PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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COVERS

FRONT COVER: Fire at sea, in both the commercial and the recreational marine industries is the theme of this month's issue. Our cover photo shows the Coast Guard Cutter *Point Francis* battling a blazing oil fire near Carteret, N.J. The fire was the result after the barge, *Ocean 80* exploded on October 25, 1972.

BACK COVER: The burning SS *C. V. Sea Witch* after she collided with the SS *Esso Brussels* on June 2, 1973.

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PROCEEDINGS

OF THE

MARINE SAFETY COUNCIL

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

Halogenated Extinguishing Agent Systems*

By Rolf Jensen, P.E.
Professor and Chairman, Department of Fire Protection Engineering, Illinois Institute of Technology

ED. NOTE: *As a result of testing at the Coast Guard Fire and Safety Test Facility in Mobile, AL, HALON 1301 fixed fire fighting systems are currently being approved by the Coast Guard on a ship-by-ship basis. The following article, written by the Chairman of the National Fire Protection Association's Committee on Halogenated Fire Extinguishing Agent Systems, discusses many of the aspects of this new agent and should be of interest to those who encounter such systems for the first time. This article is reprinted by permission of the* Fire Journal *of the National Fire Protection Association which holds the copyrights.*

THIS PAPER contains a history and an explanation of some of the current and potential applications of the agents within the family of halogens that are potential fire extinguishants, and a brief review of systems and design approaches currently being applied commercially:

The earliest Halons used as extinguishing agents were carbon tetrachloride and chlorobromomethane, both of which have largely disappeared from commercial usage in the United States. The span of useful application was from the early 1900's to the early 1960's. They have been used both in extinguishers and in package extinguishing systems. While a number of claims have been made for enhanced extinguishing effectiveness in systems using mixtures of these agents with other materials, none has been proved in actual fire tests. We can dismiss these from practical consideration for modern systems.

In the early 1950's the Army Research and Development Center of Fort Belvoir experimented with a number of the halogenated agents and ultimately developed portable extinguishers. Later small systems for aircraft and tanks were developed by other Government agencies. The most widely recognized of these was Halon 1301, which still has the greatest commercial application in the United States.

Four members of the family of halogenated agents are potentially useful extinguishants:

Halon 1211, Bromochlorodifluoromethane ($CBrClF_2$)

Halon 1202, Dibromodifluoromethane (CBr_2F_2)

Halon 1301, Bromotrifluoromethane ($CBrF_3$)

Halon 2402, Dibromotetrafluoroethane ($CBrF_2$-$CBrF_2$)

Numerically, the first digit of the numbering system refers to the number of carbon atoms; the second digit, to the number of fluorine atoms; the third digit, to the number of chlorine atoms; the fourth digit, to the number of bromine atoms; and the fifth digit, to the number of iodine atoms. The terminal zeros are dropped.

At present there are two NFPA Standards affecting these Halon systems. The first is NFPA No. 12A, *Standard on Halogenated Fire Extinguishing Agent Systems — Halon 1301,* which contains requirements for the design and installation of Halon 1301 (bromotrifluoromethane) systems. In 1971 a Tentative Standard for Halon 1211 systems was adopted by the NFPA as NFPA No. 12B-T, *Tentative Standard of Halogenated Fire Extinguishing Agent Systems—Halon 1211.* The NFPA Committee has also been requested to develop a standard for Halon 2402 systems, but it has deferred action until the question of relative toxicity can be resolved by testing. Currently the NFPA Committee is doing no work on Halon 1202.

It is adequate, then, to direct attention solely to Halon 1301 system applications, since this is the only agent currently being applied on a wide commercial scale in the United States.

Halon 1301 is a clean agent, gaseous under normal conditions and relatively easy to distribute in both total-flooding and local application system design approaches. It has proved its effectiveness on Class A and Class B fires, and on fires involving energized electrical equipment (Class C). Extinguishing and inerting concentrations for Class B fires are well defined, and they may be found

in Tables 3 and 4 of NFPA No. 12A. Many of these concentrations are validated by Underwriters' Laboratories or Factory Mutual tests. The extinguishing concentrations for Class A materials are not so well defined. It has been found that the deep-seated characteristics of a Class A fire may have a substantive effect not only on the agent concentration necessary for complete extinguishment but on the time that such concentrations must be held to accomplish complete extinguishment. There seem to be adequate data to support the contention that surface extinguishment of Class A fires can be readily accomplished with concentrations of 5 percent or less. When fires become deep-seated, concentrations of 20 to 40 per cent are sometimes needed, with soaking times of five to 30 minutes or longer.[1]

Halon 1301 systems have been installed that range in size from half a pound for outboard marine engines up to 3½ tons for 300,000-cubic-foot oil-processing buildings. There have been applications in racing cars, computer rooms, telephone exchanges, libraries, museums, and many industrial hazards.

Halon 1301 is not suitable for combustible metals or materials that contain their own oxidizing agent. The agent is expensive; for example, the 1971 end user price ranged from $5 to $10 per pound, depending on quantity, as compared to carbon dioxide at $.20 to $.25 per pound. Since Halon 1301 is about 10 times more efficient than carbon dioxide when compared by required extinguishing concentrations, the initial cost of an installation is about the same for a carbon dioxide or a Halon system. For Halons, however, the cost of recharge is significantly greater.

There has been a great deal of controversy associated with the toxicity of the Halons—some of it based on fact, some on fancy. Known information and test data support the contention that exposure concentrations over 20 per cent may cause cardiac arrhythmias in persons hypersensitized from adrenalin. Some tests have shown that the sensitization level is substantially higher in test animals. What makes the toxicity problem difficult for fire protection engineers to evaluate is that most of the data have been derived from animals, with only a very small amount of human exposures (and the NFPA Committee has lacked a qualified toxicologist as one of its members.[2]). Regardless of this, it is apparent that when one reaches a 7 per cent concentration with prolonged exposure he will begin to experience a feeling of lightheadedness and reduced dexterity. At 10 percent the symptoms are similar but more severe. At 15 percent they come on quite strongly, and at 20 per cent there is the possibility of a cardiac arrhythmia. For this reason the NFPA Committee concluded that it was inappropriate to depend on predischarge alarms as a solution to this problem. The Committee has permitted Halon 1301 total-flooding systems to be used in normally occupied areas without restriction for concentrations up to 7 per cent. Concentrations of 7 to 10 per cent demand accomplishment of egress within one minute. In concentrations from 10 to 15 per cent the agent may be used only where occupancy by people is occasional and egress can be accomplished in one minute. Above 15 per cent, it is not recommended unless personnel have available self-contained breathing apparatus inside the hazard or the hazard is unoccupied. I am personally of the opinion that this is a more logical approach to the problem of inherent toxicity than that at present followed in NFPA No. 12, *Standard on Carbon Dioxide Extinguishing Systems*. While it is known that carbon dioxide will not support life at a concentration of 16 per cent, No. 12 simply recommends the use of a predischarge alarming device.

Questions are also raised about the thermal decomposition products and associated postfire corrosivity from Halon 1301. Clinically, there is a potential for undesirable toxic decomposition products. Halon 1301 will decompose at approximately 950° F, yielding such decomposition products as hydrogen fluoride, hydrogen bromide, free bromine, and carbonyl halides. Recent testing, however, has confirmed only the existence of hydrogen fluoride and hydrogen bromide decomposition products. It would appear that the extent to which these products are present depends greatly on the adequacy of the extinguishing concentration and the rapidity of agent discharge. If a fire is rapidly and completely extinguished by an adequate design concentration that has been properly applied, the resulting amount of hydrogen fluoride and hydrogen bromide appears to be so slight as to be of no concern. Conversely, when the extinguishing concentration is inadequate, when the fire has been allowed to burn for a long time, when exposing surfaces are heated before extinguishment begins, or when extinguishment is not accomplished (as in a deep-seated fire), then substantive quantities of corrosive, irritating, and toxic decomposition products may result and be of significant concern.

During 1971 four manufacturers cooperated in a test program to define this problem, especially in regard to computers, so that NFPA Standards may give some direction to potential users. To date the following conclusions have emerged from the portion of the tests conducted by The Ansul Company:

1. Surface Class A fires are extinguished by a 5.1 per cent concentration of Halon 1301.

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[1] See Roger Cholin, "How Deep Is Deep?" FIRE JOURNAL, Vol. 66, No. 2 (March 1972), p. 19.

[2] EDITOR'S NOTE: During recent months Dr. T. R. Torkelson, Toxicology Specialist, Dow Chemical Company, has served on the Committee as Alternate Representative of the Manufacturing Chemists Association.

2. Deep-seated Class A fires are not completely extinguished by a 5.1 per cent Halon 1301 concentration. But flame inhibition is accomplished and is accompanied by reduction in burning rate, to a point where the burning rate becomes negligible.

3. Deep-seated Class A fires are not immediately extinguished by 11.8 per cent Halon 1301. But flame inhibition occurs and the burning rate is rapidly reduced, with complete extinguishment of smoldering within approximately 15 minutes.

4. Deep-seated Class A fires are immediately extinguished by 21 per cent Halon 1301.

5. The ranges of halogen acids produced by the extinguishment tests were 0 to 33 ppm of hydrogen fluoride and 0 to 26.3 ppm of hydrogen bromide.

6. Halon 1301 does not interfere with the operation of electrical equipment.

7. Halon 1301 produces no apparent corrosion of metals or equipment.

From what I have seen on the test data, it seems that one can hold toxic and corrosive concentrations low if the type of fire is adequately defined and a design concentration that will give rapid and complete extinguishment is established. Unfortunately there is a lack of information to define precisely a Class A fire, both from a surface flammability standpoint and from a deep-seated burning standpoint. If that problem can be solved, I believe it may then be possible to provide a better definition of extinguishing concentratons in the NFPA Standards. In my opinion, this is not a new problem exclusive to Halon 1301, but really an old problem to which industry has consistently failed to focus attention. It relates to extinguishing Class A fires by any suitable extinguishing agent. It is, of course, accented by the fact that with the Halons there may be serious consequences of failure to effect extinguishment.

The Halons have not yet been recognized in NFPA No. 75, the *Standard for Electronic Data Processing Equipment*, because of concern over corrosivity, toxicity, and extinguishing concentration problems. Regardless, many people are installing Halon 1301 systems to protect computers. In the absence of specific guidance, users find themselves deluged with an array of recommended protection approaches for the room, for the underfloor space, and for the equipment itself. If one couples this with the variable recommendations for design concentrations (ranging from 50 to 20 per cent) and the obvious resulting implications on cost, it is easy to see the resulting confusion. The confusion should soon be eliminated since the Committee responsible for NFPA No. 75, after reviewing the results of tests conducted by Halon 1301 manufacturers, has agreed to amend No. 75 to recognize Halon 1301 protection for computers. The amendments are being submitted for adoption at the 1972 NFPA Annual Meeting.[3]

System design for a particular hazard is not difficult. The most important feature is careful definition of the hazard and of all the parts that affect operation. Rapid and accurate detection is essential. Design must contemplate actual protected volume, with compensation for air movement through a hazard when fans or ac units cannot be shut down *promptly*. Detection, actuation, and discharge must always be accomplished in the shortest time possible, to minimize development of decomposition products. NFPA No. 12A calls for 10-second discharge and minimum delay. Leakage or air losses during this interval can greatly affect concentrations. Redundant detection is used where false trips may be a problem.

