PROCEEDINGS OF THE
MERCHANT MARINE COUNCIL
UNITED STATES COAST GUARD

The printing of this publication has been approved by the Director of the Bureau of the Budget, March 11, 1952.

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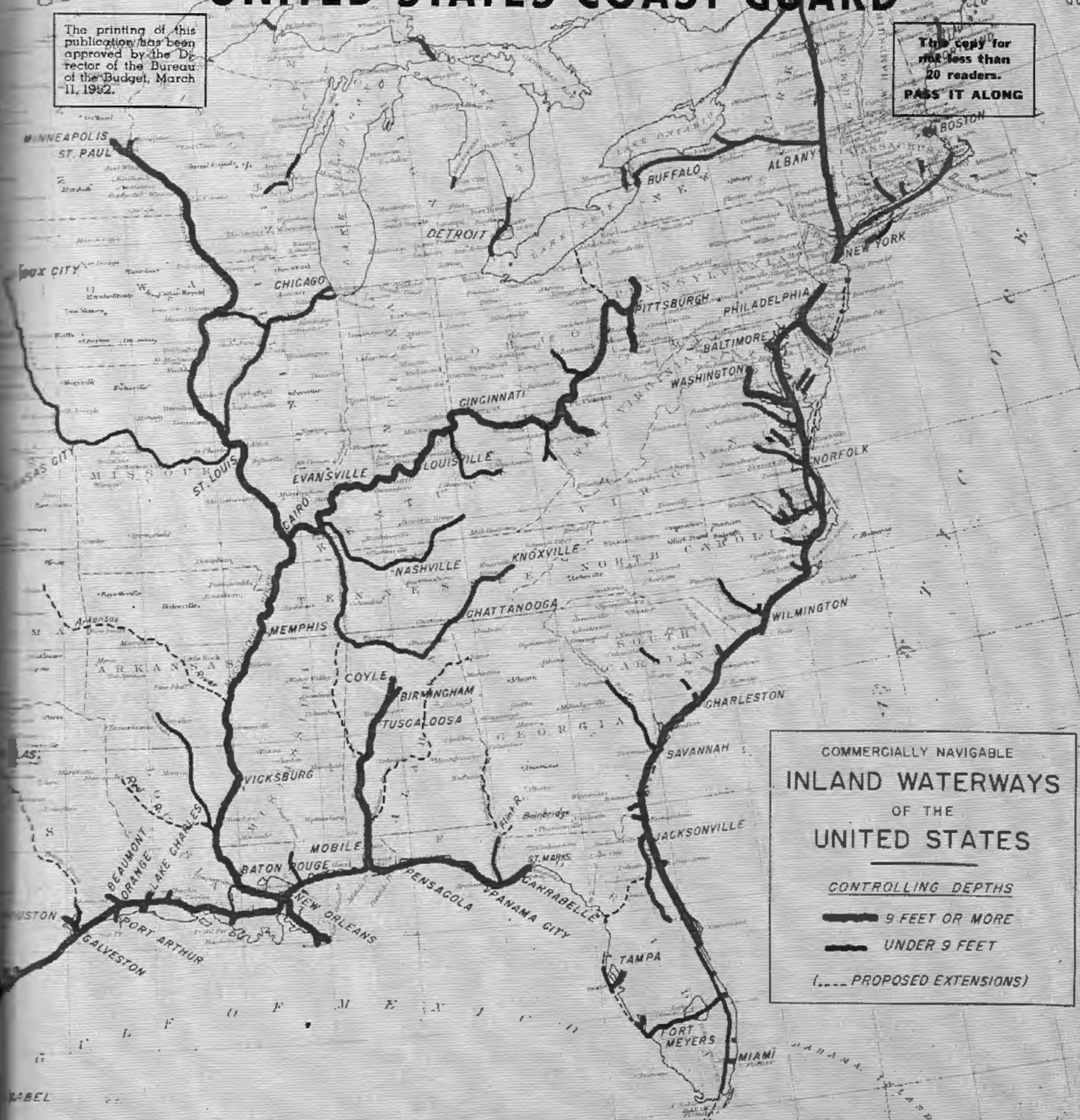

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Proceedings of the

MERCHANT MARINE COUNCIL

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COVER PICTURE: The cover picture was kindly supplied by the American Waterways Operators, Inc. It shows the commercially navigable inland waterways of the United States and the proposed extensions thereto as compiled from data furnished by the Corps of Engineers, Department of the Army, in 1952. For a summation of developments and trends in the design and construction of inland waterway equipment, turn to page 150.

