PROCEEDINGS
OF THE MERCHANT MARINE COUNCIL

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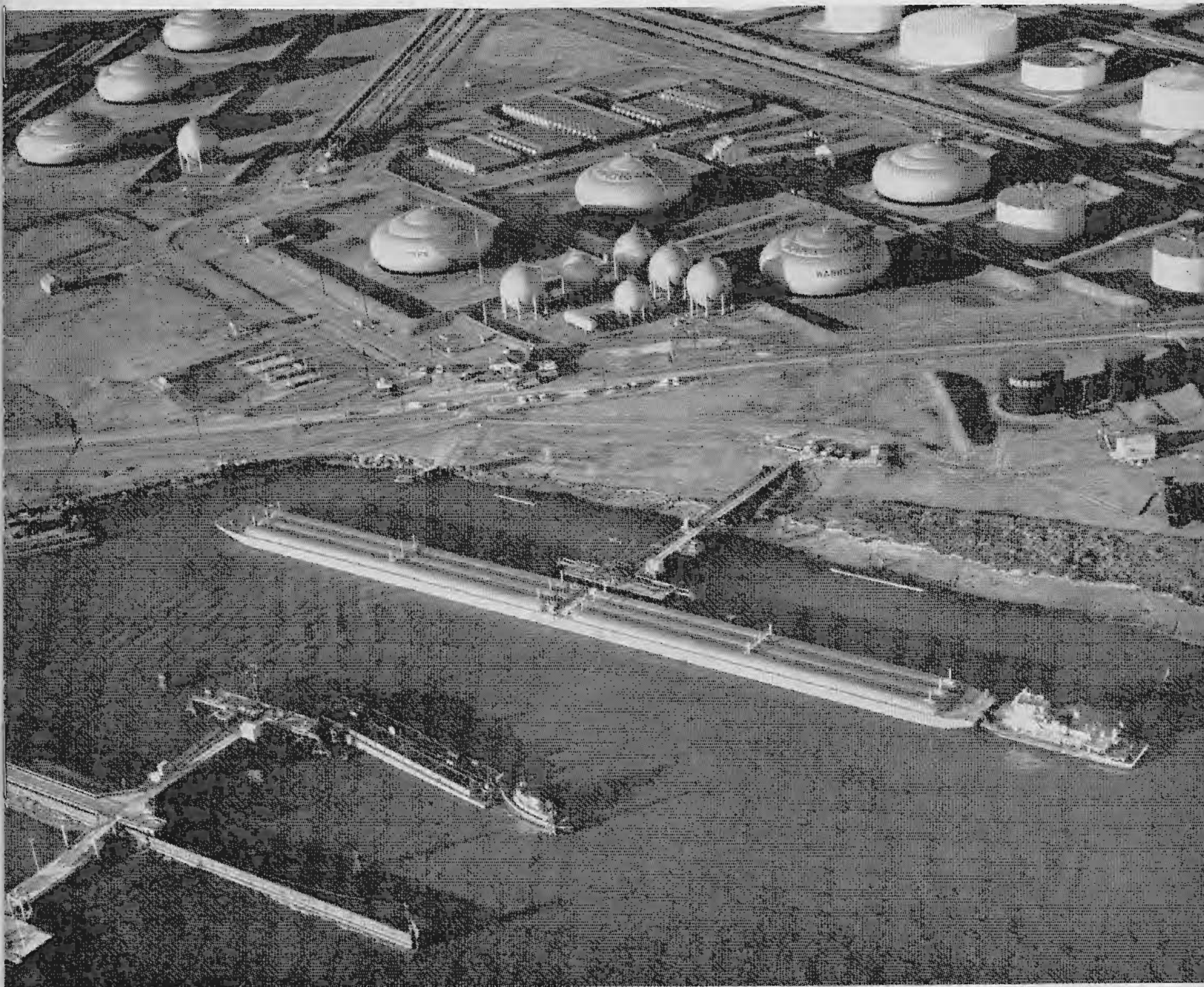

FEATURE

BARGE TRANSPORTATION

PROCEEDINGS

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LCDR N. B. Binns, USCG, *Editor*
T. A. DeNardo, *Assistant Editor*

SS BREMEN RECEIVES AMVER AWARD

CAPTAIN GUENTHER ROESSING, Master of the German passenger liner *Bremen*, is shown receiving a Certificate of Appreciation from Capt. J. H. Wagline, USCG, Deputy Commander of the Coast Guard's Eastern Area. Mr. W. A. Nagel, President of North German Lloyd, looks on. The Certificate was given to the Liner in appreciation for her active participation in the Coast Guard's Atlantic Merchant Vessel Report System (AMVER) and her contributions to maritime safety. In the past seven months the *Bremen* removed two men from Coast Guard Cutters and a child from the cargo vessel *Wolverine State* all of whom required immediate medical attention which was rendered onboard the German Liner.

THIS COPY FOR NOT LESS THAN 20 READERS—PASS IT ALONG

CONTENTS

FRONT COVER

New LP gas tow of Warren Petroleum shown at terminal facilities near Houston, Texas. The lead barge is 380 feet by 53 feet and the trail barge is 370 feet by 53 feet, which makes a rather impressive sight when coupled up to its full 750 foot length as shown.

BACK COVER

Schematic portrayal of the thousands of miles of commercially navigable Inland Waterways of the United States.

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A FORTY-ONE BARGE TOW containing 40,000 tons of steel, petroleum products and miscellaneous cargo.

BARGE TRANSPORTATION

By CAPTAIN GEORGE C. STEINMAN, USCG

ASSISTANT CHIEF, MERCHANT MARINE TECHNICAL DIVISION, HEADQUARTERS

BARGE TRANSPORTATION

A PAPER ON "BARGE TRANSPORTATION" would hardly be complete without a review of the early history of water transportation on the inland rivers. When our frontiers were not so far west, the inland waterways system was historically called the Western Rivers, and included principally the Mississippi, Ohio, Illinois and Tennessee Rivers. Today, what is known as the Inland Waterways has grown to a vast national network covering 25,260 miles of commercially navigable channels.

IMPORTANCE OF RIVER TRANSPORTATION

River transportation adds a certain and important degree of balance to the transportation system of the country. Barge transportation provides over three times the labor productivity of rail transportation. Each barge operating employee produces some 11 million ton-miles per year as compared to 3.5 million ton-miles per operating employee in railroad service, a better than three to one ratio.

A comparison of the domestic freight traffic by railways, motor trucks, inland waterways and pipelines shows that the length of the inland waterway system is only 2.5 percent of the total miles in our national transportation system, yet it has handled more than 9 percent of the ton-miles of domestic freight traffic.

EARLY HISTORY

The origins of barge transportation on our inland rivers goes back to the "flatboat" of the late eighteenth century, used by the early immigrants traveling westward on the Ohio River. What this waterborne "carry-all" lacked in nautical design, it made up in utility. Since it was unable to return upstream, the flatboat was broken up at the journey's end, and frequently served from then on as the dwelling of those it had floated to a new home.

The flatboat gave way to the keelboat, because of the real need for a boat that could move upstream, so that the settlers could reach markets with their products. Progress upstream was accomplished by men with poles, pushing the boat as they walked along the gunwale. These boats were 30 to 75 feet in length, and, until the arrival of steam, were the only practical upstream vessels on the Western Rivers. From these early beginnings, the first packet service evolved in 1794, using galley type keelboats, 70 to 100 feet long, carrying passengers and freight, and working the round trip from Pittsburgh to Cincinnati in one month.

STEAM COMES TO THE RIVERS

The steamboat arrived on the Mississippi River in 1811, when Nicholas Roosevelt representing the "Fulton" interests, built the "New Orleans" and descended the river to New Orleans. The experimental steamers, built after the "New Orleans" proved successful, followed tidewater designs, with comparatively deep draft hulls. Captain Henry M. Shreve made a vastly important advance with his "G. Washington" built in 1816. This boat appears to be the first shallow-draft steamer. Most Western Rivers steamboats that followed Shreve's design met shallow-draft requirements with boiler shells of small diameter, boosted to the greatest pressures obtainable in those days. Thus was born the so-called "Western River boiler," a horizontal cylinder fitted with one or more flues and boiler tubes above the flues through which the furnace gases returned to the stacks.

After its arrival in 1811, the steamboat gradually took over the picturesque flatboats, which continued to operate on a diminishing scale for a number of decades thereafter. The flatboats were forced to develop into freight carriers with trained riverwise crews that returned from the downstream voyage overland. These early freight barges descended the rivers at the rate of 3,000 a year between 1810 and 1820, and continued in use as coal carriers until well after the Civil War. The pilots who handled these floating cargoes became the pioneer steamboat captains.

INDEPENDENT TANK BARGE for chlorine service showing the arrangement of tanks in the hopper space.

This article on barge transportation by Captain Steinman is extracted from a paper delivered before the Compressed Gas Association's annual meeting in New York last January. This article complements and is an extension of the article on transportation of dangerous cargoes which was published in the February 1964 issue of the "Proceedings."—Editor.

The growth of the river traffic in the days following the introduction of steam was given a tremendous boost by the passenger packets, which began to dominate the rivers in 1836, a year in which 107 steamboats were launched in the Mississippi Valley system. They continued their sway unopposed until the railroads came west in the 1850's, and then staged a comeback after the War Between the States. The navigable inland water routes, accessible to the fertile valleys to the west, bore a constant and never-ending stream of immigrants from the east, until challenged by the railroads in the 1850's. In 1854, the rail lines to the west were put through, and lines joining important river cities, such as Pittsburgh and Cincinnati, were planned. The novelty of the train, as well as its greater speed and independence of natural conditions that affected river transportation, was one of the causes for the rapid decline of the river steamboat as a passenger packet.

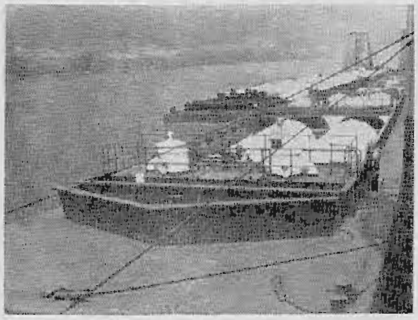
BARGE TRAFFIC GROWTH ON OUR INLAND WATERWAYS

It was soon recognized by the rivers that their salvation lay in the movement of the "low revenue bulk" commodities. Inland water transportation inherently lends itself to the shipment of large quantities of the so-called "bulk" or "nonpackaged" commodities. Indeed, the river carrier needs the bulk commodities in order to obtain the tonnages required for low-cost river transportation. When barge shipment enters the scene of our rather complex transportation picture, the "high revenue" commodities rapidly become low-revenue commodities. This is an inherent advantage barge transportation has in fending off the competition of the rails and trucks. Unfortunately for the water transportation industry, this criterion cannot be applied with such certainty to the pipelines.

Bulk liquid cargoes carried by river barges represent the trend toward the movement of higher revenue commodities. This is particularly so in the transportation of bulk chemicals and specialty liquid products, where the required product purity is maintained by corrosion-resistant cargo tank material and a tight venting system for product containment integrity. The carriers can look to an increase in their net revenues, not only by more ton-miles, but by furnishing shippers with transportation safe for those products which are not now being shipped in barges. From an examination of the principal commodities carried on the inland waterways (Table 2), it can be seen that about 90 percent of the cargo is low revenue bulk products. The high freight rate cargoes, now going by default to the rails and trucks, could be shipped by water if barges are properly designed and equipped to protect against cargo damage caused by moisture and other contaminants.

The barge and towboat concept in river transportation started as early as 1832, when the keelboat barges were navigated by lashing them to steamboats. In 1854, the "Crescent City" was built and operated expressly as a towboat for barges, but it was not until the seventies that fleets of barges became a common sight. The growing use of crude oil, which was found in locations convenient to river transportation, had a vital part in this development. Oil men in the Pennsylvania fields of the 1860's quickly learned the advantage of barge movement of their crude oil. From the hauling by the primitive river barges

A SULPHURIC ACID BARGE fitted with six cylindrical and integrated cargo tanks.