In its simplest form, a Halon system has discharge nozzles, piping, a storage container, and an automatic operation valve. The valve is operated by an actuator and by some type of rapid detection system.

At present the approval laboratories recognize only total-flooding systems. Most of them are packaged or pre-engineered systems; a few are field-engineered for the hazard. A system design for a particular hazard will depend largely on the type of system employed. In using a pre-engineered system one follows an FM- or UL-recognized and approved system design manual. In applying a package system to a hazard according to UL limitations, one merely makes a match between the hazard and the system coverage limitations, which detail temperature range, maximum volume that can be protected for both ordinary combustible and flammable liquid hazards, maximum area covered, and maximum dimension of the hazard. While it is possible to compute actual concentrations, it is unnecessary, because the niceties of detail have all been worked out in the development of the package listing at the approval laboratory. In fact, it is even permissible for such listings to violate certain provisions of the NFPA Standard when fully approved by UL or FM. In applying package systems it is possible to assemble them in multiples, so that one can use one, two, three, or more in combination to protect a hazard larger than the maximum recognized by the approval laboratories for a simple system. When using a combination in this manner, one must use multiple systems of one common size and still meet spacings on nozzles and detectors.

In the design of an engineered system one also starts by defining the hazard and by establishing the minimum design concentration required by NFPA No. 12A. The minimum design quantity is calculated by using formulas and methods given in NFPA No. 12A and in the FM- and UL-approved system design manual.

[3] EDITOR'S NOTE: The amendments were adopted without change at that meeting.

AN ALMOST ORDINARY DAY

FIRE!! is a cry that usually brings to mind images of hurriedly wakened sleepers rushing from blazing buildings, of hair breadth escapes from tumbling walls, and of daring rescues amid falling beams. There are times, however, when fire claims its victims without drama, and under circumstances that seem almost routine.

It was a routine day for the crewmembers of the M/V *Venus* as the ship steamed toward East Chicago, Illinois on a chilling January morning. A path through the sea ice covering Lake Michigan was being cut by two Coast Guard cutters; the Master of the *Venus* was on the bridge directing the tanker along the ice-strewn swath.

Below decks, two licensed engineers operated the 28 year old diesels (installed aboard the *Venus* 18 years before) that were operating at maximum (720) RPM's. It was the Chief Engineer's policy to have two men on watch while the ship was maneuvering in ice; he himself was on the upper port level of the engineering room, tinkering at a workbench while his Second and Third Assistants stood watch below.

At approximately 10:30 a.m. an ominous metallic noise from the port engine alerted the Third Assistant Engineer, who was in charge of the watch, to possible trouble. He immediately stopped the engine, and as the Second Assistant started aft toward the operating platform a crankcase explosion in the port diesel blew at least one inboard crankcase cover off.

Flames immediately engulfed the port engine, trapping the Chief Engineer on the upper level. Unable because of the flames and fierce heat to make his way to his assistants below, he scrambled aft and escaped to topside.

While the two Assistant Engineers raced to the semiportable (B–IV) CO_2 fire extinguisher located on the port side just aft of the operating platform, the Master radioed the Coast Guard Cutter *Mesquite,* which was about 2,000 yards ahead of the *Venus,* that his vessel was on fire.

The Second Assistant managed to knock the fire down by directing the CO_2 at the base of the flames on the inboard side of the engine, but a second blast ripped through the diesel, blowing out two more inboard crankcase covers and an unknown number from the outboard side.

With thick smoke billowing out of the engine having cut the visibility to zero, the two engineers decided to evacuate the engineering space. As the Second Assistant began climbing the ladder that led between the two engines to the upper level and safety, he stepped on the Third Assistant's foot. The Second Assistant yelled for his shipmate to get out and then backed off the ladder for a few seconds before scrambling up and out along the starboard passageway on the upper level.

As the two men were leaving the lower level, the Chief Engineer and another crewmember attempted to fight the blaze from the upper platform. A semiportable CO_2 extinguisher similar to that used by the Engineers below was rolled out from the auxiliary boiler room, but it failed to discharge.

Both men fled topside to find that the Third Assistant Engineer had not used the same escape route as his shipmate, but had attempted to crawl through a porthole on the upper port level of the engineroom. The 12-inch diameter porthole was too small for the man to get through; attempts by crewmembers on a Jacobs ladder over the side of the ship to pull him through the porthole failed.

At approximately 11:15 a.m. a Coast Guard firefighting team accompanied by a *Venus* crewmember entered the engineroom and brought the Third Assistant topside. A Hospital Corpsman from the CGC *Mesquite* administered mouth-to-mouth resuscitation while another crewmember administered external cardiac massage. The CGC *Raritan* rushed him to Escanaba, Michigan, but all efforts to revive the 60 year old man were fruitless. The death certificate listed the immediate cause of death as smoke or CO_2 inhalation.

Coast Guard fire fighting teams extinguished the killer engineroom fire at approximately 11:40 a.m. The M/V *Venus* was towed to Sturgeon Bay, Wisconsin after receiving a Permit to Proceed by the Officer-in-Charge, Marine Inspection in St. Ignace, Michigan.

The formal investigation of the casualty determined that heat caused by the failure of number six piston in the port engine was the source of ignition of the initial explosion. The second explosion is believed to have been caused by the atmosphere in the crankcase coming back into the explosive range as oxygen entered the crankcase through the open covers and ignited by the fire or hot metal of the engine. Neither the cause of the piston failure nor the number of hours it had been in service could be determined. The port main engine was overhauled in the spring of 1970 and was scheduled for overhaul during the 1973 winter lay-up.

All the crankcase covers were held in place by a clamp bar (strong back arrangement which was tightened down by the use of a hand wheel on the external side of the cover. Two

types of clamp bars were on this engine; one of a crimped clamp bar and the other a solid bar. The crimped style is the original design part and the solid bar type was a U.S. Navy modification adopted in March 1948. The solid clamp bar is heavier and stronger. All six of the covers blown off were of the crimped clamp bar style.

Inspection of the CO_2 cylinder used without effect by the two crewmembers on the upper level of the engineroom revealed that it had been discharged prior to the casualty. It is questionable as to what effect this extinguisher would have had on the fire, as the nozzle would not have reached the base of the flames. Because of the date of construction of the tanker (1928), a fixed fire fighting system in the engineering space is not required.

No reason was determined for the Third Assistant's attempt to evacuate through the porthole. Crewmembers informally expressed the fact that the Engineer had occasionally experienced difficulty with his breathing due to an asthmatic or emphysema condition. The porthole he was at is not along the logical route of escape using the ladder between the main engines.

Two recommendations were offered by the investigating officer following the casualty. The first, that all vessels be required to install a fixed fire fighting system regardless of the date of construction or flash point of the fuel, is being considered at Coast Guard Headquarters.

The second recommendation concerned the type of clamp bar used to hold crankcase covers in place. The *Venus* casualty indicated a possible design inadequacy in the crimped clamp bar as that style failed to contain the explosions. Further information is being requested from the U.S. Navy and other sources regarding similar problems experienced and possible alternate solutions.

For the men of the *Venus*, the excitement was over by noon on what began as an ordinary January day on the Great Lakes. But that sunny morning yet another victim had been claimed by the seafarer's deadliest enemy—fire. ⚓

lessons from casualties

Sulfur Burns

Recently, aboard a United States merchant vessel, a workman was fatally burned while sand blasting in a tank which had previously carried sulfur. The vessel was undergoing repairs and had been declared "safe for hot work."

Before modifying the cargo tank sumps, it was necessary to remove the sulfur residue from them. A shore crew was brought aboard to sand blast the affected areas. In the course of the sand blasting, which is considered hot work, sulfur dust was generated and impregnated the workman's clothing. As the Coast Guard Investigating Officer concluded, a spark generated by the sand blasting ignited the back of the man's clothing. The workman, wearing two sets of clothing, was unaware that he was on fire. His supervisor on deck, however, smelled sulfur burning and ordered him out of the tank. When he emerged from the tank, flames quickly spead over his clothing. He was taken to a hospital, but he died two days later of extensive, severe burns.

Sulfur is dangerously flammable and ignitable by friction. Sulfur dust, in the proper proportion with air is explosive. Hence, the dust cloud formed in the tank might have exploded and claimed more lives. Any source of ignition, such as the spark generated by sand blasting as in this case, or a static electricity discharge, could have caused this incident to be even more tragic.

Once again it is evident that any operation or the use of equipment that has the potential to create a source of ignition must be done with extreme caution. In this instance, a routine operation cost a life because no one considered the consequences of doing hot work in an atmosphere where sulfur dust was generated. Hindsight is always 20/20, but in dealing with hazardous cargoes, foresight must be as good.

FIRE SAFETY—NEED FOR REGULATIONS

By Donald J. Kerlin, Office of Boating Safety, U.S. Coast Guard

ED. NOTE: *This article is adapted from a paper presented at the 12th Annual ASNE Day, April 26 and 27, 1973. The opinions expressed are those of the author and do not necessarily reflect those of the U.S. Coast Guard.*

Introduction

With the enactment the Federal Boat Safety Act of 1971, the Coast Guard was given statutory authority to promulgate safety standards for recreational boats and associated equipment. This article demonstrates the process of establishing that there is a need for fire safety standards for such boats. Although this article is limited in scope to fire safety standards, a similar approach has been used for need justification for existing Coast Guard regulations for recreational boats.

Background

Fire and explosion was the leading cause of property damage and the second leading cause of personal injuries aboard recreational boats during the years 1968 through 1971. These facts alone are sufficient reason for concern. Reductions of death, injuries and property damage from fire is one of the primary areas which will be dealt with under the new Boat Safety Act. From the information derived from boating accident statistics, combined with common sense and some engineering expertise comes an approach which gives some hope of a solution to this serious marine safety problem.

