exhaled CO_2 which has been separated from the exhaled moisture by the cartridge chemicals.

REFERENCE: MarAd Safety

ANSWERS

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

MERCHANT MARINE SAFETY PUBLICATIONS

In previous issues this list has included publications that were unavailable because they were being revised or reprinted. These publications are reprints of selected subchapters of the Code of Federal Regulations (CFR). The Superintendent of Documents publishes the CFR in yearly updated form. The CFRs are thus the best source for those needing up-to-date information on Coast Guard regulations. The price and availability of any desired volume can be obtained by calling (202) 783-3238 or writing: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Publications previously appearing on this page which do not fall into the category described above will henceforth be listed separately. That list will be published periodically; it appears for the first time in this issue, on page 49.

Listed below are the Code of Federal Regulations (CFR) subchapters covering Coast Guard regulations (Title 46, Chapter I). Chapter I comprises nine volumes. A desired volume should be ordered by referring to the parts it contains; for example, if marine engineering regulations (Subchapter F) are needed, 46 CFR Parts 41 to 69 (the third volume) should be ordered. The numbers shown in the "Coast Guard Equivalent" column refer to previous reprints of selected subchapters. See the chart below.

	Volume	Coast Guard Equivalent	Contents
1.	46 CFR Parts 1 to 29	None	Subchapter A—Procedures Applicable to the Public. Parts 1 to 9.
		CG-191	Subchapter B—Merchant Marine Officers and Seamen. Parts 10 to 16.
		CG-258	Subchapter C—Uninspected Vessels. Parts 24 to 29.
2.	46 CFR Parts 30 to 40	CG-123	Subchapter D—Tank Vessels. Parts 30 to 40.
3.	46 CFR Parts 41 to 69	CG-176	Subchapter E—Load Lines. Parts 42 to 46.
		CG-115	Subchapter F—Marine Engineering. Parts 50 to 64.
		None	Subchapter G—Documentation and Measurement of Vessels. Parts 66 to 69.
4.	46 CFR Parts 70 to 89	None	Subchapter H—Passenger Vessels. Parts 70 to 89.
5.	46 CFR Parts 90 to 109	CG-257	Subchapter I—Cargo and Miscellaneous Vessels. Parts 90 to 106.
		None	Subchapter I-A—Mobile Offshore Drilling Units. Parts 107 to 109.
6.	46 CFR Parts 110 to 139	CG-259	Subchapter J—Electrical Engineering. Parts 110 to 139.
7.	46 CFR Parts 140 to 155	None	Subchapter N—Dangerous Cargoes. Parts 146 to 149.
		None	Subchapter O—Certain Bulk Dangerous Cargoes. Parts 150 to 154.
8.	46 CFR Parts 156 to 165	CG-268	Subchapter P—Manning of Vessels. Part 157
		None	Subchapter Q—Specifications. Parts 160 to 165.
9.	46 CFR Parts 166 to 199	None	Subchapter R—Nautical Schools. Parts 166 to 168.
		CG-323	Subchapter T—Small Passenger Vessels (Under 100 Gross Tons). Parts 175 to 187.
		None	Subchapter U—Oceanographic Vessels. Parts 188 to 196.
		None	Subchapter V—Marine Occupational Safety and Health Standards. Part 197.

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