A CHLORINE BARGE showing the arrangement of forward breakwater and coaming around hopper space.

of the 2,000 barrels of crude oil produced in Pennsylvania in 1859, the tank barge industry has progressed to the modern, integrated barges capable of carrying as much as 200,000 barrels, or roughly 50 percent more than a T–2 tanker. Modern barge tows now handle about 12 percent of the crude oil products in the United States. Water-borne petroleum products today is the largest single item of inland river tonnage.

The growing iron and steel industries increased the importance of coal in water transportation. The history of the coal movement on the Mississippi River System followed closely the development of the towboat from large steam towboats of the 1870's, (the "John A. Wood") to the supertowboats of the early 20th century reaching their peak in 1902 with the building of the "Sprague". The 70,000-ton coal tow that the "Sprague" moved in 1907 from Louisville to New Orleans, covering 7 acres of 56 coalboats and 6 barges, measuring 925 feet long and 312 feet wide, has become a legendary feat of the rivers. Several years later, the long distance coal hauls disappeared from the rivers. Coal was needed to feed the coke ovens and mills close to Pittsburgh, and the down river points could be more economically supplied from coal mines closer by.

The tremendous post-World War II traffic growth of the inland waterways system has necessitated the modernization of the inland rivers. For example, the Ohio River is now undergoing a modernization program where 53 original locks and dams will be replaced by 19 high-level locks and dams. This new system of locks and dams will provide pools up to 110 miles in length and greater depths in portions of the rivers. The new structures are designed so that they will accept deeper draft vessels at a later date. The locks are 1,200 feet in length by 110 feet in width and will accommodate the largest tows on the Ohio River today. An auxiliary lock of 600 feet by 110 feet is provided at each installation. In the future, it is felt that even the 1,200-foot locks will be double-locked; that is, the tow will have to be broken into two sections in order to pass through the locks.

The growth of river transportation measured in ton-miles of traffic on the inland and intracoastal waterways has increased 1,300 percent during the period 1930–1960, the thirty years since the Ohio River Improvement project was completed. This increase reflects the industrial growth of the country but to a far greater degree represents the much more rapid expansion of industry along the inland waterways.

Since we are vitally concerned today with the movement of chemicals in barges, let us examine the growth of the chemical industry. Chemical plants have proliferated along our inland waterways, because of the comprehensive and far-sighted improvements of the inland waterway system. For the 10-year period ending in 1961, an average of 1.4 billion dollars was spent on construction and expansion of new chemical plants. Texas and Louisiana were the top two states in chemical construction and the remainder of the top ten states all border upon a navigable waterway, with the greatest activity occurring from the Mississippi River System to the Atlantic Ocean.

Modern barge construction is not as simple a design problem as it first appears. Even the simple open hopper type barge must be worked out on the basis of commodity, direction (up or down stream), length of haul, turnaround time, terminal and river conditions, interchangeability, and so on. The type of commodity has a pronounced effect on open hopper type barges. Barges to carry dense cargoes such as sand, gravel and ores should be constructed with small cubic and high longitudinal strength, as the loading terminals are often quite blissfully ignorant of the effects of loading sequence and concentrated loads. For this reason, it is usually wise to construct the hull as foolproof from a loading standpoint, as is possible.

River conditions determine coaming height, which is dependent upon the maximum wave height encountered. Since each foot of coaming represents 3 tons of lost cargo in our average barge as well as additional investment costs and subsequent maintenance, it too must be evaluated carefully. Headlog height and bow-coaming heights are dictated by wave heights and through-the-water speeds.

River terminals are an important part of the river transportation picture. For the most part, the river operator does not wait at the terminals, but leaves his barges for loading and unloading and proceeds with the balance of his tow, or a new one to the next destination. The best terminals permit rapid turnaround for the towboat, as well as maximum flexibility and simplicity of internal operations for easily loading and unloading.

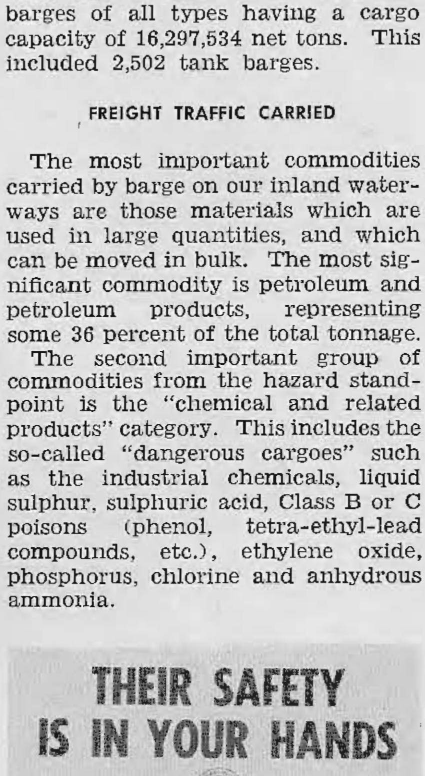
THE PRESENT SIZE OF THE INLAND FLEET

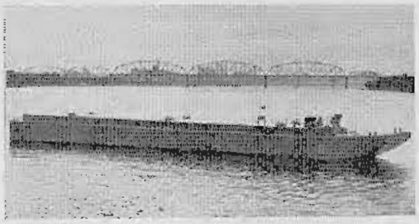
As of December 31, 1961, the number of shallow-draft vessels in operation on the inland waterways which were available for the transportation of freight totaled 4,047 towboats and tugs and 16,484 non-self-propelled barges of all types having a cargo capacity of 16,297,534 net tons. This included 2,502 tank barges.

FREIGHT TRAFFIC CARRIED

The most important commodities carried by barge on our inland waterways are those materials which are used in large quantities, and which can be moved in bulk. The most significant commodity is petroleum and petroleum products, representing some 36 percent of the total tonnage.

The second important group of commodities from the hazard standpoint is the "chemical and related products" category. This includes the so-called "dangerous cargoes" such as the industrial chemicals, liquid sulphur, sulphuric acid, Class B or C poisons (phenol, tetra-ethyl-lead compounds, etc.), ethylene oxide, phosphorus, chlorine and anhydrous ammonia.





CAUSTIC SODA BARGE of semi-integrated design with two cylindrical cargo tanks of 100,000 gallon capacity each.

Cargoes coming under Coast Guard regulations, or "regulated commodities", constitute about 40 percent of the total waterborne freight transported on the inland waterways. In general, the regulated commodities are those so-called dangerous cargoes which may present a hazard to the operating personnel or the public in their loading or unloading, or "in transit." The bulk of these regulated commodities fall in the following categories: petroleum and petroleum products (or any inflammable or combustible liquid), toxic or lethal liquids or substances, such as the chemicals and related products, and any dangerous commodity specified by name in the Dangerous Cargo Regulations, such as explosives, inflammable solids and oxidizing materials, corrosive liquids, etc.

WATERBORNE CHEMICAL MOVEMENT

The first movement of chemicals was probably on petroleum barges with nominal modifications of the pumps and piping systems to maintain product purity. The large scale movement of chemicals had its beginning about 1946 and consisted of a few basic chemicals. The chemical industry has had a tremendous growth in the past 15 years, when chemical plants have tripled their overall production. The industrial chemicals segment has done even better, increasing fourfold.

During 1962 the tonnage of chemicals carried by barge in our domestic waterborne commerce exceeded 14 million tons, 73 percent of which was shipped via our inland waterways system. Some statistics emphasize the growing demand for bulk movement of chemicals in barges. For example, of all the sulfuric acid shipped in 1962 via domestic waterborne commerce, 99.9 percent was carried by barge. Similar figures representing percent of total domestic traffic may be cited for the following products: benzene—74 percent; coal tar and chemical products—76 percent; alcohols—50 percent; caustic soda—82 percent; industrial chemicals—73 percent.

For large size shipments of chemicals, water transportation is rapidly becoming the most attractive means of bulk movement. Hence many new commodities with new and unusual properties are appearing on our waterways. To provide some guidance in determining the classification characteristics of liquids transported or proposed for transportation as bulk cargoes in merchant vessels, the Coast Guard has recently published a list of all known petroleum products and chemicals in Navigation and Vessel Inspection Circular No. 4–63, dated February 15, 1963. About 140 different commodities are listed.

HOW THE REGULATION OF WATER TRANSPORTATION STARTED

Navigation in the inland waterways has provided an interesting chapter in development of Merchant Marine safety standards. For here is where the steamboat inspection laws were born. Since the first steam packet on the Western Rivers, the "Rufus Putnam", operating with 138 lbs. of steam, appeared on the scene in 1838, numerous laws were passed attempting to provide safety in boiler design and operation. In the same year, the Act of 1838 created the United States Steamboat Inspection Service. However, the results were negative and explosions, instead of diminishing, increased with resultant increases in casualties. It wasn't until 1852, however, when Federal inspectors arrived on the Mississippi, that the Steamboat Laws developed some teeth. In the meantime, from 1810 to 1850, the toll of victims in steamboat disasters reached an appalling total of 4,000 persons. In 1832 alone, 14 percent of the steam vessels in operation were destroyed by explosions and fire and more than 1,000 persons were killed.

Through the years of historical development of steamboat safety on the Western Rivers, the old Steamboat Inspection Service gave way to the Bureau of Marine Inspection and Navigation in 1935; and finally in 1942, by the Executive Order of the President, the functions of the Bureau of Marine Inspection and Navigation were transferred from the Department of Commerce to the Commandant of the Coast Guard. This transfer was made permanent in March 1946.

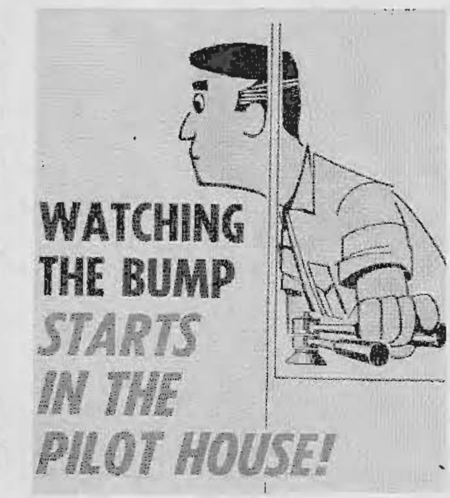
COAST GUARD RESPONSIBILITY FOR MERCHANT MARINE SAFETY

Within the Coast Guard structure, the responsibility for the administration of the navigation and inspection laws and regulations prescribed thereunder is a function assigned to the Office of Merchant Marine Safety and Office of Operations. The actual enforcement is carried out under Coast Guard District Commanders by Captains of the Port and Officers in Charge of Marine Inspection, who are located in major ports of the United States, Commonwealth of Puerto Rico and Guam.

With respect to the transportation of dangerous cargoes on the navigable waters of the United States, in their loading and unloading on vessels of the United States, the Coast Guard administers three specific statutes which are: (1) The Tanker Act in Section 391a, Title 46, U.S. Code, RS 4417a, which applies to all vessels carrying combustible or inflammable liquid cargo in bulk; (2) The Dangerous Cargo Act in Section 170, Title 46, U.S. Code RS 4472, which applies to all vessels carrying dangerous cargoes; and (3) The Espionage Act in Section 191, Title 50, U.S. Code and the Executive Orders prescribed thereunder. These require the Coast Guard to exercise surveillance and control over waterway, waterfront facilities and harbors to provide protection and security to such areas.

The Commandant has promulgated regulations, 46 CFR Parts 30 through 40 (Tank Vessels), implementing the Tanker Act (*4*). These regulations deal with the design, construction, alteration and operation of tankships and tank barges regardless of tonnage, size or manner of propulsion, that have on board any inflammable or combustible liquid cargo in bulk. The manning considered necessary for safe navigation and cargo handling is prescribed for each vessel, as well as the special operating conditions governing these vessels.

Under the Dangerous Cargo Act, the Commandant has prescribed regulations in 46 CFR Parts 90 through 98



(Cargo Vessels) (*5*), and 146 and 147 (Dangerous Cargoes) (*6*). These regulations state requirements and conditions governing the carriage of dangerous cargoes on board all vessels, except those subject to the Tanker Act, when within the territorial waters of the United States.

Under the Espionage Act and Executive Order 10173, as amended, the Commandant has promulgated special regulations in 33 CFR Parts 121 to 126 (7), which regulate the handling of dangerous cargoes on waterfront facilities and on board vessels, and to control the movements of vessels as necessary to assure the safety of ports, vessels, and waterfront facilities.