Problem Areas Identified

The 1971 statistics show that there are about 5,510,000 numbered motorboats in the United States. 88 percent of these are outboards; the remaining 12 percent are inboards. About 84 percent of the fires and explosions reported were in the "fire or explosions of fuel" category. The others reported involved materials other than fuel. The outboards were involved in only 14 percent of the fuel fire incidents, while the relatively smaller group of inboard powered boats was involved in *86 percent of such accidents*. An inboard powered boat, therefore, would seem to have a 43 times greater probability of being involved in fire or explosion of fuel than an outboard boat! It is apparent from this that the operator of an inboard boat is exposed to a fire and explosion hazard to a degree far in excess of the outboard operator.

Most of the fuel fires and explosions involve gasoline. While a few fuel *fires* have occurred on diesel powered boats, no examples of fuel explosions on such boats have come to the Coast Guard's attention. Diesel power is not truly "safe" but it offers much less hazard than gasoline power.

Regulatory focus must plainly be on the gasoline powered inboard boat. It is contemplated that a flash point of less than 110° F will be the limiting criterion for standards application.

Method of Approach

Having determined that the fire and explosion problem rests with the inboard boat, the next logical question is "does the size of the inboard boat have anything to do with the incidence of fuel fire or explosion?" Are the bigger ones safer? Is our problem only with a particular size boat? The percentages of fuel fires and explosions correlate within five percent with the inboard boat size distribution. The rate of fuel fire and explosions on inboard boats, therefore, is essentially constant throughout the size range.

Another question is "does the age of the boat have anything to do with

This can be the result when a source of ignition and gasoline vapors meet aboard a recreational boat. It is hoped that regulatory standards will help eliminate such sights.

the incidence of fuel fire or explosion?" Apparently not. A comparison of the percent of distribution of registered inboard boats by age versus the percent of fire and explosion accidents by age shows a close correlation between the age of the boat and the ages of boats involved in fuel fire and explosion.

Since boat size and age are not variables, it is much easier to get a "handle" on the apparent severity of the typical fuel fire or explosion. The average fire or explosion results in about $7500 worth of damage. This is slightly higher than the price of a brand new 18. ft. inboard/outboard. A study of the accident reports shows that many of the boats become total losses.

Statistics show that there are 5.6 deaths and 43 injuries per hundred boats involved in the fuel fire and explosion category of accidents.

In summary—

(1) The fuel fire and explosions hazard exists primarily on gasoline powered inboard boats, including inboard/outboards.

(2) The death rate, injury rate and relative extent of property damage are all at an unacceptably high level.

A chain of avoidable circumstances leading to fuel fires and explosions is especially clear. The boatman who fuels his boat and then tries to start the engine without checking the engine compartment for fumes makes a serious mistake—one that can cost his life. But his mistake *alone* does not cause an accident. There must be fuel vapors in the boat—and a potential ignition source. His turning the ignition key completes the chain of an accident waiting to happen. Better, safer boats and equipment can break this chain—reducing the consequences of human error. This is the purpose of Boating Standards.

Concentration Areas

The major areas of concentration are fuel systems, electrical systems, and ventilation.

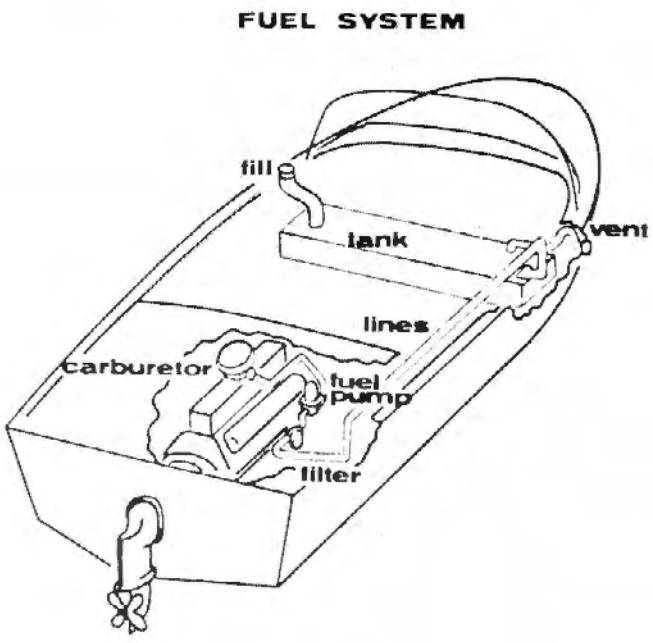

Figure 1

There has been absolutely no control of the introduction of the volatile liquids or hazardous vapors into boat compartments. There is *one* source for these dangerous liquids and vapors—the *BOAT'S FUEL SYSTEM* including the fuel tank and filling arrangement, the fuel lines, the fuel pumps and filter units and the carburetors themselves. *Figure 1* shows a typical fuel system arrangement. If fuel (usually gasoline) can pass from the pump on the dock, into the tank, through the fuel system and be burned in the engine without escaping from this closed system there would be *no* fuel fires and explosions on the boats.

But, the presence of dangerous vapors alone does not result in an accident. The vapors must be ignited. Accident reports indicate that the major source of ignition of the vapors is an *electrical spark or arc.* Recreational boats are rather simple in design and construction. The only sources of electrical sparks and arcs present in the vast majority of boats involved in fuel fires/explosions are the engine ignition and cranking systems and the auxiliary electrical system used for lighting and power. *Figure 2* shows a typical electrical system layout.

Research and Development Efforts

The Coast Guard, during 1969 and 1970, conducted a Research and Development project on ventilation of dangerous vapors and gases from closed compartments. This project was conducted at the Marine Division of Underwriter's Laboratories. Information indicates that ventilation of compartments, either by natural means or by a reasonably sized blower arrangement, may not be effective in removing the hazardous vapors if there is any significant amount of *liquid* gasoline present. Under normal conditions the vaporization of gasoline may occur at such a high rate as to "regassify" the compartment almost *immediately.*

During the summer of 1970 the Coast Guard conducted an in-depth study of recreational boat fires and explosions. A total of 15 accidents were thoroughly investigated by two officers. The cases studied were screened and selected based on preliminary information received from

Coast Guard field units located at the scenes of the casualties. The study includes cases from all parts of the continental United States and covers a wide variety of gasoline powered boats. The report does not identify specific cases by names, manufacturers, locations, or time. Of the samples studied, the boats' *fuel storage systems* were causal factors in the fire or explosion casualties 48 percent of the time.

The Coast Guard is presently conducting fire and explosion experiments. At least 20 fire/explosion type accidents will be investigated in order to accomplish three objectives:

1. Identify general design problems involved in accident types.
2. Determine whether the design problems occur despite compliance with existing (voluntary or mandatory) standards or because of departures from existing standards or both.
3. Develop an accident investigation method to be used by the Coast Guard as its accident investigation functions expand.

Present Approach to Problem

The Coast Guard's goal under its new statutory authority is to develop standards covering fuel and ignition sources. The specific standards areas presently considered important are:

Fuel Sources

1. Fuel Tank System—meaning vent pipes, fuel pipes, tank location, and tank construction;
2. Fuel Lines—materials and installation practice including connections;
3. Fuel Filters;
4. Fuel Pumps—both electric and engine driven;
5. Carburetors.

Ignition Sources

1. "Ignition Proofing" of alternators, generators, distributors and cranking motors;
2. Arc reduction in hi-tension wiring;
3. Battery connections and battery mounting;
4. Spark reduction of blowers, pumps and other auxiliary equipment.

Other Organization Involvement

The standards-making process includes the Coast Guard's Boating Standards Division working with broad-based industry groups to prepare and modify existing standards. These groups are:

ABYC—American Boat and Yacht Council
BIA—Boating Industry Associations
NAEBM—National Association of Engine and Boat Manufacturers
NFPA—National Fire Protection Association
SAE—Society of Automotive Engineers

Additional input comes from research and development contracts.

Ventilation Approach

Figure 3 outlines three categories of ventilation.

Category (1) is the condition upon which present standards for ventilation are based. Implicit in category (3) is the recognition that ventilation is presently required to an extent that may not be necessary in certain cases.

The Coast Guard anticipates that the results of its experimental work and a careful analysis of all available test material will show conclusively that the new ventilation requirements for Category (1) will have to be more stringent than today's. It is a distinct possibility that *no* practical ventilation system will be found effective in removing dangerous vapors if a significant source of basic liquid can be expected to be present.

In order to take advantage of the hazard reduction of the Category (2) space, a boat plate would be required attesting to the fact that the standards are met. Under the 1971 Act this will be manufacturer's responsibility. Present thinking is that the new requirements should apply to new boats. Identification is not a problem since the year of manufacture appears on the boat registration as well as on the hull identification number.

Conclusion

In addition to looking at the fuel, electrical and ventilation systems, the Coast Guard will investigate the overall fire hazard. This will include, but is not limited to:

Hull material
Interior finishes
Furnishings
Fire extinguishing systems

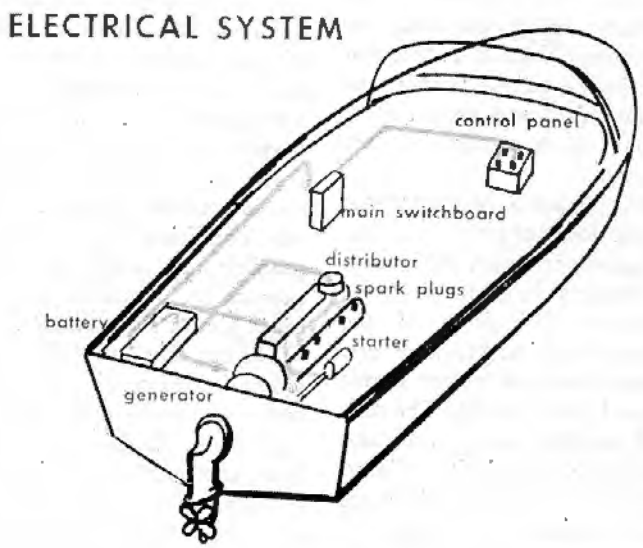

Figure 2

This article outlines the fire safety problem for recreational boats and the Coast Guard approach to it. It can reasonably be seen that the same approach can and will work for other areas of standards development. The successful use of this approach for standards concerning load capacity, flotation and powering attests to that. The approach may well be used for navigation lights, pyrotechnics, steering and control systems and almost any other areas of standards development.

The end product, of course, is a safer boat for the consumer, and that is the ultimate goal of the boating standards program.

CATEGORIES OF VENTILATION

(1) Higher Ventilation Requirements—
Compartment containing both fuel and electrical components, not all meeting standards.
(2) Lower Ventilation Requirements—
Compartment containing both fuel and electrical components, all meeting standards.
(3) Third Ventilation Category—
Compartment containing fuel system only—no electrical components.