A WORD OF CAUTION

It has been noted that most of the textbooks and publications dealing with the *Rules of the Road* which are in use today are either obsolete or will be obsolete on January 1, 1954. Further use of these textbooks and publications is highly dangerous. It is accordingly recommended that all textbooks and publications on this subject be carefully examined to determine whether or not they incorporate the up-to-date rules to prevent collisions. Failure to follow the current rules while navigating within the United States or upon the high seas may easily lead to a preventable collision.

The rules to prevent collisions which are in effect at a given time are published by the U. S. Coast Guard in three separate pamphlets, each of which is revised periodically. The pamphlets currently in effect are:

CG 169, Rules to Prevent Collisions of Vessels and Pilot Rules for Certain Inland Waters of the Atlantic and Pacific Coasts and of the Coast of the Gulf of Mexico, dated August 1, 1950.

CG 172, Pilot Rules for the Great Lakes and Their Connecting and Tributary Waters and the St. Marys River, dated May 1, 1952.

CG 184, Pilot Rules for the Western Rivers and the Red River of the North, dated August 1, 1949.

Of these, CG 169, dated August 1, 1950, is presently being revised to incorporate miscellaneous amendments to the Inland Rules and the revised International Rules effective January 1, 1954. Copies of this revised edition will be available at local Coast Guard Marine Inspection Offices approximately December 1, 1953. When requesting this edition refer to CG 169, dated September 1, 1953.

Pamphlets of a previous date are obsolete. Also obsolete is a previous Coast Guard publication entitled *Comparative Rules of the Road and How to Obey Them.*

For self protection, textbooks and publications dealing with the *Rules of the Road* which are currently in use should be checked against CG 169, dated September 1, 1953; CG 172, dated May 1, 1952; and CG 184, dated August 1, 1949. Those that do not contain the up-to-date rules to prevent collisions are a hazard to safe navigation and should be discarded immediately.

DETERMINATIONS REGARDING SAFETY CERTIFICATES

DENUNCIATION OF 1929 CONVENTION

On November 19, 1952, the United States denounced the International Convention for the Safety of Life at Sea, 1929. By the terms of Article 66 of that Convention, this denunciation becomes effective on November 19, 1953.

Ed. note: Countries whose denunciation of the 1929 Convention will be effective November 19, 1953 are: Belgium, Canada, Denmark, France, Iceland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Union of South Africa, Sweden, United Kingdom, United States of America and Yugoslavia.

On and after November 19, 1953, a passenger vessel (i. e., a vessel carrying more than 12 passengers) of a nation which has acceded to the International Convention for Safety of Life at Sea, 1948, by November 19, 1952, is required to be in possession of a valid safety certificate issued according to the provisions of Regulation 11 (a) (i), Chapter I of the 1948 Convention. Such a vessel will be entitled to claim the benefits of the 1948 Convention and acceptance of its 1948 Convention safety certificate, when carrying passengers from a port in the United States.

On and after November 19, 1953, a passenger vessel belonging to a country which is a party to the 1929 Convention, and which has acceded to the International Convention for the Safety of Life at Sea, 1948, subsequent to November 19, 1952, will be entitled to claim recognition of its 1929 Convention safety certificate under Regulation 11 (b) of Chapter I of the 1948 Convention, only from the date on which its country's ratification or acceptance of the 1948 Convention becomes effective.

Between the date of November 19, 1953, and the effective date of its country's ratification or acceptance of the 1948 Convention, a passenger vessel of a country which is a party to the 1929 Convention, and which has ratified or acceded to the 1948 Convention subsequent to November 19, 1953, will not be entitled to claim recognition of its safety certificate issued under the 1929 Convention.

A passenger vessel of a country which has ratified or acceded to the 1929 Convention but has not ratified or acceded to the 1948 Convention will not be entitled to claim benefits of the 1929 Convention and acceptance of its 1929 Convention safety certificate on and after November 19, 1953.

On and after November 19, 1953, a passenger vessel carrying passengers from any port of the United States which belongs to a country which has not ratified or acceded to the 1948 Convention, and which is not entitled to recognition of 1929 Convention certificates in accordance with Regulation 11 (b) of Chapter I of the 1948 Convention, shall be subject to the provisions of section 4400 of the Revised Statutes, as amended (46 U. S. C. 362), and shall be inspected and certificated by the Officer in Charge, Marine Inspection, United States Coast Guard, in whose zone such vessel may be located before such vessel will be permitted to carry passengers from a port of the United States.