NEW HAZARD CLASSIFICATION SYSTEM

The basic problem in the regulation of water movement of chemicals stems from the differences in the properties and characteristics of these chemicals as compared to the conventional petroleum product. The water movement of everyday petroleum hydrocarbons has been adequately covered by regulation under the Tanker Act and the Tank Vessel Regulations. The hazard recognized in these products is essentially one of fire or explosion and the standards providing for their safe transportation are based on the variation in their flashpoint and vapor pressure. However, the rapidly growing water movement of chemicals and petro-chemicals brings with it a need to reclassify these commodities under additional hazard concepts, such as toxicity and chemical stability or reactivity, since these are significant properties over and above the fire hazard normally associated with petroleum products.

Under development at the present time, is a proposed classification system which would group potential hazards in three broad categories: Health (Toxicity); Reactivity (Chemical Stability); and Fire (Flashpoint and Explosive Range). Within these broad groupings, the hazard rating will be further classified by a hazard index numeral of 1 through 5, depending upon the degree of hazard presented by each chemical within the group. In this manner it is anticipated that the design, construction, and operating requirements prescribed by the revised regulations would provide the necessary degree of protection against the potential hazards of each of the new chemicals.

RIVER BARGES UNDER COAST GUARD INSPECTION

The application of our marine and inspection laws requiring inspection and certification of vessels administered by the Coast Guard is rather complex. This application depends upon conditions and circumstances which often vary extensively. In effect, this results in a selective application of a specific law to a class or type of vessel in commercial merchant marine. A law may apply because of the method of propulsion used by a vessel (steam, motor, sail, or non-self-propelled); or by a vessel's length and/or gross tonnage, or by type of activity in which a vessel is engaged (passenger vessel, tank vessel, nautical school ship, cargo or miscellaneous vessel); or by type of cargo a vessel carries (inflammable or combustible liquids, dangerous cargoes, etc.); or by category of waters on which a vessel operates (seagoing, coastwise, Great Lakes, inland, etc.); or by type of voyage in which a vessel is engaged (International voyage, Great Lakes voyage, Coastwise voyage, etc.); or by a combination of these factors.

When are the classes of vessels which we are presently concerned with in this symposium on transportation, namely barges and towboats, subject to inspection and certification by the Coast Guard? Starting with towing vessels, the basic marine statutes require all towboats and tugboats *propelled by steam* to be inspected and certificated. On the other hand, motor vessels which do not carry freight for hire, such as diesel towboats, are only subject to inspection when they are seagoing, and are 300 gross tons and over. There is no expressed provision in the Federal Laws and Regulations for the inspection of motor-driven towboats operating on the inland waterways.

With respect to barges or non-self-propelled vessels, the basic statute requires the inspection and certification of all seagoing barges over 100 gross tons. This is further modified by the applicable statutes requiring the inspection of barges because of the type of cargo carried. In this category, all barges, irrespective of size or service, are subject to inspection when carrying "regulated" cargoes, such as combustible or inflammable liquids in bulk, or the dangerous cargoes as prescribed in Part 98 of the Coast Guard regulations for cargo vessels.

The Coast Guard has proposed legislation to extend the present authority and responsibility for the inspection and certification of motor towing vessels of over *15 gross tons* and over 26 feet in length which operate on inland waters, and for the licensing of certain of their operating personnel.

It is interesting to note that of the 5,100 towing vessels documented for towing service by the Bureau of Customs, only *103* had a U.S. Coast Guard Certificate of Inspection. As of December 31, 1961, there was a total of 84 inspected steam towing vessels and the remaining 19 inspected vessels were seagoing motor towing vessels of 300 gross tons or over. In other words, only 2 percent of the documented towing vessels were U.S. Coast Guard inspected.

NEW BARGE DESIGNS FOR DANGEROUS CARGOES

The sinking of the open hopper type barge *Wychem 112* with 1,100 tons of chlorine in the Mississippi River, approximately 7 miles below Natchez, and the sinking of 6 additional barges carrying hazardous chemicals, focused the attention of all concerned on the need to reassess existing Coast Guard regulations covering the bulk movement of dangerous cargoes. The areas considered were, in general, operation and design. The corrective action prescribed in the proposed regulations is to be implemented in three separate phases: (1) Operating requirements for existing open hopper type barges to become effective 30 days after publication in the Federal Register, (2) Changes in design standards and operational requirements for new barges, and (3) Study of existing barges to determine whether they could be continued in service or modified to meet the new safety standards. The first phase, special operating requirements for open hopper type barges, was published in the Federal Register of February 1, 1963 and became effective March 1, 1963. As soon as the new barge requirements are adopted, thereby establishing the acceptable level of safety, the modifications to existing barges, considered necessary to attain a comparable safety level, will be developed.

STRUCTURE DESIGN AND OPERATING REQUIREMENTS FOR NEW BARGES

The structural and operating requirements for new barges is based on a gradation of hazard, and consists of the following principles:

1. Each barge carrying dangerous cargoes will be assigned a barge type number whose design requirements would be consistent with the degree and nature of the hazard of the commodity to be carried.

2. The barges will be classed as Type I, II or III, in descending order of hazard of commodity.

(a) *Type I Barge*—Barges classed as Type I are those designed to carry products which require the *maximum* preventive measures to preclude the uncontrolled release of the cargo to the waterways and/or atmosphere.

(b) *Type II Barge*—Barges classed as Type II are those designed to carry products which require *substantial* preventive measures to preclude uncontrolled release to the atmosphere, but whose uncontrolled release to the waterways does not constitute a long-lasting public or operating personnel hazard, though local and temporary pollution may occur.

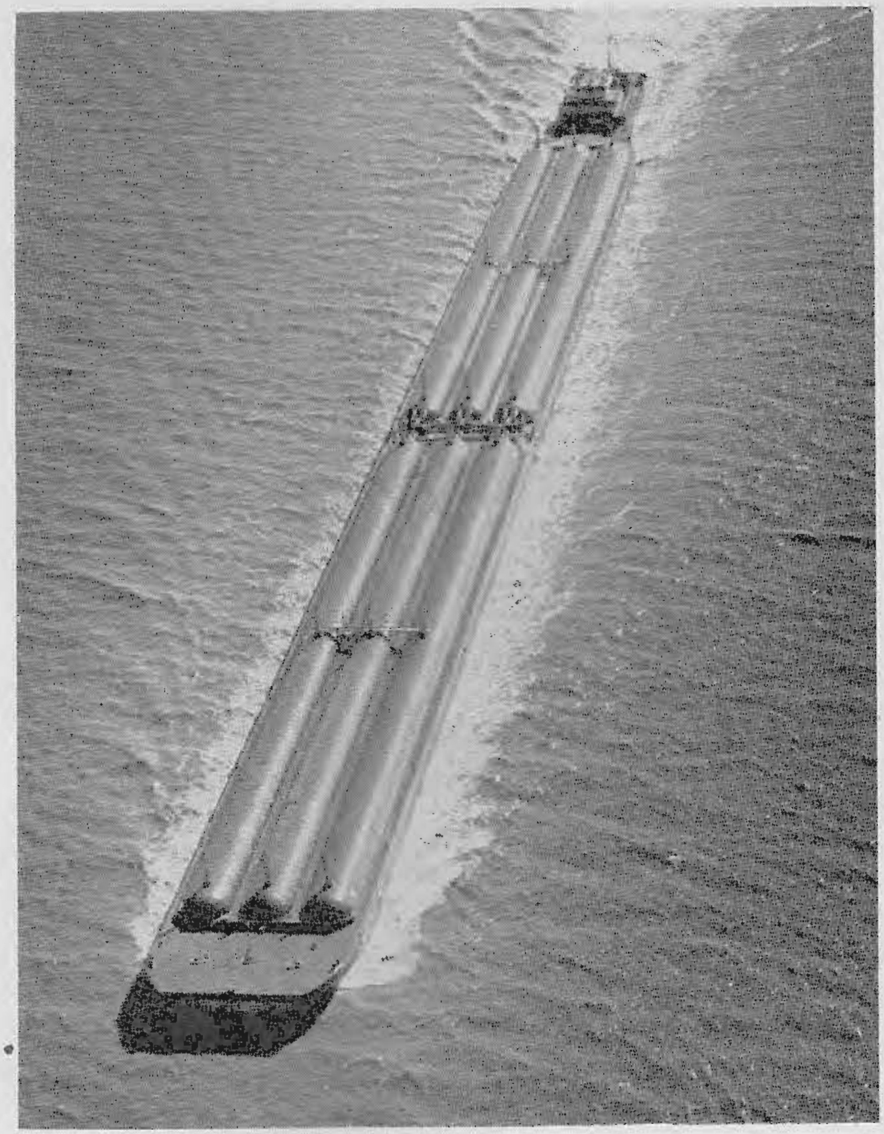
(c) *Type III Barge.*—Barges classed as Type III are those designed to carry products of sufficient hazard to require a *moderate* degree of control.

The sinking of an open hopper chemical barge is one of the more likely ways in which hazardous cargoes may be released. Open hopper type barges, as previously built, are susceptible to swamping due to low freeboard, or to sinking due to holing from grounding or collision damage. Protection against loss by sinking must therefore be built into the barge; the degree of protection to be compatible with the hazard of the cargo involved.

Protection against swamping is provided by two means. To prevent the hopper space from flooding during normal operating conditions, *all types* of barges are provided with substantial coamings. However, low freeboard barges may ship considerable water over the headlog which would simply pile up in front of the coaming and spill over into the hopper space. For this reason a plowshare breakwater, or deflector, is provided on the forward rake.

For Type I and II barges, further protection is provided to account for adverse operating conditions, which, in spite of coamings, may result in swamping of the barge. This protection is in the form of reserve buoyancy which must be sufficient to keep the barge afloat with the hopper flooded to the deck level.

Type I and II barges are provided with protection against sinking by holing, in the form of compartmentation. The criteria for Type I barges is somewhat equivalent to a two compartment standard, except that no breadth or depth of penetration is specified, which means that there is no restriction placed on bulkhead spacing. The typical Type I inner bottom and wing tank arrangement may at first appear to be a three compartment standard due to the presence of a watertight center vertical keel; however, when speaking of subdivision, a compartment should be understood to mean that volume defined by watertight transverse bulkheads and the skin of the vessel without consideration of watertight longitudinal bulkheads. To more simply describe the required compartmentation of a Type I barge one should say that the barge must remain afloat and upright after holing the side or bottom shell plating anywhere on its girth in way of a transverse watertight bulkhead.



THE LP GAS BARGES depicted on the front cover are shown here underway.

In an integrated tow, the requirements for a suitable bow form to protect against diving at the maximum speed of the tow are applicable to the lead barge only. However, it is also recognized that it may be necessary to operate box or square-ended barges as lead barges when the integrated tows are made up or split up. In such cases, the persons in charge of the towing vessel should control the speed to insure protection against diving or swamping, having due regard to design and freeboard of the barge, and the operating conditions.

SPECIAL OPERATING REQUIREMENTS

The proposed regulations will prescribe the following operating requirements to be made applicable for all barge types:

(a) All void spaces (except those used for ballasting) and the bilges are to be pumped substantially free of water.

(b) Placarding will be required to provide for the identification and description of the principal characteristics of the cargo.

(c) An information board will be required for the posting of instructions on the operation of special equipment, emergency procedures and precaution to be observed in the event of equipment breakdown and firefighting procedures and precautions.

(d) Barges containing dangerous cargoes will be required to be under constant surveillance.

MANNING

Since the time steam vessels were first inspected, the Federal Government has required personnel on certain categories of vessels be found qualified to perform specific tasks, or to have documents which can be used to control performance of certain duties. Therefore, the Coast Guard's program for licensing and documenting Merchant Mariners and others is designed to insure the competence of, and the satisfactory performance by personnel who man the vessels of the United States either in a licensed or unlicensed capacity.

To provide adequate safety control over the water transportation of specified bulk liquid dangerous cargoes, special qualifications should be provided for personnel handling the cargo transfer operations, as well as to provide for "in-transit" conditions and "idle" conditions when the vessel is anchored or moored.