Figure 3

MERCHANT MARINE PERSONNEL STATISTICS

MERCHANT MARINE OFFICER LICENSES ISSUED

FISCAL YEAR ENDING JUNE 30, 1973

DECK

Grade	July through September (1972)		October through December (1972)		January through March (1973)		April through June (1973)	
	Original	Renewal	Original	Renewal	Original	Renewal	Original	Renewal
Master:								
Ocean	46	199	53	276	65	338	70	334
Coastwise	5	25	16	21	12	23	9	26
Great Lakes	6	5		13	20	114	9	20
B.S. & L	4	32	8	46	14	58	12	38
Rivers	6	36	9	29	22	50	19	50
Radio Officer Licenses issued	6	99	4	78	11	91	3	76
Chief Mate:								
Ocean	30	40	42	57	33	74	34	79
Coastwise		1		1				6
Great Lakes							1	
B.S. & L								
Rivers			2	2			3	3
2nd Mate:								
Ocean	43	59	40	81	35	77	46	94
Coastwise				4		1		
3rd Mate:								
Ocean	35	72	21	63	17	113	256	121
Coastwise						5	1	1
Pilots:								
Great Lakes	19	7	18	11	14	27	17	17
B.S. & L	115	61	88	81	116	207	133	104
Rivers	41	117	75	92	113	159	87	138
Master: Uninspected vessels	25	14	35	27	47	128	40	101
Mate: Uninspected vessels	12	2	11	4	24	12	20	14
Motorboat operators	711	629	516	669	751	1,420	1,147	1,540
Total	1,104	1,398	938	1,555	1,294	2,897	1,903	2,762
Grand total	2,502		2,493		4,191		4,665	
Original licenses issued	5,230							
Renewals issued	8,612							
Total deck licenses issued	13,851							

MERCHANT MARINE PERSONNEL STATISTICS—Continued

ENGINEER

Grade	July through September (1972)		October through December (1972)		January through March (1973)		April through June (1973)	
	Original	Renewal	Original	Renewal	Original	Renewal	Original	Renewal
STEAM								
Chief engineer:								
Unlimited	18	328	30	293	39	410	28	363
Limited	2	25	1	32	4	49	5	42
1st Assistant engineer:								
Unlimited	35	93	39	101	51	143	40	123
Limited	1	3	2	17	4	25	----	12
2nd Assistant engineer:								
Unlimited	35	172	42	166	63	201	50	192
Limited	----	4	1	11	3	3	2	2
3rd Assistant engineer:								
Unlimited	65	234	39	205	41	217	254	293
Limited	----	6	----	2	1	4	----	----
Total	156	865	163	827	206	1,052	379	1,0[illegible]
MOTOR								
Chief engineer:								
Unlimited	9	58	13	61	28	69	7	64
Limited	31	89	24	90	28	109	22	103
1st Assistant engineer:								
Unlimited	3	14	5	20	9	34	7	17
Limited	8	33	8	38	11	31	8	33
2nd Assistant engineer:								
Unlimited	2	19	5	28	8	42	10	35
Limited	3	6	2	3	5	5	4	4
3rd Assistant engineer:								
Unlimited	51	260	21	243	21	262	237	286
Limited	1	2	1	6	5	12	4	[illegible]
Total	108	481	79	489	115	564	298	[illegible]
Chief engineer:								
Uninspected vessels	6	8	15	17	26	71	30	[illegible]
Assistant engineer:								
Uninspected vessels	4	2	9	2	31	11	13	18
Total	274	1,356	266	1,335	378	1,698	729	1,[illegible]
Original								[illegible]
Renewal								[illegible]
Grand total								7,[illegible]

MERCHANT SEAMEN'S DOCUMENTS ISSUED

Type of document	July through September (1972)					October through December (1972)					January through March (1973)					April through June (1973)				
	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total
Staff officer	6	3	15	----	24	8	1	16	----	25	4	----	11	4	19	2	1	15	----	1[illegible]
Merchant mariner's documents	860	935	560	746	3,101	935	660	556	527	2,678	1,013	779	550	393	2,735	1,504	857	504	1,141	4,[illegible]
AB any waters unlimited	51	86	38	11	186	45	28	40	3	116	37	43	23	18	121	219	31	37	8	[illegible]
AB any waters 12 months	44	44	20	69	177	22	9	15	16	62	23	20	19	46	108	33	25	15	28	[illegible]
AB Great Lakes 18 months	----	4	8	11	23	----	3	9	6	18	2	5	9	8	24	4	2	15	5	[illegible]
AB other	14	37	4	----	55	10	18	8	----	36	13	83	9	6	111	61	57	12	----	[illegible]
Lifeboatman	38	118	45	11	212	47	28	36	2	113	50	43	71	32	196	99	63	74	11	[illegible]
Electrician	24	1	12	2	39	29	5	5	6	45	15	3	13	1	32	32	4	16	4	[illegible]
Oiler	39	20	28	22	109	32	8	33	25	98	36	15	30	15	96	54	20	42	26	[illegible]
Fireman, water tender	35	16	31	22	104	28	16	20	28	92	25	14	25	19	83	49	16	22	38	[illegible]
Other QMED rating	123	55	57	2	237	151	59	51	1	262	193	47	63	6	309	355	62	67	11	[illegible]
Tankerman	57	155	18	106	336	78	154	16	90	338	91	118	16	86	311	77	214	21	106	[illegible]
Entry	1,183	850	713	721	3,467	1,139	805	616	524	3,084	1,276	816	602	333	3,027	1,539	885	784	1,199	4,[illegible]
Total	2,474	2,324	1,540	1,723	8,070	2,524	1,794	1,421	1,228	6,967	2,778	1,986	1,441	967	7,172	4,028	2,246	1,684	2,575	10,[illegible]
Total documents issued																				32,[illegible]

In addition to issuing licenses, documents and endorsements, the Coast Guard also takes action against licenses and/or merchant mariner's documents held by merchant seamen. This remedial action is initiated where there is substantive evidence of misconduct, negligence, inattention to duty, incompetence, or violation of statutes or regulations. In the fiscal year ending June 30, 1973, the Coast Guard conducted 3,559 personnel investigations. Of this number, some 658 cases were deemed sufficiently serious to warrant a formal hearing before an Administrative Law Judge. The results of the hearings are furnished below. The remainder of the cases were disposed of by voluntary surrender of documents, letters of warning, voluntary medical deposits of documents, or simply closed due to insufficient evidence.

HEARINGS BEFORE ADMINISTRATIVE LAW JUDGES

	Deck	Engine	Radio	Unlicensed	Small vessel operators
Revoked	5	1	2	62	1
Suspended outright	16	8	5	164	21
Suspended on probation	41	11	1	137	11
Admonished	22	3	0	49	6
Dismissed	23	4	0	62	3
Total					658

AMENDMENTS TO REGULATIONS

TITLE 46—SHIPPING

Chapter I—Coast Guard, Department of Transportation

[CGD 73–119R]

SUBCHAPTER H—PASSENGER VESSELS

Part 72—Construction and Arrangement

SUBCHAPTER I—CARGO AND MISCELLANEOUS VESSELS

Part 92—Construction and Arrangement

SUBCHAPTER U—OCEANOGRAPHIC VESSELS

Part 190—Construction and Arrangement Washrooms and Toilets

The purpose of these amendments to the shipping regulations is to allow female members of the crews of vessels to use washrooms and toilet rooms that are also used by male members of the crew.

This amendment is based on a notice of proposed rule making published in the Federal Register on January 15, 1972 (CGFR 72–4; 37 FR 676). The time for comments on that notice was extended by a notice published in the Federal Register on March 2, 1972 (CGFR 72–38; 37 FR 4357).

As explained in the notice, current regulations for passenger, cargo, miscellaneous, and oceanographic vessels require that toilet and washing facilities for female members of the crews of these vessels must be located in spaces separate from the facilities for other crew members.

Under §§ 72.20–1, 92.20–1, and 190.20–1, this requirement applies only to passenger, cargo, and miscellaneous vessels of 100 gross tons and over contracted for on or after November 19, 1952, and to oceanographic vessels contracted for on or after March 1, 1968. The separate washroom and toilet requirement does not apply to vessels contracted for before these dates; their existing structures, arrangements, materials, and facilities previously approved are considered satisfactory so long as they are maintained in good condition, under §§ 72.20–90, 92.20–90, and 190.20–90.

The facts that create the need for the proposed revision are as follows:

The "semi-private" facility referred to in the present regulations is understood to mean a toilet and washing facility, between two rooms, with two doors that can be locked from either side. This arrangement has been interpreted by the Coast Guard as not being a toilet and washing facility located in a space separate from the facilities for other crewmembers. On vessels where semi-private but no private facilities were available for women, women have been denied employment to avoid violation of the regulations; particularly where the employer has determined it to be unreasonable or impractical to modify the vessel at the time a woman sought employment as a crewmember.

As indicated in the notice, the

Coast Guard has determined that to require that each women's toilet and washing facility be located in a space separate from men's toilet and washing facilities is unduly restrictive. The requirement was first adopted, for passenger, cargo, and miscellaneous vessels in 1952 when fewer ships had private and semi-private facilities for crewmembers and when women were employed mostly aboard passenger ships where arrangements were satisfactory.

In January of 1970, the Coast Guard responded to a request for an interpretation of present § 92.20–1 in a situation where a female crewmember on board a vessel would share a semi-private shower and wash facility with a male crewmember. The Coast Guard's interpretation concluded that the semi-private toilet and washroom facility available between each pair of single staterooms in the crew quarters of the vessels involved would oot meet the requirements of § 92.20–1.

In January, 1971, the National Maritime Union of America requested reconsideration of that interpretation so that female seamen would be permitted to ship on cargo ships when the union and the company agree that the facilities provided on the vessel meet the intent of the regulations to provide privacy for the female.

The Union indicated that the employment of females on merchant vessels where the seamen have a private room and toilet facilities that can be made private by way of a lock when occupied was now acceptable to both management and labor.

In March 1971, after reconsideration, the Coast Guard reaffirmed the earlier interpretation, but noted that semi-private washroom and toilet facilities would now be considered acceptable to the industry, and pointed out that promulgation of a regulation change under the Administrative Procedure Act would be required to effect this position.

On May 10, 1971, the Coast Guard advised the United States shipping commissioners, who superintend the arrangement and discharge of seamen and inspect crew quarters, that the regulations were being amended to allow female members of the crew to share semi-private washroom and toilet facilities without restriction. Therefore, the restriction against employing female crewmembers has been relaxed since May 10, 1971, insofar as it applied to semi-private washroom and toilet facilities. The amendment proposed in the Coast Guard's notice CGFR 72–4 not only relaxes the restriction on the use of semi-private rooms by female crewmembers but also removes the restriction on the use of washroom and toilet facilities that are not located between adjoining crewmembers quarters. Therefore, the proposed revision would remove the restriction and enable employment of female crewmembers on those vessels that are not arranged to have semi-private toilet and washroom facilities. For example, the proposal would enable employment of female crewmembers on a vessel arranged with one or more toilet and washroom facilities that are not between quarters but can be used privately.