ACCEPTANCE OF SAFETY CERTIFICATES ISSUED UNDER THE 1948 CONVENTION

Under the 1948 Convention, provision is made for the issuance of safety certificates to passenger vessels of countries signatory or acceding to this Convention. These safety certificates, however, can be issued only to vessels which are in full compliance with the provisions of the 1948 Convention, and the regulations of that Convention. The Commandant has therefore ruled:

A foreign passenger vessel carrying an unexpired safety certificate issued under the authority of the International Convention for the Safety of Life at Sea, 1948, shall be subject to no other inspection under the 1948 convention by the U. S. Coast Guard than necessary to satisfy the marine inspectors that the condition of the vessel, her boilers, lifesaving equipment, fire-fighting equipment, etc., is as stated in her current safety certificate.

The List of Countries which have accepted the International Convention for the Safety of Life at Sea, 1948, and of Territories to which the Convention has been extended, as of this date, is as follows:

ACCEPTANCES DEPOSITED

Country	Date of Deposit	Effective Date
United Kingdom	30th Sept., 1949	19th Nov., 1952
New Zealand	29th Dec., 1949	19th Nov., 1952
United States of America	5th Jan., 1950	19th Nov., 1952
France	8th Feb., 1950	19th Nov., 1952
Netherlands	18th Apr., 1950	19th Nov., 1952
Sweden	16th May, 1950	19th Nov., 1952
Norway	12th June, 1950	19th Nov., 1952
Union of South Africa	18th Aug., 1950	19th Nov., 1952
Iceland	19th Oct., 1950	19th Nov., 1952
Portugal	30th Nov., 1950	19th Nov., 1952
Canada	1st Feb., 1951	19th Nov., 1952
Pakistan	1st Feb., 1951	19th Nov., 1952
Denmark	15th Oct., 1951	19th Nov., 1952
Yugoslavia	13th Nov., 1951	19th Nov., 1952
Italy	19th Nov., 1951	19th Nov., 1952
Belgium	5th Dec., 1951	19th Nov., 1952
Israel	2d July, 1952	19th Nov., 1952
Japan	23d July, 1952	19th Nov., 1952
Philippines	2d Oct., 1952	19th Nov., 1952
India	19th Nov., 1952	19th Nov., 1952
Spain	26th Dec., 1952	26th Mar., 1953
Liberia	13th Jan., 1953	13th Apr., 1953
Chile	5th June, 1953	5th Sept., 1953

EXTENSIONS NOTIFIED

Territory	Effective Date
Alaska, Hawaii and Puerto Rico	19th Nov., 1952
Spanish Protectorate of Morocco and the Spanish Colonies	26th Mar., 1953
Hong Kong	7th Apr., 1953
Somaliland	6th July, 1953

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Side Lights on the Rules

This is the third article in this series. The first article discussed in general terms the four sets of rules to prevent collisions governing navigation in the inland waters of the United States and on the high seas. Running lights prescribed by Rule 2, revised International Rules, were discussed and compared in close detail to those required by the local rules in the second article. We shall now go on to a discussion of lights to be shown by a vessel towing.

Such lights are prescribed in Rule 3 of the revised International Regulations for Preventing Collisions at Sea (i. e., International Rules), which have been proclaimed effective January 1, 1954. Rule 3 (a) states:

(a) A power-driven vessel when towing or pushing another vessel or seaplane shall, in addition to her sidelights, carry two bright white lights in a vertical line one over the other, not less than 6 feet apart, and when towing more than one vessel shall carry an additional bright white light 6 feet above or below such lights, if the length of the tow, measuring from the stern of the towing vessel to the stern of the last vessel or seaplane towed, exceeds 600 feet. Each of these lights shall be of the same construction and character and one of them shall be carried in the same position as the white light mentioned in Rule 2 (a) (i),[1] except the additional light, which shall be carried at a height of not less than 14 feet above the hull. In a vessel with a single mast, such lights may be carried on the mast.

In short, the only time a power-driven vessel towing or pushing another vessel or seaplane on the high seas carries three 20 point white lights in a vertical line is when there are two or more vessels or seaplanes in an astern tow and the length of the tow measured from the stern of the towing vessel to the stern of the last vessel or seaplane towed exceeds 600 feet. At other times, the towing vessel displays two 20 point white lights in a vertical line, whether the tow is alongside, astern, or is being pushed ahead.