The proposed regulations will, therefore, require that persons (including licensed officers) demonstrate to the satisfaction of the Officers in Charge, Marine Inspection, their ability and qualifications to handle the cargo transfer operations, etc., for certain bulk liquid dangerous cargoes. As a condition of employment in performing such work, such persons shall be holders of merchant mariner's documents bearing tankerman's endorsements for specified commodities. The merchant mariner's documents will be appropriately endorsed to show scope of holders qualifications in handling inflammable and combustible liquids as normally described in the Tank Vessel Regulations, as well as the bulk liquid dangerous cargoes, such as ethylene oxide, elemental phosphorous, sulfuric acid, hydrochloric acid, liquid chlorine, anhydrous ammonia, bulk liquids having lethal characteristics (class B or C poisons), elevated temperature cargoes, and liquefied inflammable gases.

UNMANNED BARGES

For unmanned barges, the towing vessel will be required to have on board at all times, while towing, at least one licensed officer or one certificated tankerman specifically instructed in the emergency procedures to be followed. During cargo transfer operations, the owner or operator of the barge must insure that a certificated tankerman especially qualified to handle such cargoes is on duty to perform the transfer operations.

Each dangerous cargo proposed for bulk transportation under the provisions of the new regulations for barges will be carried in a hull barge type designed and constructed consistent with the degree and nature of the hazard of the commodity. The selection of the required barge type for each cargo will be determined by the Commandant of the Coast Guard.

The current thinking appears to line up the named cargoes in barge types as follows:

Type I Barge—Ethylene oxide, carbon disulphide, Class B or C poisons, chlorine, phosphorus, and anhydrous hydrofluoric acid.

Type II Barge—Propane, butane, butadiene, ethylene and anhydrous ammonia.

Type III Barge—The corrosive liquids such as hydrochloric acid, sulfuric acid and nitric acid, and the combustible or inflammable liquids not otherwise specified for Types II or III Barges which may have a Reid vapor pressure over 25 p.s.i absolute, and carried in independent cargo tanks.

These listings are presented for guidance only, and are by no means to be considered as final.

Although the proposed requirements for new barge designs have not been formally promulgated in the regulations, some shippers of chemicals have elected to build their new barges in accordance with the basic provisions of the proposed rules. This has been particularly so in the case of chlorine, which will require a Type I barge design.

FIRE EXTINGUISHING IN BULK CHEMICAL TRANSPORTATION

The basic fire extinguishing system for protecting the cargo tank areas of tank vessels carrying conventional petroleum products is usually the deck foam system. This system uses water into which is injected 3 percent or 6 percent foam concentrate to form a solution which is piped to special foam nozzles where air is injected into the solution to form foam which is played into the fire in large volumes.

Chemicals such as alcohols, ketones, esters, etc., are water-soluble organic solvents which break down the regular protein-base foam. Therefore, different type foams or other fire extinguishing agents must be used.

The foams now suitable for extinguishing fires in these polar solvents have two disadvantages. First, they must be applied on the fire quickly after injecting the concentrate into the water. This time limit in solution, which is about 50 seconds maximum, restricts the piping runs so as to prevent ordinary distribution from a central supply. Second, they must be applied very gently to a burning polar solvent, such as by squeezing through a Moeller (loosely woven asbestos) tube on the surface of the liquid. This limited method of application prevents the use of conventional hose line foam nozzles and monitor turret nozzles for applying the foam onto the fire.

The Coast Guard is currently testing a completely new type of mechanical foam for extinguishing fires in water soluble flammable liquids. This new "alcohol-type" mechanical foam utilizes water, a foaming concentrate, a catalyst, and air injection into the solution at the application nozzle. Existing nozzle equipment can be used for applying it. The presently installed protein-base foam systems can be adapted to use it through existing piping and nozzles. This new foam provides a foamed-continuous-polymeric film and blanket which smothers fire. It has no transit time limitations nor need for application by cumbersome, unusual equipment. It has been found to be effective, using conventional application methods, in a wide variety of chemical products, including isopropanol, ethyl acetate, ethylene diamine, acetone, acetic anhydride, isopropyl ether, and many others.

Other firefighting methods, such as water spray for cooling and diluting the product, dry chemicals for extinguishing fires of limited size, and carbon dioxide for smothering fires in enclosed spaces, are expected to continue their functions in the whole spectrum of fire extinguishing and overall fire protection.

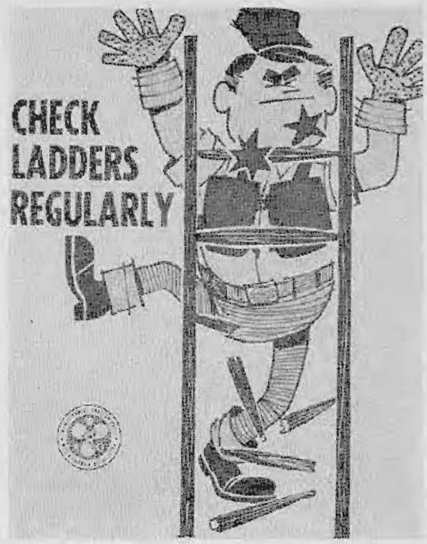
SOME NEW CONCEPTS IN BARGE TRANSPORTATION

Tank barges and open hopper type barges carrying chemicals are normally built with a steel hull. The cargo tanks, where required for product purity and resistance to the corrosive effect of the commodity may be stainless steel, aluminum, or stainless steel or nickel clad.

To date, the Coast Guard has authorized the construction of three chemical barges fabricated of aluminum. The first two, put in service in 1962 were the *Reynolds Aluminum 97* (97′ by 35′ by 11′) and the *NMS Aluminum 1202* (100′). In addition to certification for the conventional petroleum and petroleum distillates, the barges were authorized to carry 25 named chemical cargoes.

The third aluminum barge was launched in November 1963. It is the largest all-aluminum barge built to date. The all-welded aluminum hull,

723-850—64——2



195′ by 52′6″ by 12′7½″, is nearly twice the size of the previous two. This barge has been authorized to carry 50 different chemical products.

Refrigerated liquefied compressed gas cargoes are finding new modes of transportation by barge on the inland waterways. Due to somewhat similar pressure and temperature design requirements, propane and ammonia have been carried interchangeably in these barges. Refrigerated cargoes offer the advantage of a greater payload per cubic, by the use of increased filling densities and lighter weight cargo tanks, as well as a safer method of transportation in low pressure tanks or, when fully refrigerated down to the boiling point of the liquid in atmospheric pressure tanks. A number of refrigerated, non-pressure tank chemical barges have been approved by the Coast Guard.

One of the first of these new concepts in petrochemical transportation was the two refrigerated propane-ammonia barges for Phillips Petroleum Co. The barges are designed to be handled independently or as an integrated tow, the two barges being lashed box end to. Each barge carries 1,700 tons of anhydrous ammonia, refrigerated to −28° F.

Two additional barge designs currently under construction have been approved for the carriage of refrigerated propane and anhydrous ammonia. These barges will meet the *new* requirements for a type II barge. One is intended for a three-barge integrated tow, the lead barge being 293′ by 50′ by 14′, and will carry 2,200 tons per barge. The second design is a two-barge integrated tow, one lead and one trail barge, 295′ by 50′ by 12′6″, carrying 2,000 tons per barge of cargo. The cargo tanks for both designs will be capable of moving the refrigerated cargoes at a temperature down to −50° F.

To supply fuel for the Saturn series rocket motors the National Aeronautics and Space Administration has invited bids for the construction of barge mounted tanks to transport liquid hydrogen and liquid oxygen. There will eventually be four liquid hydrogen and five liquid oxygen barges in this service. The route will be from Michoud in New Orleans to the test facility on the Pearl River, a trip of approximately 12 hours. The tow will be segregated with no mixing of the liquid oxygen and liquid hydrogen barges. The barges will also act as a storage facility for the test site. The liquid hydrogen will be carried at −423° F and liquid oxygen at −297° F.

Like trying to predict the future of our population explosion (the prognosticators always seem to fall short of the mark), the crystalball-guess for future chemical movement by water has similar pitfalls.

To make this problem somewhat easier, only a small percentage of the 500 new chemicals produced each year ever reach the point of becoming a bulk commodity for water transportation. However, the new chemicals which do reach the quantities justifying bulk movement by water have become much more complex than the basic commodities now being shipped. Of course, we will continue to see many of the old chemicals such as caustic soda, sulphuric acid, benzene, ammonia, fertilizer and fertilizer products, chlorine, propane, being moved by water. Special manufacturing processes, such as the plastic industry might employ, or our space program, are generating large scale uses of chemicals. Since the producers of the raw materials, as well as the users, are located on or near our inland waterways system, it is quite natural that these special products find their way down or up river by barges. We now find such new products as ethylene oxide, carbon disulphide, ethyl ether, ethylene and propylene as proposed bulk cargoes for river barges.

The future appears unlimited for commodities destined to be transported in bulk by water. The Coast Guard, as the Federal regulatory agency responsible for the safety of our waterborne commerce, must evaluate the potential hazard to operating personnel and to the public which each new dangerous cargo may present. If it is determined by an assessment of the hazards, that the safety problems created by the bulk water movement of the commodity cannot be overcome by adequately designed equipment and proper operating requirements, then absolute prohibition against bulk movement by water would be in the best interest of public safety. However, such extreme cases may indeed be rare, for the technological advances in metals engineering and fabrication procedures should provide us with the tools to secure the necessary safeguards against all the known hazards. Our major problem today in the water movement of dangerous cargoes is not in the engineered safety, but in learning, to the fullest extent possible, all the conceivable ramifications and permutations of the physical behavior of chemicals under varying conditions of pressure, temperature, etc. Not only must we be fully cognizant of the stability or reactivity of each chemical under all creditable situations, but we must be assured of their mutual compatibility, in the event of admixture. When we have satisfactorily probed all the dimensions of the hazards confronting us in the water movement of dangerous cargoes, only then can we be justified in expressing the opinion that there is no commodity which cannot be safely transported in bulk by water. Once we have recognized the hazard, providing the necessary safeguards which will result in a safe mode of transportation, it is only a matter of bringing into play the required scientific and operational know-how. These talents and

DANGEROUS CARGO REGULATIONS IN PAPERBOUND VOLUME

The Coast Guard's Regulations for Dangerous Cargoes in effect on January 1, 1964, are now printed in a paperbound volume. Shipowners, officers, and others interested are urged to purchase these regulations.

The Division of Federal Register, the National Archives, General Services Administration, publishes this pamphlet annually with separate semiannual supplements, usually available in July of each year. These regulations are the official version of parts 146 and 147 of Title 46, Code of Federal Regulations. Since these regulations are a "sales" publication, they are not available at local Coast Guard offices.

Copies of this volume entitled "Title 46, Code of Federal Regulations, containing parts 146 and 147" (Subchapter N—Dangerous Cargoes), may be obtained as a sales publication from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price $2.50.

disciplines are readily available today in our technological cornucopia.

The scientific complexities in shipping today, enhanced with the use of specialized vessels and cargoes, are generally considered to be beyond the skills of any one group. This makes it abundantly clear that the Coast Guard cannot "go it alone" in carrying out the statutory responsibilities for the safe movement of dangerous cargoes by water. We must look to industry and other sources for advice and guidance. For example, the latest thinking in new barge construction for dangerous cargoes represents the united efforts of a number of organizations and the people who represent them. In this respect, two joint industry groups have been very helpful to the Coast Guard in our mutual endeavor to maintain a high degree of safety in this important area of river transportation. These are the Chemical Transportation Advisory Panel and the Western Rivers Panel Committee on Dangerous Cargoes. The Chemical Transportation Advisory Panel was primarily established to assist the Coast Guard in the overall field of water transportation of dangerous chemicals. This group is composed of representatives of the Manufacturing Chemists Association, the American Petroleum Institute, the Compressed Gas Association, the Chlorine Institute, the American Bureau of Shipping, the American Waterways Operators and certain shipbuilding yards. As an example of the excellent cooperative effort with this Panel, requirements for the bulk water movement of the following commodities were jointly developed: carbon disulphide, ethyl ether, anhydrous hydrofluoric acid, and ethylene oxide.