Comments in response to the notice generally favored regulations that would permit females to be employed aboard vessels when private and semi-private washroom and toilet facilities are available. Comments pointed out that in the case of new construction such facilities are being provided and that female crewmembers could obtain employment on a substantial portion of the United States flag ocean-going vessels.

However, the Maritime Service Committee and others commented:

> * * * that the proposal would go further and permit the hiring of females even in those instances where a single washroom and toilet facility is shared by an entire department aboard the vessel and where a female would be required to use a washroom and toilet facility which is also being used by seven male crewmembers.
>
> Thus, it would be impossible to insure that a female would have privacy at the time she is using the washroom and toilet facilities, and, of course, privacy for her would deprive other crewmembers of those facilities at the same time.
>
> This kind of situation envisaged by the newest proposed regulations goes far beyond current accepted standards both at the sea and on shore. Not only would it create serious personal problems for the female and male crewmembers but it would also create serious disciplinary problems for the vessel and might, indeed, create circumstances which would endanger the safety of the vessel itself.

Another comment stated that adoption of the proposed rule would have the effect of depriving ship owners and operators of their present legal right to refuse to employ female crewmembers where females would have to share common toilet and washroom facilities with male members of the crew.

Although the proposal would enable the employment of female crewmembers on vessels that are arranged so that there are no toilet or washroom facilities that are intended for private use, it should be noted that Coast Guard regulations and the shipping laws do not require employment of female crewmembers or require females to serve as crewmembers aboard a vessel without facilities that could be used privately.

If the regulations continue to require that vessels be arranged so as to provide female crewmembers with facilities that they can use privately the regulations would continue to enable discrimination in employment of female crewmembers on a vessel on which the shipowner refuses to provide private facilities.

The Coast Guard recognizes that problems arising from the use of toilet and washroom facilities by both sexes on board merchant vessels during lengthy voyages are different from those aboard passenger vessels, aircraft, and trains or in factories, stores, homes, and other living quarters. However, problems of discipline

morale, sanitation, safety, and discrimination cannot be resolved solely by promulgating general toilet and washing facility requirements. These problems are of the concern not only to the Coast Guard but also to employees, employers, and their representatives and to other government agencies. These are problems that should be resolved by the persons involved, including the Coast Guard when the problem is within its jurisdiction, after considering the arrangement of the particular ship or class of ships and the specific kind of problem.

It should be noted further that the present regulations requiring separate facilities for females are inappropriate insofar as they apply at the time of initial inspection and certification of a vessel because it is not known at that time how many, if any, female crewmembers will regularly serve on the vessel. The regulations were originally promulgated for passenger vessels, where women regularly served in various capacities and the need for facilities could be anticipated. The regulations have been extended, as recently as 1968, to oceanographic vessels, without regard to the difficulty of anticipating crew complement at the time of approval of a vessel's design. The other regulations in the sections being revised apply regardless of sex.

In consideration of the foregoing, the amendments to Parts 72, 92, and 190 of Title 46 of the Code of Federal Regulations are adopted as proposed in the notice of proposed Rulemaking (CGFR 72–4; 37 FR 676).

T. R. SARGENT,
Vice Admiral, U.S. Coast Guard,
Acting Commandant.

JULY 25, 1973.

Chapter I of Title 46, Code of Federal Regulations is amended as follows:

By revoking §§ 72.20–25(b)(3), 92.20–25(b)(3), and 190.20–25(b)(3).

(Federal Register of August 1, 1973; 38 F.R. 20448.)

TITLE 46—SHIPPING

Chapter I—Coast Guard, Department of Transportation

[CGD 71–161 CR]

Part 10—Licensing of Officers and Motorboat Operators and Registration of Staff Officers

Part 12—Certification of Seamen

Part 31—Inspection and Certification

Part 71—Inspection and Certification

Part 91—Inspection and Certification

Part 105—Commercial Fishing Vessels Dispensing Petroleum Products

Part 175—General Provisions

Part 176—Inspection and Certification

Part 187—Licensing

Part 188—General Provisions

Part 189—Inspection and Certification

Pollution Prevention Inspection of Vessels and Deck and Engineer Officers' Licenses; Change of Effective Date

FR Doc.72–21817 published in the December 21, 1972 issue of the Federal Register (37 FR 28261) promulgated new regulations which included the requirement for more frequent hull inspection (drydocking) of tank barges operating in fresh water service.

It was the intent of the regulations that the tank barges which were affected would be on a 3-year drydocking cycle by July 1, 1974. Since promulgation of the regulations, it has become apparent to the Coast Guard that primarily due to the heavy flooding throughout the central part of the nation which has interfered with the operation and capabilities of drydocking and gas freeing facilities, the 3-year drydocking cycle will be physically impossible to universally attain by July 1, 1974. With the present energy shortage, a resultant lay up of a large number of barges due to insufficient drydocking and gas freeing facilities is not prudent.

Accordingly, an extension to the period allowed for existing equipment to be phased into the new drydocking schedule is appropriate. Such action would assure progress toward the 3-year cycle and provide first attention to barges that have operated the longest period since last drydocking.

By changing the effective date of § 31.10–20, all tank barges will be on a 3-year drydocking/internal examination cycle by July 1, 1975; however by July 1, 1974, a tank barge is required to be drydocked or, if appropriate, inspected internally if the vessel was constructed or drydocked before July 1, 1970.

In consideration of the foregoing, the effective date of the regulations is changed to read as follows: "These amendments shall become effective on July 1, 1974, except as follows: The amendments to Parts 10, 12, 105, and 187 shall become effective on July 30, 1973; The amendments to § 31.10–20 shall become effective on July 1, 1974 for all barges drydocked or constructed before July 1, 1970, and on July 1, 1975 for all barges drydocked or constructed after July 1, 1970."

(R.S. 4405, as amended, R.S. 4462, as amended, sec. 311(j)(1)(C) and (D), Federal Water Pollution Control Act, 86 Stat. 816, 868; National Environmental Policy Act of 1969, 83 Stat. 852; sec. 6(b)(1), 80 Stat. 937; 46 U.S.C. 375, 416, 33 U.S.C. 1161(j)(1)(C) and (D), 42 U.S.C. 4321, et seq.; 49 U.S.C. 1655(b)(1); E.O. 11548; 3 CFR, 1966–1970 Comp., p. 949; 49 CFR 1.46 (b) and (m))

Dated: August 20, 1973.

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

(Federal Register of August 24, 1973; 38 F.R. 22787)

CGD 73–107R

SUBCHAPTER B—MERCHANT MARINE OFFICERS AND SEAMEN

Part 10—Licensing of Officers and Motorboat Operators and Registration of Staff Officers Registration of Staff Officers

The purpose of these amendments to the Coast Guard regulations governing the issuance of Certificates of Registry to Staff Officers is to change the endorsement of pharmacist's mate to marine physicians assistant and to provide for the endorsement of hospital corpsman.

During World War II, the endorsement "pharmacist's mate" was authorized, under 46 U.S.C. 242, on each Certificate of Registry issued in the several grades of purser to persons who had completed the U.S. Maritime Service Training Program. This rating was established in § 10.25–9 of Title 46, Code of Federal Regulations, in the June 1, 1967 issue of the Federal Register (32 FR 7915), following the institution of a nine month course of instruction at the United States Public Health Service Hospital, Staten Island, New York.

Responding to requests by pharmacologists, the Navy and the Coast Guard changed the name of the rate from "pharmacist's mate" to "hospital corpsman" after World War II. Under the same aegis and to provide a more descriptive title to the training program, the United States Public Health Service, starting with the class commencing September 8, 1969, used the title "marine physician assistant." Those persons successfully completing that and subsequent classes have been issued certificates by Public Health as Marine Physician Assistants.

The Coast Guard, in recognition of the special qualifications of persons completing this training and under authority of 46 CFR 10.25–9(d) which allows for the issuance of Certificates of Registry to applicants presenting such qualifications, has granted a supplemental Certificate of Registry to each person who has successful completed the prescribed course of training at the United States Public Health Service Hospital, Staten Island, New York. The course of training offered there since January 1973 has been increased to 13 months and has been approved by the State of New York and the American Medical Association.

The purpose of this document is to grant formal recognition of the training program at the Staten Island Public Health Service Hospital. Anciliary purposes are to provide for the rating of "hospital corpsman" for persons with Armed Service experience to provide for the elimination of the term "pharmacist's mate" and to retitle § 10.25–9 to more fully explain the intent of that section.

Since the amendments in this document concern matters relating to agency management, they are excepted from notice of proposed rule making and may be made effective in less than 30 days from the publication date.

In consideration of the foregoing, Part 10 of Title 46, Code of Federal Regulations, is amended as follows:

1. By deleting § 10.25–9(a)(6) and revising the heading of § 10.25–9 to read as follows:

§ 10.25–9 Experience requirements for registry.

* * * * *

2. By adding a new § 10.25–11 to read as follows:

§ 10.25–11 Experience requirements for ratings endorsed on certificates of registry.

An applicant for a rating to be endorsed on a certificate of Registry must submit evidence of experience as follows:

(a) *Marine physician assistant.*—Successful completion of a course of training for the rating of marine physician assistant that is conducted by the United States Public Health Service at Staten Island Public Health Service Hospital.

(b) *Hospital corpsman.*—(1) A rating of at least hospitalman, first-class in the U.S. Navy, U.S. Coast Guard, U.S. Marine Corps, or an equivalent rating in the U.S. Army (not less than staff sergeant, Medical Department U.S.A.), or in the U.S. Air Force (not less than technical sergeant, Medical Department, U.S.A.F.), and a period of service of at least 1 month in a military or U.S. Public Health Service Hospital;

(2) Successful completion of a course of training for rating of hospital corpsman that is approved by the Commandant; or

(3) A Certificate of Registry with an endorsement as pharmacist's mate.

(Sec. 7, 53 Stat. 1147, as amended, Sec. 6(b)(1), 80 Stat. 937; 46 U.S.C. 247, 49 U.S.C. 1655(b)(1); 49 CFR 1.46(b))

Effective date.—These amendments are effective on August 27, 1973.

Dated: August 17, 1973.

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

(Federal Register of August 24, 1973; 38 F.R. 22788)

SUBCHAPTER J—ELECTRICAL ENGINEERING

[CGD 73–GR]

Part 111—Electrical System; General Requirements

Wiring Methods and Materials for Hazardous Locations

The purpose of this amendment to Part 111, Subchapter J of Chapter I, Title 46, Code of Federal Regulations is to bring the list of certain air mixtures of hazardous gases, vapors, or dusts into conformity with the recently revised Article 500–2 of the National Electric Code.