The rules applicable to Inland Waters provide for four distinct types of towing operations: towing alongside, towing by pushing ahead, towing astern, and the towing of submerged or partly submerged objects on a hawser when no signals can be displayed upon the object which is towed.

[1] See page 69 of the April-May-June, 1953 Proceedings or page 131 of the October 1953 Proceedings.

Towing lights for the first three towing operations are prescribed in Article 3, Inland Rules.

A vessel towing *one* or *more* vessels alongside or by pushing them ahead must carry, in addition to regular red and green side lights, either two 20 point white lights forward or two 32 point white lights aft, in a vertical line not less than 3 feet apart.

A vessel towing *one* or *more* vessels astern must carry, in addition to regular red and green side lights, either three 20 point white lights forward or three 32 point white lights aft, in a vertical line not less than 3 feet apart. The length of the astern tow is immaterial.

Whether the white lights are similar to the masthead light, which is required to be visible at a distance of 5 miles, or the all around after range light, which has no minimum visibility specified, is left to the option of the towing vessel. There are no equivalent height requirements in Art. 3 to those in Rule 3 (a), International Rules.

Special provisions are made in Section 80.18 of the Pilot Rules for Inland Waters for a vessel towing a submerged or partly submerged object astern on a hawser on which no signals can be displayed. Such a vessel must display, in addition to regular side lights, four lights in a vertical line, 3–6 feet apart, the upper and lower of which are white, and the middle two red. All four of these lights must be of the same character as the regular towing lights, that is either 20 point lights or 32 point lights.

IT IS SUGGESTED THE READER REFER TO CG–169, "RULES TO PREVENT COLLISIONS OF VESSELS AND PILOT RULES FOR CERTAIN INLAND WATERS OF THE ATLANTIC AND PACIFIC COASTS AND OF THE COAST OF THE GULF OF MEXICO"; CG–172, "PILOT RULES FOR THE GREAT LAKES AND THEIR CONNECTING AND TRIBUTARY WATERS AND THE ST. MARYS RIVER"; AND CG–184, "PILOT RULES FOR THE WESTERN RIVERS AND THE RED RIVER OF THE NORTH"; WHICH CONTAIN THE LOCAL RULES TO PREVENT COLLISIONS BETWEEN VESSELS ON THE LOCAL WATERS OF THE UNITED STATES. REFERENCES TO RULES AND ARTICLES THROUGHOUT THIS SERIES MAY BE FOUND THEREIN WITH THE EXCEPTION OF THE REVISED INTERNATIONAL RULES OF THE ROAD WHICH WILL BE QUOTED HEREIN.

These rules do not provide for the towing or pushing of seaplanes as such.

The rules applicable to the Western Rivers, like the rules applicable to Inland Waters, provide for four distinct types of towing operations: towing alongside, towing astern, towing by pushing ahead, and the towing of submerged or partly submerged objects on a hawser when no signals can be displayed upon the object which is towed.

Towing lights for the first three towing operations are prescribed by Rules 3 and 4, Western Rivers Rules.

A vessel towing *one* or *more* vessels alongside or by pushing them ahead must carry, in addition to regular red and green side lights, at or near the stern, where they can best be seen, two 16 points red lights in a vertical line, one over the other, not less than 3 feet apart, of such a character as to be visible from aft for a distance of at least two miles, so screened as not to be visible forward of the beam.

A vessel towing *one* or *more* vessels astern must carry, in addition to regular red and green side lights, in the forward half of the vessel, at a height greater than the side lights, two 20 point white lights in a vertical line, at least 3 feet apart, visible from ahead at a distance of at least 3 miles. The length of the tow astern is immaterial.

There are no equivalent height requirements in Rules 3 and 4 to those in Rule 3 (a), International Rules.

Special provisions are made in Section 201.2 of the Corps of Engineers Rules and Regulations, which supplement the Pilot Rules for the Western Rivers, for a vessel towing a submerged or partly submerged object astern on a hawser on which no signals can be displayed. These provisions are identical to those prescribed by Section 80.18 of the Pilot Rules for Inland Waters.

As in the case of the Inland Rules, the Western Rivers Rules do not provide for the towing or pushing of seaplanes as such.

The Rules applicable to the Great Lakes provide for three distinct types of towing operations: towing rafts, towing other than rafts, and the towing of submerged or partly submerged objects on a hawser when no signals can be displayed upon the object which is towed.