For a number of years the American Petroleum Institute Committee on Tank Vessels has advised the Coast Guard on the problems and hazards relating to the bulk transportation of petroleum products.

The Coast Guard will continue to make every effort to maintain close association with the chemical and compressed gas industry, as well as other organizations in this field, in our joint endeavor to maintain a high degree of safety in the bulk water movement of dangerous cargoes. The close cooperation we have received from all the industry advisory panels and committees has indeed provided the mutual understanding to make this joint effort a less difficult task.

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5. United States Coast Guard, "Rules and Regulations for Cargo and Miscellaneous Vessels"—CG–257, Title 46 CFR Parts 90 to 98, inclusive, Subchapter I

6. United States Coast Guard, "Rules and Regulations Covering the Transportation or Storage of Explosives or other Dangerous Articles or Substances", Title 46, Parts 146 to 149

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PROPELLER REPAIR

A C–3 type freighter off Hawaii struck a submerged floating object, causing propeller damage. Reduced engine RPM and speed resulted due to excessive vibration. A survey was conducted in Hilo where the vessel was unloaded sufficiently to raise the 20-foot diameter propeller's upper blade tip from the water. Two tips were found broken and the remaining three were bent aft. The attending inspector authorized the temporary repair of removing a 14 by 47 inch section from across each blade tip. Since measurement was a problem, tram marks were punched in the ship's hull and tram bars used to mark each blade as it was jacked into position. Sound powered phones were rigged for communication from the wheel area to the jacking motor. After cutting off the tips, the remaining jagged edges were ground smooth. A weight check of the removed bent tips revealed a close 85-pound average.

Although the propeller efficiency was reduced, the Chief Engineer reported no unusual vibration during an interisland run. Consequently, the vessel was permitted to return to the East Coast for subsequent installation of a new wheel when drydocked.

ACCIDENT REPORT

The following accident report, slightly edited, is printed for information without additional comment:

NAME: ____________________________

EMPLOYED AS: Radio officer.

DATE & TIME INJURED: 0200 hours, 14 September.

DATE & TIME INJURY REPORTED: 1000 hours, 14 September.

INJURED'S SUPERVISOR: SELF, radio officer.

ACCIDENT INVESTIGATED BY: SELF, radio officer.

STATEMENT OF INJURED: Aboard ship, in my quarters, reading. I arose from my bunk to get a drink of water; noticed a small black bug or beetle on the deck; kicked at same. Missed. Kicked chair instead. Breaking strength of oak chair leg approximately 500 pounds; breaking strength of little toe considerably less. Law of probability prevailed. Result: broken phalange, little toe, right foot.

WITNESSES: NONE, except the bug, and he died of laughter.

REMEDY: Suggest all chairlegs be made of foam rubber, all bugs be denied access to the ship or, alternatively, that orders be issued that no one kicks at little black bugs.

TREASURY DEPARTMENT
UNITED STATES COAST GUARD

ADDRESS REPLY TO:
COMMANDANT
U.S. COAST GUARD
HEADQUARTERS
WASHINGTON, D.C. 20226

MVI-3
15 July 1963

Commandant's Action
on
Marine Board of Investigation; engineroom casualty and subsequent foundering on 2 October 1961 of the SS *Hess Mariner*, O.N. 247229, in position Lat. 30°42′ North, Long. 79°30′ West.

The record of the Marine Board of Investigation convened to investigate subject casualty, including its Findings of Fact, Conclusions and Recommendations, has been reviewed.

At about 1948 hours, 1 October 1961, the SS *Hess Mariner*, a T-2 tank vessel, while approximately 110 miles east of the Georgia coast, suffered a disintegration of the main turbine generator. The fragments ruptured the main condenser and turbine, resulting in the flooding of the after spaces and eventual foundering of the vessel. One crewman, the oiler on watch in the engineroom, was injured by the flying fragments of the generator. The remaining crewmembers together with the injured oiler were safely removed from the vessel.

The *Hess Mariner* was en route Perth Amboy, New Jersey, out of Houston, Texas, with a cargo of Number 6 fuel oil. All cargo tanks were full except Number 4 port and starboard and Number 6 tanks across which were empty, and Numbers 2 and 9 centers which were slack. The vessel's draft was estimated at 28.95 feet forward and 30.95 feet aft at the time of the casualty.

Just prior to the casualty, while underway at 88 RPM's, the Second Assistant Engineer, then on watch and standing near the main switchboard, heard the main turbo-generator accelerate. He went to the maneuvering station, and moved the governor control lever to the idle position. However, the turbine continued to accelerate. He then pulled the emergency turbine trip several times with no apparent results. Upon proceeding aft toward the throttle valve, the main generator began to disintegrate, throwing metal fragments through an opening between the casing and the end bell. He then departed this area via the lower engineroom into the fireroom and up to the bulkhead steam stop valves where he secured the steam to the main turbine. The lights went out just as he reached the fireroom. Due to the electrical failure, the fires in the boilers went out. The oiler on watch also tried the emergency trip subsequent to the attempt by the Second Assistant with no apparent effect. While leaving the space and passing the main generator turning motor, the oiler was struck in the leg by a piece of flying debris sustaining a cut on his right foot. However, he was able to proceed through the lower engineroom into the shaft alley, where he awaited assistance.

Following the casualty, all engineers and various other members of the engine department proceeded into the machinery space. The emergency generator was started and a survey of the machinery space revealed the following:

a. The forward and after end of the main generator casing had been pushed out and down.

b. Sections of the main generator casing on the port side were missing and the casing was bulged and torn.

c. The coils, windings, and other internal parts of the main generator were scattered throughout the engineroom.

d. The main turbine casing was split across the top between inspection plates. The turbine relief valve located on the top of the casing was missing. The port and starboard inspection plates on the turbine were loose.

e. There was a hole (est. 12 to 24 inches) in the inboard side of the port bunker tank, about three feet above the generator flat and approximately in line with the center of the main generator.

f. The ship service generators were apparently undamaged.

g. Water was flooding the engineroom through the ruptured main turbine casing, the inspection plates, the turbine glands, and through the fractured condenser.

Under the direction of the Chief Engineer, the suction and overboard discharge valves and all other sea valves to the machinery space were reportedly closed. However, flooding through the ruptured condenser still continued. The after bilge pump in the shaft alley was started, and suction was taken from the engineroom. Shortly thereafter the shaft alley fire pump was started and the bilge pump was secured. Preparations were made to relight the boilers; however, as soon as the electric forced draft fan was started all the power and lights failed, the emergency generator stopped and the emergency generator room filled with smoke. Subsequent to the emergency generator tripping out, no further attempts were made to start any machinery or to stop the flooding through the ruptured condenser. The watertight doors between engineroom and fireroom, engineroom and shaft alley and the watertight hatch from the shaft alley to the fireroom were closed and these spaces were abandoned. From the upper levels of the engineroom and fireroom, periodic inspections of the machinery spaces were made at about half-hourly intervals. At about 2300 the engineroom was found to have flooded to within thirteen feet of the main deck, and the flooding rate was estimated at about twenty to twenty-four inches per hour. At about 0200, 2 October, the water in the engineroom had reached the main deck level and water was noted above the floor plate in the fireroom. At about 0230 the vessel was abandoned, and at 0926, 2 October 1961 the vessel was observed to break in half and sink. The safe recovery of all hands was accomplished by the SS *Texaco Nevada* and the *Esso Suez*.

REMARKS

Concurring with the Board, it is considered that the loss of the vessel resulted from the disintegration of the main turbine generator, flying fragments from which ruptured the main condenser and turbine casing, allowing flooding of the engineroom and progressive flooding of adjacent spaces.

That the *initial* cause of the casualty was the failure of excitation to the main generator is concurred in. However, it is considered that the *actual* cause of the casualty was the failure of the speed control system and the overspeed safety devices to operate properly, thus permitting the main turbine with its attached generator, to overspeed to destruction when the electrical load was dropped through failure of excitation. The reason for the failure of the excitation, and of the speed control and overspeed devices, was not determined.

The Board concluded that a possible explanation for the failure of the turbine speed control devices was leaking stop valves or non-return valves in the steam reducing stations and extraction systems, thus allowing live steam to enter the turbine directly through these systems. It is recognized that, even had the speed control devices operated properly, they could have been by-passed through a malfunction of a check valve in the steam extraction system. Such a malfunction would permit live steam to enter the turbine directly, and so cause overspeeding. The record, however, does not support this conjecture; therefore, this conclusion is not concurred in.

The Board's conclusion that the failure of the closed sea valves to control the engineroom flooding may have been caused by pieces of damaged condenser tubes jamming the sea valves is not concurred in. The probability of any parts of the condenser tubes passing through the tube sheets of the condenser and then entering the sea valves is remote. The ingress of water from the sea through the sea valves, into and through the ruptured condenser would tend to keep the sea valves free of any of the tube parts. The reason for the failure of the closed sea valves to control the flooding was not determined.

The record contains considerable evidence concerning the closure of sea valves in general; however, testimony relating specifically to the status of the low and the high main injection valves is vague and uncertain. In fact, under direct examination the Junior Third Assistant Engineer stated: "I started closing the lower sea suction, I mean the upper sea suction on the high suction. I had to stand up on the lower sea suction in order to reach the high one." In response to further questioning he stated: "I knew it was shut off from the sea. I knew the higher valve was completely closed, the lower suction was always closed, and I saw the First Assistant close the upper suction, I mean the discharge."

From the above, it appears that any check of the low injection valve may have been of a visual nature rather than manual. Thus, it appears possible that this valve may not have been fully closed. In fact, considering the apparent volume of water emanating from the broken turbine casing and condenser, the probability of such a condition existing is well founded.

Based on this casualty and subsequent examination of similar vessels, the Board recommended that specific areas be inspected on all T-2 and T-3 tank vessels relative to watertight integrity. In this regard Navigation and Vessel Inspection Circular No. 2-62 was promulgated. This circular is considered adequate to accomplish this recommendation.

Subject to the foregoing remarks, the record of the Marine Board of Investigation is approved.

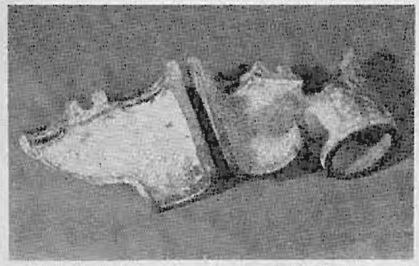
D. McG. MORRISON,
Vice Admiral, U.S. Coast Guard,
Acting Commandant.

AMMONIA REFRIGERATION CASUALTY

A recent failure of a cast iron return bend in a vessel's ammonia refrigeration system resulted in injury to four men and an eight day delay to the vessel. At first, a leak was detected in No. 5 tube of the ammonia condenser. The vessel, which was underway, diverted to a nearby port and had a total of ten new condenser tubes installed. The condenser was then leak tested with Freon 12 and a halide torch, purged with 80 p.s.i. air, and pumped down to a 28-inch vacuum which was held for 30 minutes.

After being recharged with ammonia, the system operated about 20 minutes when the cast iron return bend on No. 6 and 7 condenser tubes let go. The released ammonia caused eye burns to four men; fortunately none were seriously injured.

Normal operating pressure with 90° F cooling water was 240 p.s.i. on the high side. The compressor had a 300-pound relief valve, however the hand of the 300-pound gauge on the discharge side was stuck tight against the stop above the 300 p.s.i. mark when the investigating officer checked it.



PHOTOGRAPH of the defective cast iron return bend on the ammonia receiver showing the fracture through the center of the casting.

After rebuilding the compressor, all the cast iron fittings on the condenser and the valves were removed, cleaned of paint and scale and visually examined. When reassembly was completed the condenser and receiver were hydrostatically tested to 300 p.s.i. for two hours. The relief valve was renewed at the compressor and a new one, relieving to atmosphere, was installed in the discharge line. Both valves were tested for 300 p.s.i. Again the system was tested with Freon, then vacnum tested followed by recharging.

This ammonia unit was installed in 1938. Current practice is to employ systems using a refrigerant other than ammonia, therefore when an ammonia system is being used it should be the object of careful inspection because of its probable age and the danger to personnel from accidental release of ammonia. When an ammonia receiver rests horizontally in saddles on the deck, as was the case in this instance, the receiver and components should be checked frequently and carefnlly for weakening due to corrosion.