A notice of proposed rulemaking was published in the Federal Register on February 14, 1973 (38 FR 4414) proposing the addition of several chemicals to table § 111.80–5(a)(7).

During the period of February 14, 1973 to March 16, 1973, written comments from interested persons were received. The Coast Guard has considered these comments in preparing the final rule.

One comment questioned the omission of the footnote of table 500–2(c) of the National Electric Code in the proposed change. Footnotes (1), (2), and (4) will be included at the end of Table 111.80–5(a)(7), Hazardous Atmospheres, as these footnotes modify the group classification of some chemicals. The subject matter of footnote (3) does not relate to the group classification and is adequately addressed in other parts of this chapter.

Two comments supported the proposed rule while none opposed it. In consideration of the foregoing,

§ 111.80–5(a)(7) is revised to read as follows:

§ 111.80–5 Wiring methods and materials for hazardous locations.

(a) * * *

(7) Electrical equipment is approved for location and for specific hazardous atmospheres of gas, vapor, or dust, that are present. Hazardous air mixtures that are not oxygen enriched are grouped on the basis of their characteristics in Article 500 of the National Electric Code, which is reproduced in Table § 111.80–5(a)(7). Other chemicals and materials which generate hazardous atmospheres and are not listed in Table 111.80–5(a)(7) are listed in Table 151.05 of this chapter.

TABLE 111.80–5(a)(7) HAZARDOUS ATMOSPHERES

GROUP A

Acetylene.

GROUP B

Butadiene.[1]
Ethylene oxide.[2]
Hydrogen.
Manufactured gases containing more than 30 percent hydrogen (by volume).
Proyplene oxide.[3]

GROUP C

Acetaldehyde.
Cyclopropane.
Diethyl ether.
Ethylene.
Isoprene.
Unsymmetrical dimethyl hydrazine (UDHM 1, 1-dimethyl hydrazine).

GROUP D

Acetone.
Acrylonitrile.
Ammonia.
Benzene.
Butane.
1-butanol (butyl alcohol).
2-butanol (secondary butyl alcohol).
n-butyl acetate.
Isobutyl acetate.
Ethane.
Ethanol (ethyl alcohol).
Ethyl acetate.
Ethylene dichloride.
Gasoline.
Heptanes.
Hexanes.
Methane (natural gas).
3-methyl-1-butanol (isoamyl alcohol).
Methyl ethyl ketone.
Methyl isobutyl ketone.
2-methyl-1-propanol (isobutyl alcohol).
2-methyl-2-propanol (tertiary butyl alcohol).
Petroleum naptha.[3]
Octanes.
Pentanes.
1-pentanol (amyl alcohol).
Propane.
1-propanol (propyl alcohol)
2-propanol (isopropyl alcohol).
Propylene.
Styrene.
Toluene.
Vinyl acetate.
Vinyl chloride.
Xylenes.

GROUP E

Metal dust, including aluminum, magnesium, and their commercial alloys, and other metals of similar hazardous characteristics.

GROUP F

Carbon black.
Coal.
Coke dust.

GROUP G

Flour.
Starch.
Grain dust.

* * * * *

Effective date.—This amendment becomes effective November 27, 1973.

* * * * *

(R.S. 4405, as amended, sec. 5, 49 Stat. 1384, as amended, sec. 3, 70 Stat. 152, R.S. 4417a, as amended, R.S. 4462, as amended, R.S. 4491, as amended, sec. 6 (b)(1), 80 Stat. 937; 46 U.S.C. 375, 369, 390b, 391a, 416, 489, 49 U.S.C. 1655(b)(1); 49 CFR 1.46(b))

Dated: August 21, 1973.

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

(Federal Register of August 24, 1973; 38 F.R. 22788)

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[1] Group D equipment may be used for this atmosphere if such equipment is isolated as required by paragraph (b)(10) of this section.

[2] Group C equipment may be used for this atmosphere if such equipment is isolated as required by paragraph (b)(10) of this section.

[3] A saturated hydrocarbon mixture boiling in the range of 20–135° C (68–275° F). Also known by the synonyms benzine, ligroin, petroleum ether or naphtha.

Passenger Ship Subdivision and Stability Information Available

The Subcommittee on Subdivision and Stability of the Intergovernmental Maritime Consultative Organization (IMCO) has proposed a significant change to the 1960 International Convention for Safety of Life at Sea. The proposed amendment would change Chapter II, Part B "Subdivision and Stability" of the Convention as it applies to passenger ships. It would introduce a probabilistic concept for the evaluation of passenger ship safety into that part, and is substantially different in application from the present text.

The proposed change is scheduled for consideration by the Eight Assembly of IMCO. Adoption is likely. Should the proposal be adopted, the Coast Guard may propose similar changes to its Rules and Regulations for Passenger Vessels, Title 46, Code of Federal Regulations, Subchapter H.

To keep interested parties abreast of current developments in this area, the Coast Guard's Office of Merchant Marine Safety has available copies of the proposed changes and of a supporting technical document. Interested parties should address inquiries to:

Commandant (G–MMT–5)
U.S. Coast Guard
Washington, D.C. 20590

MODERNIZATION OF THE INTERNATIONAL RULES OF THE ROAD

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ED. NOTE: This is the second of a series of installments on the modernization of the International Rules of the Road. The article will be continued in subsequent issues of the Proceedings. *The views expressed are those of the authors and do not necessarily reflect those of the Commandant or of the Coast Guard as a whole.*

PART B—STEERING AND SAILING RULES

Section I—Conduct of Vessels in Any Condition of Visibility

Comment: It is here that broad changes begin to evidence themselves. For example, the title alone recognizes the fact that ships do navigate in conditions of restricted visibility.

RULE 4

APPLICATION

Rules iu this Section apply in any condition of visibility.

RULE 5

LOOK-OUT

Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

Comment: Keeping a proper look-out is often termed the first rule of seamanship. Accordingly, it's quite appropriate that the first operating rule should be dedicated to the duty of look-out. Old Rule 29 had left the term proper look-out for the courts to decide. In general the courts have been very diligent in this task, declaring that the look-out must be as low down and as far forward as possible. However, there are examples where the courts have held a radar look-out was adequate, or that if the mate saw an approaching vessel in time to avoid collision that the question of a proper look-out was not an issue. In this new rule the drafters have, in our opinion, done an excellent job of going directly from the rule to the mariner without relying on the wisdom of the courts. This rule makes it abundantly clear that you must look and you must listen. Additionally, by requiring "all appropriate means to appraise risk of collision" this ties Rule 5 to Rule 7 (the definition of risk of collision) and is a clear mandate to not only use the radar but to satisfactorily plot for a proper evaluation of the information.

RULE 6

SAFE SPEED

Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.

In determining a safe speed the following factors shall be among those taken into account:

(a) By all vessels:

(i) the state of visibility;

(ii) the traffic density including concentrations of fishing vessels or any other vessels;

(iii) the manoeuvrability of the vessel with special reference to stopping distance and turning ability in the prevailing conditions;

(iv) at night the presence of background light such as from shore lights or from back scatter of her own lights;

(v) the state of wind, sea and current, and the proximity of navigational hazards;

(vi) the draught in relation to the available depth of water.

(b) Additionally, by vessels with operational radar:

(i) the characteristics, efficiency and limitations of the radar equipment;

(ii) any constraints imposed by the radar range scale in use;

(iii) the effect on radar detection of the sea state, weather and other sources of interference;

(iv) the possibility that small vessels, ice and other floating objects may not be detected by radar at an adequate range;

(v) the number, location and movement of vessels detected by radar;

(vi) the more exact assessment of the visibility that may be possible when radar is used to determine the range of vessels or other objects in the vicinity.

Comment: This is a totally new rule. If it has an counterpart in the existing 1960 Rules the counterpart

would be paragraph 2 of the radar annex which attempts to assist in the determination of what is a moderate speed in restricted visibility. It is here worth noting that the term "moderate speed" does not appear in this draft of rules. We believe two facts are clearly evident by the insertion of this fine rule in the New International Rules:

a. The drafters have so written and so located this rule with respect to the others as to make mariners aware of the need for setting a safe speed *in all conditions of visibility*. This does not mean the same safe speed will apply in good visibility as well as in restricted visibility; indeed, the first mandate under this rule is to consider the state of visibility. What it does mean is that speed in any conditions is intimately related to the immediate circumstances at hand. For example, under no circumstances can unlimited visibility by itself be considered a carte blanche for wide open throttles.

b. There exists at this time an almost universal dissatisfaction with the term "moderate speed" as it appears in Rule 16(a) of the existing 1960 rules. Myriad court cases attest to the mariner's difficulty with this rule and with subsequent judicial interpretation. This new rule makes what we believe a valiant attempt at aiding the mariner with the impossible burden of determining what is a safe speed in a fog. Obviously this rule could contain several volumes on good seamanship advisements. Considering that prevention of collisions is the primary mandate of these rules the selection of requirements laid down here is commendable.

RULE 7

RISK OF COLLISION

(a) Every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist.

(b) Proper use shall be made of radar equipment if fitted and operational, including long-range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.

(c) Assumptions shall not be made on the basis of scanty information, especially scanty radar information.

(d) In determining if risk of collision exists the following considerations shall be among those taken into account:

(i) such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change;

(ii) such risk may sometimes exist even when an appreciable bearing change is evident, particularly when approaching a very large vessel or a tow or when approaching a vessel at close range.

Comment: Paragraph (a) of this rule, which is similar to but much stronger than the preliminary section in the existing Steering and Sailing Rules (beginning with Rule 17), strongly implies that a radar plot would be a very good idea and uses essentially the same language as can be found in Rule 5 (the look-out rule already covered). If these two advisements are not enough to convince the mariner he should make full use of his radar equipment, paragraph (b) goes one step farther and virtually demands a plot.

An interesting phrase in this particular rule is "radar plotting or equivalent systematic observation * * *". The drafters intend by this language to make it clear that radar plotting, either directly on the scope or on a radar deflection plotter fitted over the scope, is the minimum degree of compliance necessary. The term "systematic observation" covers everything from plotting teams used on naval type vessels to the most sophisticated and exotic collision avoidance systems currently being installed on newer vessels. One man plotting, as would be the case on most merchant vessels, can handle three or four targets at the most. Collision avoidance systems are intended to alleviate this problem. They are basically a computer and additional scope fed from the conventional radar. The computer can catalog virtually all targets and the additional scope presents a picture that is a combination of true and relative. Such systems can not only plot virtually an unlimited number of contacts automatically, they can also alarm and indicate proper evasive action should one of those contacts become a risk of collision. An additional feature of the more expensive of these systems is that navigational chart information can be included in the computer memory and displayed upon the scope allowing for harbor and channel considerations to be included in the computer solution of maneuvering problems. This latter feature is particularly attractive to the very deep draft vessels.