Towing lights for the first two towing operations are prescribed by Rules 4 and 5, Great Lakes Rules, except in the case of harbor tugs under 100 net tons register.

A vessel having a tow *other than a raft* must carry, in addition to the regular side lights, a 20 point masthead light and, 6 feet above or below it, a second 20 point white light. Both lights must be visible at a distance of at least 5 miles and, the lower of the two must be higher above the water than the side lights.

A vessel *with a raft in tow* must carry, in addition to the regular side lights, two all around white lights, visible at a distance of at least 5 miles, in a horizontal line athwartship, at least 8 feet apart. These two lights must be 20–40 feet above the hull and in the forepart of the vessel.

If the towing vessel is a tug under 100 net tons register, whose principal business is harbor towing, there is a slight variation in prescribed lights. Section 90.16 of the Pilot Rules for the Great Lakes prescribes towing lights for such vessels. They must carry the same lights as vessels engaged in regular towing operations on the Great Lakes with these exceptions:

(1) The visibility of the lights must be but three miles.
(2) The vertical separation of the lights must be but 3 feet.
(3) The horizontal separation of the lights must be but 4 feet.

As in the case of the Inland Rules and the Western Rivers Rules, special provisions are made by Section 201.2 of the Corps of Engineers Rules and Regulations, which supplement the Pilot Rules for the Great Lakes, for a vessel towing a submerged or partly submerged object on a hawser when no signals can be displayed upon the object which is towed. These provisions are identical to those prescribed in Section 80.18, Pilot Rules for Inland Waters.

These Rules, like the Inland Rules and the Western Rivers Rules, do not provide for the towing or pushing of seaplanes as such.

Continuing with Rule 3, International Rules, we find Rule 3 (b) states:

> (b) The towing vessel shall also show either the stern light specified in Rule 10 or in lieu of that light a small white light abaft the funnel or aftermast for the tow to steer by, but such light shall not be visible forward of the beam. The carriage of the white light specified in Rule 2 (a) (ii) [1] is optional.

Article 3, Inland Rules, allows an identical steering light, but that light is not mandatory. No mention is made in Article 3 of stern lights to be carried by towing vessels. However, Article 10 requires every vessel which is being overtaken by another, except a steam vessel with an after range light showing all around the horizon, to show from her stern to such last mentioned vessel a white light or a flare-up light. This light may, but need not, be fixed. These Rules are also silent as to towing vessels showing an after range light or masthead light in addition to the towing lights.

Rules 3 and 4, Western Rivers Rules, are silent as to steering lights. They are also silent as to whether a towing vessel may carry either a range light or a stern light in addition to the towing lights. Rule 10, Western Rivers Rules, however, requires an overtaken vessel, except one which has one or more lights visible from aft, to show a white light or a flare-up light from her stern. This light may be a fixed 12 point white light visible at a distance of two miles.

Rules 4 and 5, Great Lakes Rules, require an identical steering light on vessels having a tow. However, the Great Lakes Rules are silent as to towing vessels showing a range light or a stern light in addition to towing lights.

The remainder of Rule 3, International Rules, deals with lights to be shown by a seaplane on the water when towing one or more vessels or seaplanes. Rule 3 (c) states:

> (c) A seaplane on the water, when towing one or more seaplanes or vessels, shall carry the lights prescribed in Rule 2 (b) (i), (ii) and (iii);[1] and, in addition, she shall carry a second white light of the same construction and character as the white light mentioned in Rule 2 (b) (i),[1] and in a vertical line at least 6 feet above or below such light.

There are no equivalent provisions in the rules applicable to the Inland Waters, Western Rivers, or the Great Lakes, as seaplanes are not specifically provided for in these rules. In the United States, seaplanes on the water are governed primarily by Civil Air Regulations.

This would appear to end the present discussion of Rule 3, revised International Rules. There are, however, two additional factors to be considered: (1) As explained in the second article in this series, Naval and Coast Guard vessels of *special construction* are allowed to vary the number, position, range, or arc of visibility of the lights prescribed by the Rules, *provided they maintain the closest possible compliance with the Rules.* While this will not lead to their carrying lights dissimilar from the prescribed towing lights, some variation in their separation or position may be expected. (2) On occasion a vessel towing a submerged or partly submerged object *at sea* will fall within the meaning of Rule 4 (c), revised International Rules, which prescribes special lights for a vessel engaged in underwater operations that is unable to get out of the way of approaching vessels due to the nature of her work.