MARITIME SIDELIGHTS

There were 915 vessels of 1,000 gross tons and over in the active oceangoing U.S. merchant fleet on February 1, 1964, two more than the number active on January 1, 1964, according to the U.S. Department of Commerce.

There were 10 government-owned and 905 privately-owned ships in active service. These figures did not include privately owned vessels temporarily inactive. They also exclude 25 vessels in the custody of the Departments of Defense, State, and Interior and the Panama Canal Co.

There was one more active vessel and two fewer inactive vessels in the privately-owned fleet. One tanker, *Gold Stream*, was purchased from the government. Two freighters were transferred foreign. This made a net loss of 1 in the total of 973. Of the 68 privately-owned inactive vessels, 1 passenger ship, 13 freighters and 3 tankers were being repaired or reactivated. The others were laid up or temporarily idle.

The Maritime Administration's active fleet increased by one, while the inactive fleet decreased by two. Nine ships were sold for scrap, one tanker was sold to a private owner, and one ship was returned from Navy Operations. The total government fleet decreased by 9 to 1,802. The total U.S. Merchant fleet decreased by 10 from January 1, 1964 to 2,775.

Two additional freighters were ordered by Grace Line from Sun Shipbuilding and Drydock Co., and a tanker was ordered by Humble Oil and Refining Co. from Newport News. No additional ships were delivered. The number of large oceangoing ships under construction in U.S. shipyards increased by 3 to 51.

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During 1963 the Port of New York welcomed 121 new ships. These included 103 dry cargo vessels, 17 tankers, and 1 cable laying vessel. The smallest vessels were the Dutch motorships *Candide* and *Bree Helle*, both of 499 gross tons, and the largest tanker to arrive was the U.S. Flag *Mount Washington* of 27,797 gross tons.

A COAST GUARD HELICOPTER is shown rescuing ten men, a woman, and a German shepherd puppy from the stern of the sinking yacht *Hattie D.* about 20 miles below Cape Mendocino, Calif. The rescue was made in two trips. The casualty was reportedly the result of a collision with a floating object during a storm, with the resultant loss of the craft's rudder.

The Port of Los Angeles will have a new pilot boat sometime this summer. The proposed vessel will be 66 feet long with an 18-foot beam and a 9-foot draft. The steel-hulled, diesel propelled craft will operate at a speed of 12 knots and is equipped with radar and fathometer. When completed, she will replace the 32-year-old *Stephen M. White.*

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A flotilla of the world's great sailing vessels will visit New York harbor this July. The event is part of Operation Sail, 1964. Eighteen ships are already pledged for a great "sail-past" in the harbor on July 14th. Part of the operation will consist of a race between the sail training ships of Europe from Lisbon, Portugal to Bermuda. In Bermuda the flotilla will rendezvous with the sail training ships from the Western Hemisphere and the combined armada will set sail for New York with arrival in Gravesend Bay scheduled for July 11th and 12th.

The American passenger liner *President Wilson* recently rescued 18 crewmembers from the sinking Liberian freighter *Agia Erinil* in heavy seas off the coast of Japan. The freighter was enroute from Portland, Oreg. to Japan with a cargo of scrap iron when she sprang several leaks.

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Lloyd's Register of Shipping shows that Japan continued to lead the world in merchant vessel shipbuilding during the last quarter of 1963. Japan's total tonnage was 1,569,651 gross tons, about 18 percent of the world's tonnage for that quarter. Great Britain was second with 1,421,455 gross tons.

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Humble Oil has authorized construction of a new 66,500-ton tanker. It is scheduled for delivery at the end of this year and is the first of two 800-foot vessels to be designed and built with automated and simplified machinery. The entire plant will be operated from a single control console.

nautical queries

DECK

Q. Describe a vernier scale and explain how a reading is obtained on the vernier scale.

A. The vernier scale is an auxiliary movable ruler device, which permits great accuracy in measurement. On the lower ruler, a distance equivalent to 9 divisions on the upper scale, is divided into 10 parts. To measure an object, the end of which is noted to be between two divisions on the upper scale, set the beginning of the vernier scale at this point and look for the first division on the vernier scale which exactly coincides with a division on the upper scale.

Q. a. What accuracy can be expected normally with bearings furnished by shore radio direction-finder stations?

b. How would you regard bearings by shore radio direction-finder stations which were described as doubtful, approximate, or second class.

A. a. The bearings taken by radio direction-finder stations and reported by them to ships are corrected for all determinable errors except the difference between a great circle and a rhumb line and are normally accurate within 2° for distances under 150 miles. However, this error may be increased by various circumstances, such as faulty transmitter adjustment, coastal refraction, sunrise, sunset or night effects, etc.

b. When radio direction-finder stations in reporting bearings use such words as doubtful, approximate, second class, or the equivalents in foreign languages, the bearings must be treated with grave suspicion, as very considerable errors may exist in such bearings.

Q. Which of the following is true when paying out nylon line from around bitts or cleats?

a. Few turns are necessary because of nylon's high coefficient of friction.

b. It is preferable to have two or three round turns under the figure of eights.

c. It is necessary to surge the line even with a single turn.

d. The person attending the line should stand clear of the direction of pull.

e. Both (b) and (d) above.

A. e. Both (b) and (d) above.

ENGINE

Q. The symbol below indicates a/an:

(a) Two pole, single throw knife switch

(b) DC oil type circuit breaker

(c) Double pole automatic relay

(d) Normally open main contact for DC

(e) AC single phase motor connector

A. (a) Two pole, single throw knife switch

Q. What type of steam-driven machinery is usually equipped with:

(a) speed limiting governors?

(b) speed regulating governors?

A. (a) Speed limiting governors are usually used on variable speed machinery such as main propulsion machinery, forced draft blowers and most pumps.

(b) Speed regulating governors are usually used on constant speed machinery such as turbo-driven generators and air compressors.

Q. What are the characteristics of an isochronous governor? On what machinery is this type of governor usually installed?

A. An isochronous governor is one which will maintain a constant speed for all values of steady load within the capacity of the prime mover. Its sensitivity should be such that each time a change of load occurs, there will be a momentary variation of the speed from normal, but the speed should return immediately to the original number of revolutions per minute. It is used on constant speed machinery handling varying loads, such as a turbo-generator.

Q. A synchronous converter will:

(a) Reverse the power factor by 180°

(b) Convert AC current into DC current

(c) Change a synchronous motor to a wound-rotor type

(d) Not be found on board ships

A. (b) Convert AC current into DC current

Q. What are the advantages gained through the use of a double-suction impeller in centrifugal pumps rather than a single-suction impeller?

A. The advantages gained through the use of the double-suction impeller are the elimination of hydraulic end-thrust and a greatly increased pump capacity for impellers having the same throat size.

Q. What precautions should be taken before breaking joints on steam and hot water piping?

A. When breaking a flange joint, particularly in steam and hot water piping or in those of salt water lines which have a direct connection with the sea, precautions should be taken to see that:

(a) There is no pressure on the line

(b) The valves cutting pressure off the line undergoing repair are secured in such a manner that they cannot be accidentally opened

(c) The line is completely drained

(d) Two of the flange nuts (diametrically opposite) remain in place, while others are being removed. The two remaining nuts shall then be slacked sufficiently to allow breaking the joint

Q. Why is it dangerous to operate an air compressor without the proper inlet air filters?

A. Every effort must be made to have only clean, dry air at the compressor intake because dust laden intake air may cause an explosion within the air compressor, discharge line, or receiver.

Q. A voltmeter has a resistance of 25 ohms and a range of 0 to 5 volts. What series resistance will provide it with a range of 0 to 120 volts?

A. Full scale deflection of the voltmeter will be produced by a current of:

$$I=\frac{E}{R}=\frac{5}{25}=0.2 \text{ amp therefore,}$$

the total resistance at 120 volts will have to be:

$$R=\frac{E}{I}=\frac{120}{0.2}=600 \text{ ohms and,}$$

the additional resistance required is:

$600-25=\underline{575 \text{ ohms}}$ answer

TITLE 32—NATIONAL DEFENSE

Chapter VI—Department of the Navy

SUBCHAPTER B—NAVIGATION

PART 706—NAVIGATIONAL LIGHT WAIVERS

PART 707—DISTINCTIVE LIGHTS AUTHORIZED FOR SUBMARINES

Scope and purpose. For convenience of reference, the new parts codify current notices published heretofore in the FEDERAL REGISTER, i.e., navigational light waivers for certain classes and types of naval vessels (25 F.R. 5791, with amendments: 26 F.R. 11505, 27 F.R. 4394, 28 F.R. 4525, 8000) and the authorization of the display by U.S. naval submarines of distinctive lights (28 F.R. 9699).

1. Part 706 is inserted to read as follows:

Sec.
706.1 Purpose of regulations.
706.2 Certifications of the Secretary of the Navy under 33 U.S.C. 143a and 360.

AUTHORITY: The provisions of this Part 706 issued under sec. 1, 59 Stat. 590, sec. 2, 65 Stat. 407; 33 U.S.C. 143a, 360. Statutory provisions interpreted or applied are cited in the text.

CROSS-REFERENCE: For lights of Coast Guard vessels of special construction, see 33 CFR Part 135.

§ 706.1 Purpose of regulations.

(a) All ships are warned that, when U.S. naval vessels are met on the high seas or on navigable waters of the United States during periods when navigational lights may be displayed, certain navigational lights of some naval vessels may vary from the requirements of the Regulations for Preventing Collisions at Sea, 1948, 33 U.S. Code sections 144 to 147d, and rules applicable to the navigable waters of the United States, as to number, position, range of visibility or arc of visibility. These differences are necessitated by reasons of military function or special construction of the naval ships. An example is the aircraft carrier where the two white lights are in most instances on the island superstructure considerably displaced from the center or keel line of the vessel when viewed from ahead. Certain other naval vessels cannot comply with the horizontal separation requirements of the white lights, and the two white lights on even large naval vessels, such as some cruisers, will thus appear to be crowded together when viewed from a distance. Other naval vessels may also have unorthodox navigational light arrangements or characteristics when seen either underway or at anchor.

(b) Naval vessels may also be expected to display certain other lights. These lights include, but are not limited to, different colored recognition light signals, landing lights on carriers, pulsating red lights to indicate speed to other naval ships, and green lights to indicate minesweeping operations. These lights may sometimes be shown in combination with navigational lights.

(c) During peacetime naval maneuvers, naval ships, alone or in company, may also dispense with showing any lights, though efforts will be made to display lights on the approach of shipping.

TABLE ONE

Vessel class or type	Distance in feet of the forward 20-point white light below minimum required height (based on requirements of International Rule 2(a)(iii))	Distance in feet below minimum required vertical separation between forward and after 20-point white lights (based on requirements of International Rule 2(a)(iii))	Ratio of horizontal to vertical separation of the two 20-point white lights (based on International Rule 2(a)(iii) which requires ratio of 3.0 to 1)	Minimum distance horizontally in feet between forward and after 20-point white lights
CRUISERS:				
CA (Heavy Cruiser) CAG (Guided Missile Heavy Cruiser). CG(N) (Guided Missile Cruiser). CL (Light Cruiser) CLG (Guided Missile Light Cruiser).	None	None	0.9 or greater to 1	29 or greater.
AIRCRAFT CARRIERS:				
T-AKV (MSTS Auxiliary Cargo Ship). LPH (Amphibious Assault Ship). CVA (Attack Aircraft Carrier). CVS (ASW Support Aircraft Carrier).	11 or less	2 or less	0.7 or greater to 1	20 or greater.
CC2 (Command Ship converted from aircraft carrier).	25	None	2.0 or greater to 1	30 or greater.
AUXILIARIES:				
ADG (Degaussing Vessel) AG (Miscellaneous) AGB (Icebreaker) AGS (Surveying Ship) AKS (General Stores Issue Ship). AN (Net Laying Ship) APB (Self-Propelled Barracks Ship). ARSD (Salvage Lifting Vessel). AVB (Advanced Aviation Base Ship). AVM (Guided Missile Ship) AVP (Small Seaplane Tender)	40 or less	3 or less	0.9 or greater to 1	19 or greater.
DESTROYERS:				
DD (Destroyer) DDE (Escort Destroyer) DDG (Guided Missile Destroyer). DDR (Radar Picket Destroyer). DL (Frigate) DLG (Guided Missile Frigate).	18 or less	3 or less	0.9 or greater to 1	17 or greater.
AMPHIBIOUS WARFARE VESSELS:				
APD (High Speed Transport) IFS (Inshore Fire Support Ship) LSD (Dock Landing Ship) LST (Tank Landing Ship) LSM (Medium Landing Ship).	40 or less	5 or less	1.0 or greater to 1	21 or greater.
PATROL VESSELS:				
DE (Escort Vessel) DER (Radar Picket Escort Vessel) PC (Submarine Chaser) PCE (Escort) PCER (Rescue Escort)	17 or less	5 or less	1.0 or greater to 1	19 or greater.
PC(H) (Hydrofoil Patrol Craft).	None	After white light not carried.		
MINE VESSELS:				
MHC (Minehunter Coastal) MSF (Minesweeper Fleet) MSO (Minesweeper Ocean)	16 or less	3 or less	0.6 or greater to 1	8 or greater.
SERVICE VESSELS:				
YG (Garbage Lighter Self-Propelled). YV (Drone Aircraft Catapult Control Craft) Self-Propelled Crane (No hull classification)	16 or less	5 or less	0.6 or greater to 1	12 or greater.