Paragraph (c) retains and strengthens that first excellent sentence of the existing radar annex which essentially says "a quick look at your radar is not good enough". Paragraph (d)(i) is the steady bearing caution taken from the preliminary to the existing Steering and Sailing Rules. Paragraph (d)(ii) advises that even though a steady bearing may not exist you are not necessarily out of hot water. This is an addition to the rules and a good one.

At the end of Rules 6 (Safe Speed) and 7 (Risk of Collision) we get the elated feeling that the mariner has been given not only the duty but the tools with which to set a safe speed and properly maintain it. Wouldn't it be marvelous if the persons who schedule vessels shared in that burden?

RULE 8

ACTION TO AVOID COLLISION

(a) Any action taken to avoid collision shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship.

(b) Any alteration of course and/or speed to avoid collision shall, if the circumstances of the case admit, be large enough to be readily apparent to another vessel observing visually or by radar; a succession of small alterations of course and/or speed should be avoided.

(c) If there is sufficient sea room, alteration of course alone may be the most effective action to avoid a close-quarters situation provided that it is made in good time, is substantial and does not result in another close-quarters situation.

(d) Action taken to avoid collision with another vessel shall be such as to result in passing at a safe distance. The effectiveness of the action shall be carefully checked until the other vessel is finally past and clear.

(e) If necessary to avoid collision or allow more time to assess the situation, a vessel shall slacken her speed or take all way off by stopping or reversing her means of propulsion.

Comment: Paragraph (a) is an excellent seamanship advisement taken from paragraph (1) of the preliminary part to the existing Steering and Sailing Rules. It has been strengthened, but not essentially modified. Paragraphs (b) through (e) are likewise excellent seamanship advisements which appear in the existing rules. These were lifted from the radar annex. Conspicuous in its absence is the advisement in the present radar annex against a port turn. However, fear not fellow port turn detesters, this wonderful advisement can be found further on in Rule 19. Essentially Rule 8 says that action to avoid collision shall be early and substantial. It defines substantial as large enough to be readily apparent by the other vessel. It advises against a succession of small changes. It allows that given sufficient sea room an alteration of course may be most effective to avoid close quarters provided such action does not create additional problems with vessels elsewhere in the vicinity. It demands that action taken to avoid collision shall result in passage at a safe distance and further, that the effectiveness of the action shall be carefully checked until the other vessel is indeed past and clear. Finally it requires that a vessel must, if necessary, slacken her speed or stop not only to avoid collision but also to allow more time to assess the situation if that is necessary.

Rule 9

Narrow Channels

(a) A vessel proceeding along the course of a narrow channel or fairway shall keep as near to the outer limit of the channel or fairway which lies on her starboard side as is safe and practicable.

Comment: This rule has been reworded. Although it is similar to existing rule 25(a) one significant change should be noted. While both rules make the requirement to keep to the starboard hand, the existing rule speaks only to power-driven vessels and the new rule requires the compliance of all vessels.

(b) A vessel of less than 20 metres in length or a sailing vessel shall not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway.

Comment: This rule takes the existing narrow channel advisements for small craft and sailing vessels from rules 25(c) and 20(b) respectively and changes them from advisements to a "thou shalt not" type of rule. This is the first place in this draft of rules that specific vessel size appears. Notice that the rules convention has shifted to the metric system. Henceforth all linear measurements will be given in meters with a singular exception of the nautical mile which remains unchanged. This change is in keeping with a universal shift towards the metric system. It will have some impact, primarily in a positioning of navigational lights. For this reason we have prepared a table of comparison for the length standards in these rules with respect to those in the existing rules.

Situation	Old imperial system (feet)	New metric system (meters) (corresponding feet)
Length of tow	600	200 (656)
Outlying fishing gear	500	150 (493)
Anchor gong, lights at anchor	300	100 (328)
Range lights, 2d anchor light	150	50 (164)
Small boat lighting relaxations, prohibition against obstructing channel, etc.	65	20 (65.7)
Lighting and whistle relaxations.	40	12 (39.4)
Lighting, new category the inclusion of which will leave doubt about vessels between 7 and 20 meters in length for special lighting		7 (23)

(c) A vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel or fairway.

Comment: What the above rule did for small craft and sailing vessels, this rule does for fishing vessels. Old Rule 26 has been rephrased so that fishing vessels have the duty not to impede the passage of the vessels in narrow channels.

(d) A vessel shall not cross a narrow channel or fairway if such crossing impedes the passage of a vessel which can safely navigate only within such channel or fairway. The latter vessel may use the sound signal prescribed in Rule 34(d) if in doubt as to the intention of the crossing vessel.

Comment: This is a new rule and we believe a very good one. It will have wide application in harbor and river areas. Rules like this one that speak directly to the difficulties of navigating in rivers or harbors will help considerably with the problem of maritime nations bringing their local rules into conformity with International Rules. The United States, perhaps more than any other nation, needs very badly to do this. This "stay clear commandment" for the crossing vessel is very similar to Rule 19 of our own Western Rivers Rules. The sound signal mentioned in this rule is the danger signal which has been given much broader scope under these rules. It now follows various U.S. Rules very closely. We believe this rule could have been improved if it had stated to the effect that a vessel shall not enter or cross a narrow channel or fairway, etc. In this way vessels coming from small estu-

aries, or anchorages would do so only when the main channel was clear.

(e)(i) In a narrow channel or fairway when overtaking can take place only if the vessel to be overtaken has to take action to permit safe passing, the vessel intending to overtake shall indicate her intention by sounding the appropriate signal prescribed in Rule 34(c)(i). The vessel to be overtaken shall, if in agreement, sound the appropriate signal prescribed in Rule 34(c)(ii) and take steps to permit safe passing. If in doubt she may sound the signals prescribed in Rule 34(d).

(ii) This Rule does not relieve the overtaking vessel of her obligation under Rule 13.

Comment: This is an outstanding rule. Let us first rejoice that the international community has finally accepted whistle signals of intent which we find so necessary and so useful in our own Inland Rules. This rule speaks directly to the situation in which every mariner so often finds himself, where one vessel is to overtake another but there is not enough room unless the lead vessel moves over. Under the existing rules the lead vessel has the Rule 21 "privileged vessel" duty of holding course and speed. Such an overtaking can take place only if the lead vessel tacitly breaks that rule. Under this rule the lead vessel is allowed to move over and slow down thus decreasing the overall time that the two vessels are running parallel to one another and therefore measurably increasing the overall safety of the maneuver. This maneuver can now be closely likened unto one vehicle passing another on the highway. Signals of intent mentioned here are to be executed as follows: The vessel wishing to overtake blows "two prolonged blasts of his whistle" to get the attention of the vessel in front of him. He then blows "one short blast" if he intends to go starboard and two if he intends to go to port. The vessel in the lead, if he agrees to let the passing maneuver take place, answers with one prolonged, one short, one prolonged, one short. This is Morse Code for the letter C and is the International Signal meaning "yes". If the lead vessel sees danger or is not in agreement with the maneuver she will sound the danger signal just as is done in our rules. Paragraph 2 of this rule reminds the overtaking vessel that he is heavily burdened with the duty to keep well clear.

(f) A vessel nearing a bend or an area of a narrow channel or fairway where other vessels may be obscured by an intervening obstruction shall navigate with particular alertness and caution and shall sound the appropriate signal prescribed in Rule 34(c).

Comment: This rule is taken from the bend signal found in 25(b) of the existing rules, however, it has been changed slightly. The existing rule, which speaks only to power-driven vessels, requires that a prolonged blast be given when a vessel is within one-half mile of a bend. The signal shall be answered by any power-driven vessel which may be approaching from the other direction. This new rule does not limit itself to a bend but includes areas in narrow channels or fairways that may obscure other vessels. It does not limit itself to power-driven vessels. Since this rule has been expanded to include various situations in narrow channels and/or fairways, the somewhat arbitrary one-half mile requirement has been removed.

(g) Any vessel shall, if the circumstances of the case admit, avoid anchoring in a narrow channel.

Comment: This is a new, obvious and excellent advisement. Although it speaks to any vessel we believe it is aimed primarily at small vessels and more specifically, pleasure craft.

Rule 10

Traffic separation schemes

(a) This Rule applies to traffic separation schemes adopted by the Organization.

(b) A vessel using a traffic separation scheme shall:

(i) Proceed in the appropriate traffic lane in the general direction of traffic flow for that lane;

(ii) so far as practicable keep clear of a traffic separation line or separation zone;

(iii) normally join or leave a traffic lane at the termination of the lane, but when joining or leaving from the side shall do so at as small an angle to the general direction of traffic flow as practicable.

(c) A vessel shall so far as practicable avoid crossing traffic lanes, but if obliged to do so shall cross as nearly as practicable at right angles to the general direction of traffic flow.

(d) Inshore traffic zones shall not normally be used by through traffic which can safely use the appropriate traffic lane within the adjacent traffic separation scheme.

(e) A vessel, other than a crossing vessel, shall not normally enter a separation zone or cross a separation line except:

(i) in cases of emergency to avoid immediate danger;

(ii) to engage in fishing within a separation zone.

(f) A vessel navigating in areas near the terminations of traffic separation schemes shall do so with particular caution.

(g) A vessel shall so far as practicable avoid anchoring in a traffic separation scheme or in areas near its terminations.

(h) A vessel not using a traffic separation scheme shall avoid it by as wide a margin as is practicable.

(i) A vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane.

(j) A vessel less than 20 metres in length or a sailing vessel shall not impede the safe passage of a power-driven vessel following a traffic lane.

Comment: For ease in understanding traffic separation schemes, they can be closely likened to an interstate dual highway where all the traffic in one lane travels in the same direction and traffic in the opposite direction is in a different lane separated by a median strip. The median strip for these traffic separation schemes is called a separation zone. Similarly the inshore traffic zones may be likened to a busy traffic area on either side of the interstate highway as it approaches a large city. As we mentioned earlier, these schemes are charted or displayed on navigational charts. Both lanes are drawn on either side of a separation zone. The lanes usually have arrows drawn in them to indicate the direction of traffic in the lane. Magenta is

usually the chart color used for separation zones within these schemes.

Paragraph (a) states that this rule applies only to those schemes adopted by IMCO. Paragraph (b) gives the vessels guidelines on how to use traffic schemes; (i) tells the mariner to generally follow the direction of traffic flow for the lane, or, in short, follow the arrows; (ii) says what we have already learned in the Narrow Channel Rule, namely keep to the starboard hand; (iii) tells us to enter or leave the scheme at its end if possible but if necessary to join this scheme somewhere in the middle, we should do so at a narrow angle. This last advisement is to have joining traffic going practically parallel with the lanes when they enter the lanes for as little disruption of lane traffic as is possible. Paragraph (c) cautions vessels not to cross these lanes unless they have to, but when they have to, to do so as close as possible to right angles for the obvious reason of doing it in a hurry. Paragraph (d) implores mariners to use these lanes when they can do so advantageously in order to reduce inshore traffic congestion. Paragraph (e) tells the mariner to stay out of the separation zone except in cases where it is necessary to avoid immediate danger. Note that this rule also permits fishing within the separation zone.