Rule 4, revised International Rules, will be discussed in its entirety in the next issue. Differences in the requirements of the four sets of rules will become even more pronounced then.

SOME PRECAUTIONS FOR SEAMEN

Never smoke on deck, on barges, or on the pier when fuel oil is being loaded or discharged.

Never smoke in the vicinity of open hatches or in cargo holds.

While cargo lighters are alongside, do not throw lighted matches, cigarettes, etc., over the side or out of portholes.

Never go up and down ladders with both hands full.

Never work in the hot sun without protecting the head.

Never walk on the side of the vessel on which cargo is being worked.

Never walk under heel blocks of winches.

Never walk through unlighted 'tween deck spaces.

Never walk on the weather side of decks in a heavy sea.

Never walk on wet or oily decks with rubber soles or heels.

Never stand in the bight of an anchor cable or line.

Never work aloft without a safety belt and line.

Never use goggles to protect your forehead instead of your eyes.

Never attempt to pass through a watertight doorway while the alarm is sounding or the door is in motion.

Never enter a tank or other closed compartment until sure that the tank or compartment is thoroughly ventilated and that an oxygen deficiency does not exist. Be sure that someone is standing by to effect rescue in case of necessity.

It isn't always easy to be patient with a man who asks a lot of questions, particularly if some of them seem unnecessary, or if you have already answered his same questions a number of times. It's all new to him, and he is paying you the compliment of admitting that you have more experience than he has by asking the questions, so give him a break. Some good shipmates may be born, but good seamanship is usually acquired by experience and knowledge obtained from others.

Courtesy Safety Log

ON THE INLAND WATERWAYS

This article was made possible through the courtesy of the American Waterways Operators, Inc., a non-profit trade association of domestic carriers and operators on the inland rivers, intracoastal canals and waterways, bays, sounds and harbors of the continental United States. Upon the indication of a desire to present an authoritative summation of improvements and trends in the design and construction of inland waterway floating equipment in the "Proceedings", it kindly supplied factual literature to be abstracted and arranged in article form. Familiarity with the nature of the vessels a mariner may encounter while navigating is of unquestionable value. Of equal importance, is the recognition safety, progress, and efficiency can march hand in hand, to the economical benefit of the operator. The inland waterway operators appear to have recognized this fact.

Through carefully conducted research and experimentation there have occurred many significant developments in the modernization and improvement of the design and efficiency of inland waterway floating equipment.

Improvements in hull design have brought about increased speed of towboats with a given amount of power and have appreciably facilitated the towing and handling of barges. Significant among them is the gradual evolution away from the scow bow to the modeled bow, the efficiency of which has been proven by extensive tank tests. The use of modeled bows in towboat hulls noticeably improves free running speed and steering, an important factor that reduces the time lost in making up tows of barges. Furthermore, the modeled bow is better able to resist stress when running free and its shape, toward a point instead of flat or square, tends to cast ice and drift to the sides of the boat clear of the propellers so as to minimize propeller damage.

More effective use of higher-powered engines in shallow draft channels, with a consequent increase in speed and power of towboats, has been gained by the use of screw propellers working in tunnels in the stern, a method which has largely displaced the older and less efficient stern-wheel type of propulsion. The tunnel stern, by partially enclosing the screw, results in a more constant flow of unbroken water to the wheel and eliminates much of the loss of power that occurs when a smaller diameter open screw is used on an inland waterway towboat. It also affords protection to the screw and rudders in shallow water.

The use of the tunnel stern method has permitted the installation of rudder arrangements, which furnish backing and flanking performance equivalent to or exceeding that obtained from a stern-wheel towboat while retaining and improving the steering advantages of a screw-propelled boat in forward motion. The greater maneuverability thus available is of considerable benefit in the movement of large tows of barges, particularly in flanking them around bends in waterway channels.

An important supplementary mechanical development in connection with the propulsion of propeller-type towboats is a ring-like housing completely encircling the propeller and controlling the flow of water to, through, and away from it. It is said that the use of this device has increased the propulsive efficiency of screw-propelled towboats from 25 to as much as 35 percent depending on the towing speeds. As a result vessels so equipped are performing work which had previously required much greater engine power; the size and pay load of tows have been increased without the necessity of installing additional engine capacity on the propelling unit; and owners and operators have benefited from being able to displace larger and less efficient vessels, with smaller, less costly vessels and engines. Also the protection provided by the device has lengthened propeller life in operations where frequent groundings and severe drift conditions are encountered thereby reducing the time lost in docking vessels for propeller repairs.