(d) 33 U.S. Code, sections 143a and 360, provide that the requirements of the Regulations for Preventing Collisions at Sea, 1948, the Inland Rules, the Great Lakes Rules, and the Western River Rules, as to the number, position, range of visibility, or arc of visibility of lights required to be displayed by vessels, shall not apply to any vessel or class of vessels of the Navy where the Secretary of the Navy shall find or certify that, by reason of special construction or purpose, it is not possible for such vessel or class of vessels to comply with the statutory provisions as to lights.

(e) This part consolidates and codifies certificates of the Secretary of the Navy under 33 U.S.C. 143a and 360. It has been determined that, because of their construction, it is not possible for the classes or types of naval vessels listed in this part to comply with all of the requirements of the statutes enumerated in sections 143a and 360, Title 33, United States Code.

§ 706.2 Certifications of the Secretary of the Navy under 33 U.S.C. 143a and 360.

The Secretary of the Navy hereby finds and certifies that the classes or types of vessels listed in this section are naval vessels of special construction and that, with respect to the position of the navigation lights listed in this section, it is not possible to comply with the requirements of the statutes enumerated in sections 143a and 360 of Title 33, United States Code. The Secretary of the Navy further finds and certifies that the navigation lights listed in this section conform as closely as feasible to the applicable statutory requirements.

TABLE TWO

SUBMARINES

(a) One, 20-point white light is generally carried in the forward part of the vessel and will not be less than 15 feet above the hull. This light is visible over a maximum arc of 27 points, that is from right ahead to 5½ points (62 degrees) abaft the beam on either side.

(b) A second, 20-point or other white light is not installed.

(c) Side lights may be visible simultaneously across the bow. The side lights may also be visible 30 degrees abaft the beam.

(d) Not-under-command lights are not installed.

(e) The white light showing to the stern will be visible over a maximum arc of 23 points of the compass, that is from right astern to 11½ points (approximately 126 degrees) to either side. This light is not installed at the stern but may be located from 20 to 190 feet forward of the stern.

(f) The forward anchor light is carried at a height not less than 6 feet above the hull, and the after anchor light may be carried at a greater height.

NOTES

1. The after range light when carried by naval vessels is a 20-point white light as required by International Rule 2(a)(ii).

2. The arc of visibility of the after 20-point white light on certain heavy cruisers (CA) may be obstructed by as much as one point when viewed from ahead.

3. On aircraft carriers (CVA and CVS) and aircraft carrier types (LPH and T-AKV), the following additional variations exist:

a. The two 20-point white lights are located at a maximum distance of 89 feet to the left of the keel line when viewed from ahead. (This distance is measured perpendicularly from the keel line to the two white lights.)

b. The forward anchor lights are located at a maximum of 8 feet vertically below the uppermost continuous deck (two lights at the same level). These lights are located forward and on either side of the vessel.

c. The after anchor lights are located a maximum of 31 feet vertically below the uppermost continuous deck (two lights at the same level). These lights are located aft and on either side of the vessel.

4. On certain command ships (CC2 type converted from aircraft carrier hull), the following additional variations exist:

a. Towing lights, when displayed, will meet the requirements for vertical separation; however, the lower light will be located 3–9 feet above the hull.

b. 5 degrees of the arc of visibility of the range light is obstructed at a point commencing approximately 2½ points forward of the port beam.

c. The number and position of the forward and after anchor lights are the same as those of other classes of aircraft carriers herein described in Notes 3b and 3c of this section.

d. The lights mentioned in Table One with respect to CC2 type ships are located on the center or keel line.

e. The masthead light shall be carried at a height of 15 feet or more above the hull.

5. On certain utility landing craft (LCU) only one 20-point white light is installed and is located in the after part of the ship. Also in certain of these ships, the 20-point white light is located 11 feet or less to the left of the keel line when viewed from ahead.

6. On 94-feet aircraft rescue boats (no hull classification) and motor-torpedo boats (PT), the 20-point white light is located at a maximum of 14 feet below the required height (based on International Rule 2(a)(iii)).

7. On motor-torpedo boats (PT) the lower towing light is located at a maximum of 4 feet below the required height (based on International Rule 3(a)).

8. On hydrofoil patrol craft (PC(H) class):

a. The masthead and anchor lights shall be located on the centerline and two feet aft of the amidship point instead of in the forepart of such vessels.

b. The anchor light shall be carried at a height above the hull of more than 20 feet.

9. 57-feet minesweeping boats (MSB), 50-feet minesweepers (MS) and 36-feet minesweeping launches (MSL) when engaged in mine operations will carry the required day signals and underwater task lights (based on International Rule 4 (a) and (c)). However, the underwater task lights will be carried at a 3-feet separation on 36-feet minesweeping launches (MSL). Day shapes will be carried as follows:

36′ MSL—15″ diameter shape—1 foot separation of shapes.

50′ MS—15″ diameter shape—1 foot separation of shapes.

57′ MSB—18″ diameter shape—4 feet separation of shapes.

10. On self-propelled crane (no hull classification) considerable reduction in the all around visibility of anchor lights exists. Two sets of "not under command" lights are installed, one set on either side of the superstructure (based on International Rule 4(a)).

11. Great Lakes—Naval vessels operating on the Great Lakes shall carry their navigational lights and shapes at the positions complying with the Regulations for Preventing Collisions at Sea, 1948, except as follows. For naval vessels under 150 feet in length requiring only one white light under the Regulations for Preventing Collisions at Sea, 1948, an additional all around white light will be carried which in some cases may be carried less than 50 feet abaft the forward light. In addition, the after white range light required by Rule 3(c), Great Lakes Rules, is a 20-point white light, so fixed as to show the light 10 points on each side of the vessel, that is, from right ahead to two points abaft the beam on either side. These vessels will, however, carry the white light stern light required by Rule 10, Regulations for Preventing Collisions at Sea, 1948, to light the vessels aft. At anchor these vessels will display in lieu of the two lights forward and two lights aft, Rule 9, Great Lakes Rule, a single all around white anchor light forward and a single all around white anchor light aft located in accordance with Rule 11 (a) and (b), Regulations for Preventing Collisions at Sea, 1948, as modified for aircraft carriers and aircraft carrier types by Note 3 above. Submarines will be lighted as provided by Table Two.

12. On guided missile destroyers, known as the DDG-2 Class, and on other destroyer-type vessels when engaged in towing vessels or objects exceeding 600 feet in length, the two lower of the three towing 20 point white lights will be separated from 3 feet to 15 feet vertically in lieu of the prescribed 6-foot separation.

2. Upon publication in the Federal Register, Part 706 supersedes the notice "Navigational Light Waivers for Certain Classes and Types of Naval Vessels—No. 22" (25 F.R. 5791) and the amendments thereto, numbered 22A through 22D (26 F.R. 11505, 27 F.R. 4394, 28 F.R. 4525 and 28 F.R. 8000). Any future amendments will

be published as amendments to Part 706 rather than as amendments to Light Waiver 22.

3. Part 707 is inserted to read as follows:

§ 707.1 Display of distinctive lights by submarines.

(a) In accordance with Rule 13(a) International Rules and Article 13, Inland Rules, the Secretary of the Navy has authorized the display of a distinctive light by U.S. Naval submarines in international waters and in the inland waters of the United States. The light will be exhibited in addition to the presently prescribed navigational lights for submarines.

(b) The normal navigational lights of submarines have been found to be easily mistaken for those of small vessels when in fact submarines are large deep draft vessels with limited maneuvering characteristics while they are on the surface. The newly authorized light is expected to promote safety at sea by assisting in the identification of submarines.

(c) United States submarines may therefore display an amber colored rotating light producing 90 flashes per minute visible all round the horizon at a distance of at least 3 miles, the light to be located approximately 6 feet above the masthead light.

(Sec. 1 (art. 13), 30 Stat. 99, sec. 6 (rule 13(a)), 65 Stat. 415; 33 U.S.C. 145k(a), 182)

4. Upon publication in the Federal Register, Part 707 supersedes the Notice "Distinctive Lights Authorized for U.S. Naval Submarines", published in the Federal Register of September 5, 1963 (28 F.R. 9699). Any future amendments will be published as amendment to Part 707 rather than as amendment to that notice.

Dated: February 19, 1964.

By direction of the Secretary of the Navy.

[SEAL] ROBERT D. POWERS, Jr.
Rear Admiral, U.S. Navy, Acting Judge Advocate General of the Navy.

[F.R. Doc. 64-1854; Filed, Feb. 26, 1964; 8:45 a.m.]

EQUIPMENT APPROVED BY THE COMMANDANT

[EDITOR'S NOTE.—Due to space limitations, it is not possible to publish the documents regarding approvals and terminations of approvals of equipment published in the Federal Register dated February 5, 1964 (CGFR 63-81) and February 11, 1964 (CGFR 64-1). Copies of these documents may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402.]

ARTICLES OF SHIPS' STORES AND SUPPLIES

Articles of ships' stores and supplies certificated from February 1, to February 29, 1964, inclusive, for use on board vessels in accordance with the provisions of Part 147 of the regulations governing "Explosives or Other Dangerous Articles on Board Vessels" are as follows:

CERTIFIED

National Research & Chemical Co., 12520 Cerise Ave., Hawthorne, Calif., Certificate No. 232, dated Feb. 5, 1964, TYFOSOL 50.

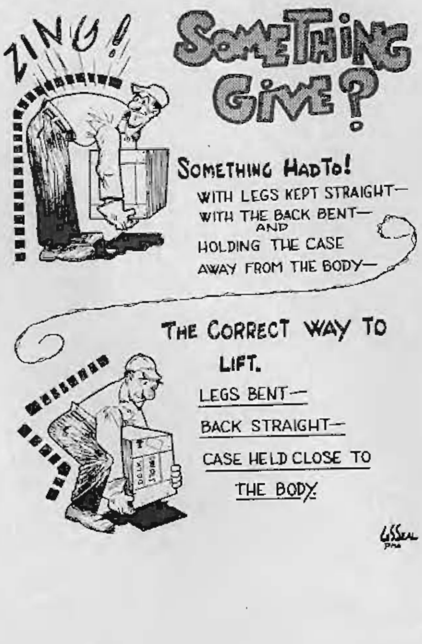
The Dow Chemical Co., Midland, Mich., Certificate No. 237, dated Feb. 13, 1964, CHLOROTHENE INDUSTRIAL.

The following certificates were cancelled effective Feb. 3, 1964:

CANCELLED

(Failed to Renew in Accordance With 46 CFR 147.03-9)

John B. Moore Corp., P.O. Box 3, Nutley 10, N.J., Certificate No. 149, dated Dec. 22, 1953, SOLVENT M-5 CINECLENE.