One sweep along the New England Coast or through the Dover Strait is all that is necessary to point out that fishermen are going to fish where the fish are. This rule, we believe, presents a cautious note and is a very practical approach to this serious problem. Paragraph (f) cautions both users of the traffic schemes and also any near by traffic to be exceedingly careful at the ends of the traffic separation schemes. Paragraph (g) cautions against anchoring in a traffic separation scheme or near either end of it. Obviously, care will have to be taken in establishing both traffic separation schemes and anchorages to see that they do not conflict with one another. Rule (h) requires that if you do not use a traffic separation scheme you should stay as far away from it as is practicable in order to avoid confusing lane traffic. Rules (i) and (j) tell fishing vessels, sailing vessels and small craft not to impede the progress of traffic separation scheme users.

Our mariners, in the questionnaire, were about evenly split as to whether or not traffic separation schemes should be placed in the rules. In retrospect we believe these rules on traffic separation schemes are properly placed and will indeed assist in prevention of collisions. There is, however, one fairly obvious omission: while the large vessels that use these traffic separation schemes can be expected to have charts with the schemes depicted thereon, the same cannot be said for many small vessels. Fishing vessels, sailing vessels and small craft must obviously know where these schemes are in order to obey the rules with respect to them. A great many of these vessels may not have charts or other means of determining the limits of traffic separation schemes.

ABOUT THE AUTHORS

Captain Winford W. Barrow assumed the duties of Chief, Operations Division, Fifth Coast Guard District, Portsmouth, Va. on July 31, 1972 with, at times, additional duties as Acting Chief of Staff. Before assuming his present duties, Captain Barrow was Commander, Coast Guard Group, Baltimore.

Commander John M. Duke is presently the Chief, Merchant Marine Safety School at the Coast Guard Reserve Training Center, Yorktown, Va. He assumed those duties on July 5, 1971. Immediately prior to his present assignment, Commander Duke spent 4 years as Chief, Rules of the Road Branch at Coast Guard Headquarters where he worked with national and international groups on safety of navigation problems.

Both authors had a great deal of experience in the early preparations leading up to the new International Regulations for Preventing Collisions at Sea.

Captain Winford W. Barrow

Commander John M. Duke

ZERO in ON SAFETY

MERCHANT MARINE SAFETY PUBLICATIONS

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

The Federal Register will be furnished by mail to subscribers, free of postage, for $2.50 per month or $25 per year, payable in advance. The charge for individual copies is 20 cents for each issue, or 20 cents for each group of pages as actually bound. Remit check or money order, made payable to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Regulations for Dangerous Cargoes, 46 CFR 146 and 147 (Subchapter N), dated October 1, 1972 are now available from the Superintendent of Documents price: $5.75

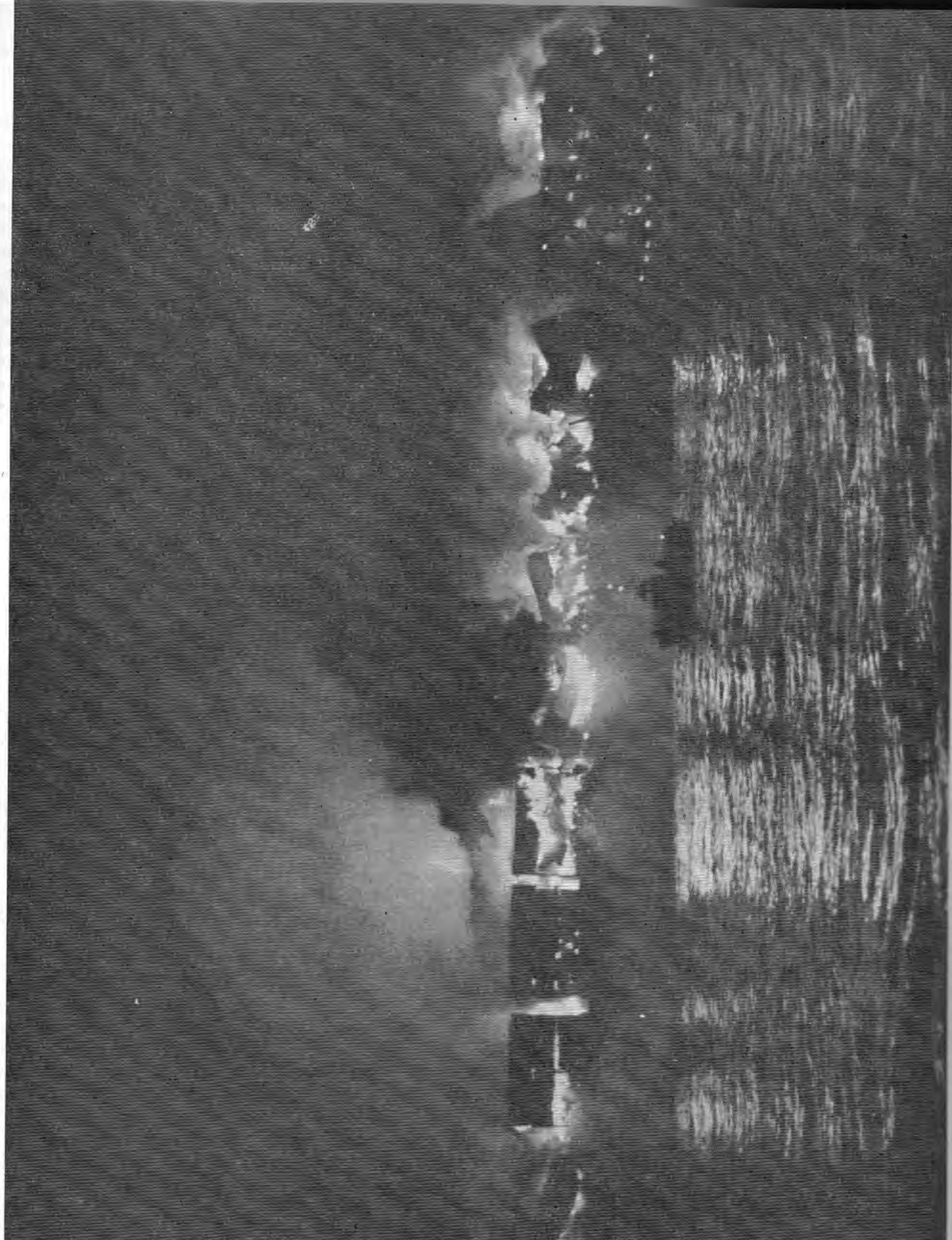
CG No.	TITLE OF PUBLICATION
101	Specimen Examination for Merchant Marine Deck Officers (7–1–63).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (4–1–72). F.R. 7–21–72, 12–1–72.
115	Marine Engineering Regulations (7–1–70) F.R. 12–30–70, 3–25–72, 7–18–72, 8–19–72, 5–1–73, 6–29–73.
123	Rules and Regulations for Tank Vessels (1–1–73). F.R. 8–24–73.
129	Proceedings of the Marine Safety Council (Monthly).
169	Rules of the Road—International—Inland (8–1–72). F.R. 9–12–72.
172	Rules of the Road—Great Lakes (7–1–72). F.R. 10–6–72, 11–4–72, 1–16–73, 1–29–73, 5–8–73.
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (3–2–64).
175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3–1–73).
176	Load Line Regulations (2–1–71) F.R. 10–1–71, 5–10–73.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
184	Rules of the Road—Western Rivers (8–1–72). F.R. 9–12–72, 5–8–73.
190	Equipment List (8–1–72). F.R. 8–9–72, 8–11–72, 8–21–72, 9–14–72, 10–19–72, 11–8–72, 12–5–72, 1–15–73, 2–6–73, 2–26–73, 3–27–73, 4–3–73, 4–26–73, 6–1–73, 8–1–73.
191	Rules and Regulations for Licensing and Certification of Merchant Marine Personnel (6–1–72). F.R. 12–21–72, 3–2–73, 3–5–73, 5–8–73, 5–11–73, 5–24–73, 8–24–73.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (5–1–67). F.R. 3–30–68, 4–30–70, 10–20–70, 7–18–72, 4–24–73.
220	Specimen Examination Questions for Licenses as Master, Mate, and Pilot of Central Western Rivers Vessels (4–1–57).
227	Laws Governing Marine Inspection (3–1–65).
239	Security of Vessels and Waterfront Facilities (3–1–72). F.R. 5–31–72, 11–3–72, 7–8–72, 1–5–73.
256	Rules and Regulations for Passenger Vessels (5–1–69). F.R. 10–29–69, 2–25–70, 4–30–70, 6–17–70, 10–31–70, 12–30–70, 3–9–72, 7–18–72, 10–4–72, 10–14–72, 12–21–72, 4–10–73, 8–1–73.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (8–1–69). F.R. 10–29–69, 2–25–70, 4–22–70, 4–30–70, 6–17–70, 10–31–70, 12–30–70, 9–30–71, 3–9–72, 7–18–72, 10–4–72, 10–14–72, 12–21–72, 6–28–73, 6–29–73, 8–1–73.
258	Rules and Regulations for Uninspected Vessels (5–1–70). F.R. 1–8–73, 3–28–73.
259	Electrical Engineering Regulations (6–1–71). F.R. 3–8–72, 3–9–72, 8–16–72, 8–24–73.
266	Rules and Regulations for Bulk Grain Cargoes (5–1–68). F.R. 12–4–69.
268	Rules and Regulations for Manning of Vessels (10–1–71). F.R. 1–13–72, 3–2–73.
293	Miscellaneous Electrical Equipment List (9–3–68).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (7–1–72). F.R. 7–8–72.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (12–1–71). F.R. 3–8–72, 3–25–72, 6–24–72, 7–18–72, 9–13–72, 12–8–72, 12–21–72, 1–8–73, 3–5–73, 6–29–73.
329	Fire Fighting Manual for Tank Vessels (7–1–68).
439	Bridge-to-Bridge Radiotelephone Communications (12–1–72).

CHANGES PUBLISHED DURING AUGUST 1973

The following have been modified by Federal Registers:

CG–190, CG–256, and CG–257, Federal Register of August 1, 1973.

CG–123, CG–191, and CG–259, Federal Register of August 24, 1973.



NATIONAL FIRE PREVENTION WEEK

OCTOBER 7-13, 1973