The Diesel engine is perhaps the factor which has most influenced the modern trend in towboat design. This engine, a more compact unit requiring less space than a steam engine of equal power, can be operated by fewer personnel and generally at lower fuel cost. Consequently, Dieselized towboats can be built to smaller over-all dimensions than a steam towboat of identical power and do not require as large a crew.

The compactness of the Diesel engine as a propulsion unit is strikingly demonstrated in the case of a modern towboat built in 1948 for operation on the Mississippi River System. This triple-screw vessel, having hull dimensions of only 118 feet in length, 38 feet in width, and 11 feet in depth, is equipped with three Diesel engines of 1,800 horsepower each or a total of 5,400 horsepower. Despite the small size of the boat, the amount of space available for the engine room and crew quarters is surprising. It is furnished with all modern conveniences and up-to-date navigation appurtenances. The short length of the boat also facilitates the handling of tows of barges through locks enabling the avoidance of double lockages required with respect to tows moved by larger towboats. In contrast to this 5,400-horsepower installation, one of the smallest applications of Diesel power on river towboats is a 60-horsepower engine on a vessel with a length of 77 feet, a beam of 16.5 feet, and a hull depth of 2.8 feet.

Typical of Diesel-powered tugs (as distinguished from Mississippi River System towboats) recently built for operation on the waterways and in the harbors of the Atlantic and Gulf coasts is a single-screw vessel with a length of 102 feet, a beam of 24 feet, a hull depth of 12 feet, 4 inches, and

Inland waterway transportation, as it is generally known, is the transportation of freight and passengers on the inland waterways (exclusive of the Great Lakes) of the United States which consist of rivers, canals, bays, sounds, harbors, and intracoastal waterways.

While some freight is transported on inland waterways by self-propelled vessels, the predominant method is by non-self-propelled vessels, commonly referred to as barges, which are moved or towed by self-propelled units, i. e., tugs or towboats. The way in which the towing is done varies according to the physical characteristics and the navigating conditions of the waterway used. For example, on the Mississippi River and tributaries, the barges are tied together by means of steel cables or ropes and ratchets so as to form a single rigid unit and pushed ahead of the towboat. On such waterways as the Atlantic Intracoastal Waterway and the bays, sounds, and harbors, the barges are pulled behind the tug on a tow line or hawser. Both methods are used on the Gulf Intracoastal Waterway.

Passenger traffic on inland waterways usually moves on self-propelled vessels. The predominant types of operations are scheduled passenger vessels between specified ports and in regular service, excursion and tourist vessels, and ferries.

a normal draft of 10.5 feet. Propelled by a 1,000-horsepower Diesel engine, it has accommodations for a crew of ten and is equipped with ship-to-shore radio telephone and a radio direction finder. When running light, the tug's speed averages about 10.5 knots per hour.

The careful attention to detail, convenience, and efficiency in the construction of floating equipment is illustrated by the following requirements that have been incorporated in the pilothouses of some of the newest inland waterway towboats: (1) unobstructed vision so the pilot is enabled to see all sections of the boat; (2) ship-to-shore radio telephone; (3) radar; (4) telephone connection to the engine room; (5) front windows hinged and sloping inward to eliminate the glare from the sun and reflections from shore lights; (6) properly placed rudder control levers to indicate at all times the position of the rudders; (7) electrically controlled searchlights so placed as to prevent the blinding of the pilot; and (8) a teletalk system to several locations on the boat and to the head of the tow.

Navigation delays caused by fog and other adverse weather conditions are being reduced constantly by the increasing use of radar on inland waterway vessels. The radar equipment aboard a modern towboat generally consists of an antenna on the pilothouse roof with the transmission-receiving unit built into the base inside the pilothouse; a compact console in the pilothouse; and a small motor-generator set for conversion of direct into alteranting current. The antenna continuously scans the area through which the boat is proceeding and the scope picture of such area is shown in the console on a cathode ray tube similar to those used in television. Objects above the surface of the water such as vessels, navigation aids, bridges, and banklines are indicated by a bright fluorescent pattern in the same form as they would be on a regular navigation map while the water surfaces are black. Vessels are distinguished from fixed objects by their rate of travel in relation to the center spot of the scope picture which marks the location of the vessel on which the radar is installed.