Sonneborn Chemical & Refining Corp., 300 Park Ave. South, New York 10, N.Y., Certificate No. 242, dated Feb. 21, 1962, PETROSENE D-R.

West Chemical Products, Inc., 42-16 West St., Long Island City 1, N.Y., Certificate No. 347, dated July 9, 1952, WEST SANIKLEEN.

Turco Products, Inc., 24600 South Main St., Wilmington, Calif., Certificate No. 538, dated Oct. 11, 1962, TURCO TRANSPO.

Jaxon Engineering Specialties, 185 Steuart St., San Francisco 5, Calif., Certificate No. 534, dated Aug. 20, 1962, UNITED ELECTRIC SOLVENT #1, Certificate No. 535, dated Aug. 20, 1962, UNITED ELECTRIC SOLVENT #2.

AFFIDAVITS

The following affidavits were accepted during the period from Jan. 15, 1964 to Feb. 15, 1964.

Trent Tube Co.,[1] East Troy, Wis., PIPE AND TUBING.

Jetty Tool Co., P.O. Box 15375, Houston 20, Texas, FITTINGS AND FLANGES.

General Regulator Corp., 110 South Orange Ave., Livingston, N.J., 07039, VALVES AND FITTINGS.

Hyde Windlass Co.,[2] Bath, Maine, VALVES, FLANGES AND FITTINGS.

Yale Machine Works, Inc., P.O. Box 10717, Houston, Texas, FITTINGS.

Clayton Mark & Co., 1900 Dempster St., Evanston, Ill., PIPE AND TUBING.

Velan Steam Specialties, Inc., P.O. Box 462, Plattsburgh, N.Y., 12902, FITTINGS.

Velan Valve Corp.,[3] P.O. Box 462, Plattsburgh, N.Y., 12902.

Velan Engineering Co.,[2] 1216 Drummond St., Montreal, Canada, FITTINGS.

[1] Includes ASTM A-312-62T stainless steel fusion welded pipe for use in Class II piping systems.

[2] Delete in Previously Approved Section of CG-190.

[3] Presently listed for valves, but the company desires new address to be shown as listed herein.

NOTE: The change to Fluid Controls entry in CG-190 will be made as follows:
Fluid Controls, Inc., Mentor, Ohio, RELIEF VALVE (ALUMINUM ALLOY), Part No. 54009-2, 4000.

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications that are directly applicable to the Merchant Marine are available and may be obtained upon request from the nearest Marine Inspection Office of the United States Coast Guard. The date of each publication is indicated in parentheses following its title. The dates of the Federal Registers affecting each publication are noted after the date of each edition.

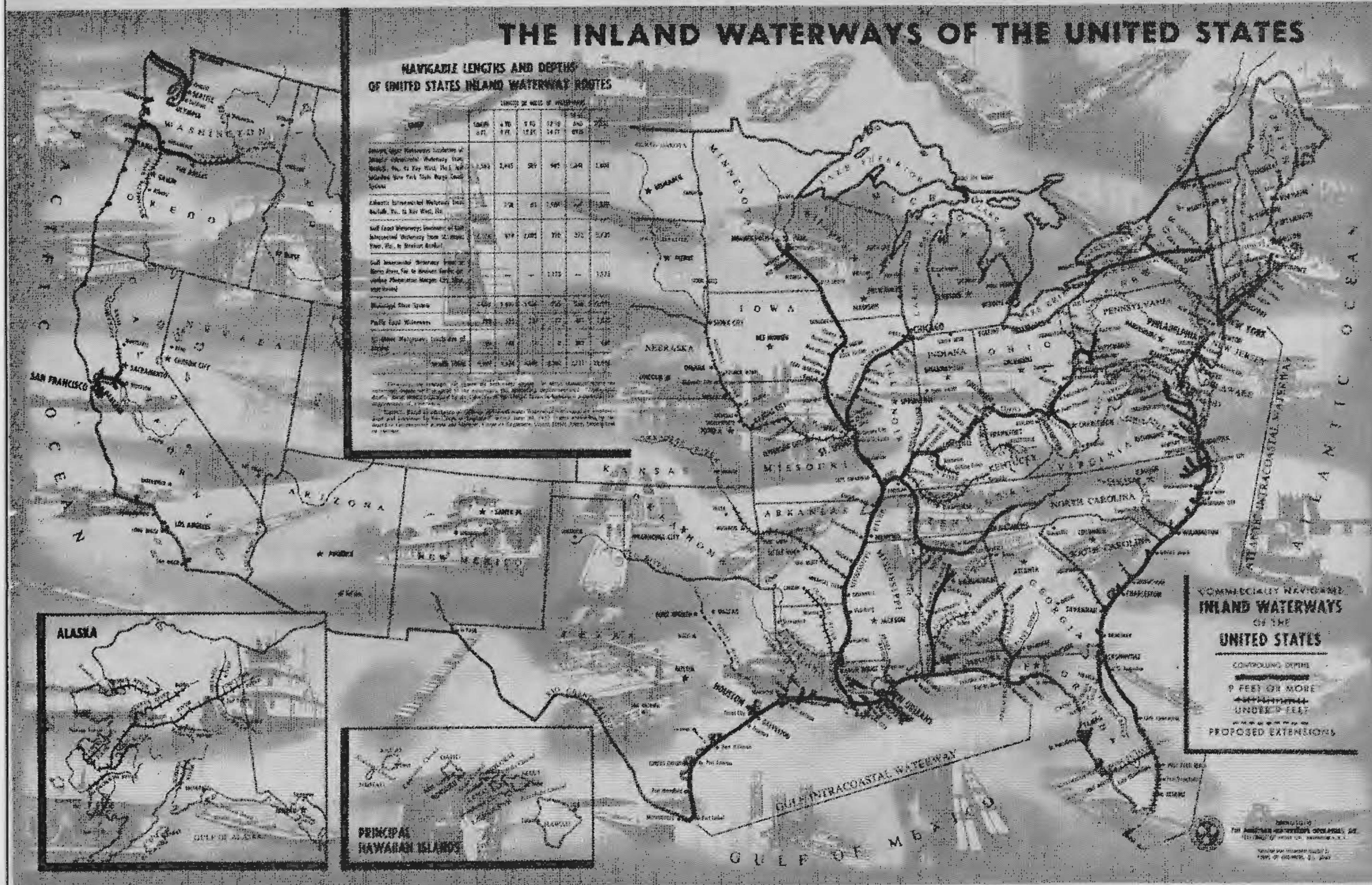
CG No.	TITLE OF PUBLICATION
101	Specimen Examination for Merchant Marine Deck Officers (7–1–63).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (8–1–62).
115	Marine Engineering Regulations and Material Specifications (3–1–63), F.R. 8–20–63, 10–26–63.
123	Rules and Regulations for Tank Vessels (1–2–62). F.R. 5–2–62, 9–11–62, 2–6–63, 4–4–63, 5–30–63, 8–20–63, 9–6–63, 10–8–63, 10–26–63, 12–13–63.
129	Proceedings of the Merchant Marine Council (Monthly).
169	Rules of the Road—International—Inland (6–1–62), F.R. 1–18–63, 5–23–63, 5–29–63, 7–6–63, 10–2–63, 12–13–63.
172	Rules of the Road—Great Lakes (6–1–62). F.R. 8–31–62, 5–11–63, 5–23–63, 5–29–63, 10–2–63, 10–15–63.
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (7–2–51).
175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (9–1–60).
176	Load Line Regulation (7–1–63).
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
184	Rules of the Road—Western Rivers (6–1–62). F.R. 1–18–63, 5–23–63, 5–29–63, 9–25–63, 10–2–63, 10–15–63.
190	Equipment Lists (4–2–62). F.R. 5–17–62, 5–25–62, 7–24–62, 8–4–62, 8–11–62, 9–11–62, 10–4–62, 10–30–62, 11–22–62, 11–24–62, 12–29–62, 1–4–63, 1–8–63, 2–7–63, 2–27–63, 3–20–63, 4–24–63, 6–11–63, 6–15–63, 6–22–63, 6–28–63, 8–10–63, 10–16–63, 11–23–63, 12–3–63, 2–5–64, 2–11–64.
191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (7–1–63). F.R. 9–18–63, 12–13–63.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (10–1–63).
220	Specimen Examination Questions for Licenses as Master, Mate, and Pilot of Central Western Rivers Vessels (4–1–57).
227	Laws Governing Marine Inspection (6–1–62).
239	Security of Vessels and Waterfront Facilities (8–1–61). F.R. 11–3–61, 12–12–61, 8–8–62, 8–31–62, 11–15–62, 1–30–63, 3–27–63, 5–29–63, 6–4–63, 10–9–63, 1–30–64.
249	Merchant Marine Council Public Hearing Agenda (Annually).
256	Rules and Regulations for Passenger Vessels (1–2–62). F.R. 5–2–62, 9–11–62, 12–28–62, 4–4–63, 5–30–63, 8–20–63, 9–6–63, 10–26–63.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (11–1–62). F.R. 2–1–63, 2–6–63, 3–13–63, 4–4–63, 5–30–63, 8–20–63, 9–6–63, 10–2–63, 10–26–63.
258	Rules and Regulations for Uninspected Vessels (9–1–61). F.R. 1–20–62, 4–24–62, 5–2–62, 9–11–62, 5–14–63, 9–6–63.
259	Electrical Engineering Regulations (12–1–60). F.R. 9–23–61, 9–30–61, 5–2–62, 9–11–62, 8–20–63, 9–6–63.
266	Rules and Regulations for Bulk Grain Cargoes (5–1–62). F.R. 9–11–62, 12–24–63.
268	Rules and Regulations for Manning of Vessels (2–1–63).
269	Rules and Regulations for Nautical Schools (5–1–63). F.R. 10–2–63.
270	Rules and Regulations for Marine Engineering Installations Contracted for Prior to July 1, 1935 (11–19–52). F.R. 12–5–53, 12–28–55, 6–20–59, 3–17–60.
293	Miscellaneous Electrical Equipment List (6–1–62).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (10–1–59). F.R. 10–25–60, 11–3–61, 4–10–62, 4–24–63.
323	Rules and Regulations for Small Passenger Vessels (Not More Than 65 Feet in Length) (6–1–61). F.R. 9–11–62, 10–5–62, 12–28–62, 1–22–63, 9–6–63.
329	Fire Fighting Manual for Tank Vessels (4–1–58).

Official changes in rules and regulations are published in the Federal Register, which is printed daily except Sunday, Monday, and days following holidays. The Federal Register is a sales publication and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402. It is furnished by mail to subscribers for $1.50 per month or $15 per year, payable in advance. Individual copies desired may be purchased as long as they are available. The charge for individual copies of the Federal Register varies in proportion to the size of the issue and will be 15 cents unless otherwise noted in the table of changes below. Regulations for Dangerous Cargoes, 46 CFR 146 and 147 (Subchapter N), dated January 1, 1964, are now available from the Superintendent of Documents, price: $2.50.

CHANGES PUBLISHED DURING FEBRUARY 1964

The following have been modified by Federal Registers:
CG–190, Federal Register, February 5 and 11, 1964.

U.S. GOVERNMENT PRINTING OFFICE:1964


THE INLAND WATERWAYS OF THE UNITED STATES
NAVIGABLE LENGTHS AND DEPTHS OF UNITED STATES INLAND WATERWAY ROUTES
COMMERCIALLY NAVIGABLE INLAND WATERWAYS OF THE UNITED STATES
CONTROLLING DEPTHS
9 FEET OR MORE
UNDER 9 FEET
PROPOSED EXTENSIONS
ATLANTIC INTRACOASTAL WATERWAY
GULF INTRACOASTAL WATERWAY
ATLANTIC OCEAN
PACIFIC OCEAN
GULF OF MEXICO
ALASKA
PRINCIPAL HAWAIIAN ISLANDS
WASHINGTON
NEVADA
ARIZONA
NEW MEXICO
KANSAS
NEBRASKA
IOWA
MINNESOTA
MISSOURI
ARKANSAS
INDIANA
OHIO
PENNSYLVANIA
KENTUCKY
VIRGINIA
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
SAN FRANCISCO
SACRAMENTO
LOS ANGELES
CHICAGO
PHILADELPHIA
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HOUSTON
NEW ORLEANS