Radar has made possible operating economies, navigation efficiency, and safety advantages never before thought to be feasible. As much as 12 hours running time has been saved on a round trip of a tow on the Mississippi River between St. Louis, Missouri, and Baton Rouge, Louisiana. Radar has also been found beneficial in certain instances for the making of radar navigation charts of confined inland waterways to insure the continuous and safe movement of traffic. Considerable use is made on inland waterway towboats and tugs of the ship-to-ship and ship-to-shore radio telephone communications systems thus greatly facilitating the location and dispatching of vessels and cargoes and speeding up their movement.

NAVIGABLE LENGTHS AND EXISTING PROJECT DEPTHS[a] OF UNITED STATES INLAND WATERWAY GROUPS
(Great Lakes excluded)

Group	Length in Miles of Waterways				
	Under 9 ft.	9 ft. and under 12 ft.	12 ft. and over	Open waters	Total
Atlantic Coast Rivers	3, 490	539	1, 805	-----	5, 834
Mississippi River System	7, 301	4, 612	249	-----	12, 162
Gulf Coast Rivers	3, 351	634	24	-----	4, 009
Pacific Coast Rivers	1, 098	95	248	-----	1, 441
Intracoastal Waterways:	665	74	1, 944	570	3, 253
Gulf Intracoastal	-----	-----	1, 116	-----	1, 116
Plaquemine-Morgan City	-----	56	-----	-----	56
Florida West Coast	103	-----	-----	-----	103
Atlantic Intracoastal	562	18	828	570	1, 978
All other	799	-----	-----	-----	799
Grand total	16, 704	5, 954	4, 270	570	27, 498

[a] Project depths are depths provided in projects approved by Acts of Congress and executed by the Corps of Engineers. Such depths are not controlling depths in all instances.

A new electronic device being tested on inland waterway vessels is the supersonic depth recorder. This instrument utilizes the echo-sounding principle. Streams of high-frequency signals are beamed down into the water from a sound head mounted on the bottom of the boat or on the lead barge. As in the case of radar, the signals reflect back when they hit solid objects, and are then picked up, magnified electronically, and translated into terms of depth, density, and size on a graph in the pilothouse convenient for the pilot's observation. Thus, the pilot is quickly apprised of the depth of water and certain characteristics of the underwater scene ahead of the tow, including obstructions. It is said that the depth recorder will simplify navigation problems for pilots and also lower operating costs by reducing running time and preventing delays and damage from groundings.

The use of electric arc welding, instead of riveted steel construction, has not only provided greater resistance to impact fatigue and corrosion, but has enabled the building of stronger, yet lighter, hulls of increased capacity requiring less propulsive power for their movement than do the older type. Devices for lowering the pilot house and collapsing the stacks of towboats, so that passage under bridges can be effected without reducing speed, have improved the efficiency of inland waterway transportation service in congested areas.

The non-self-propelled equipment of the inland waterway carriers and operators has come in for its share of modernization. Practically all of it now in use on inland waterways is of all-steel construction. Improvements to barges are frequently being made to increase their efficiency, provide better service to the shipping public, afford greater safety of operation, and reduce the possibility of loss or damage to the cargoes carried.

Included among such improvements are the use of welded steel hulls; rounded corners to reduce the damage caused by barges to other units of a tow or fleet; rake ends shaped to secure the greatest tonnage carrying capacity consistent with economical towing cost; serrated framing to increase structural strength; rounded gunwales to eliminate rough edges and reduce damage to tow lines; flanged headlogs strong enough to resist all normal service bumps and keep damage to a minimum in the event of extreme impact from accidents; scientifically designed skegs to insure a barge maintaining its course when being towed astern; steel rolling hatch covers to protect cargo from the elements and allow maximum clearance for loading and unloading; and specially designed hopper-type hulls to enable the handling of bulk cargo by buckets and clam shells efficiently, with the minimum of damage to the barges. All of these features reduce repair and maintenance costs and contribute to the economy of inland waterway transportation.

The efficiency of the new type of barges is illustrated in the case of a tank barge built recently, with a length of 210 feet, a width of 50 feet, a hull depth of 10.5 feet, and a capacity of 15,000 barrels of petroleum products. On six trips fully loaded, this new streamlined barge averaged 8 miles per hour as versus an average of 6 miles per hour for an older conventional type barge of 9,000 barrels capacity, over the same route and distance and using the same tug. Without considering the increased speed of the new barge it is apparent that it could handle, on the six trips, a total of 90,000 barrels as compared with only 54,000 for the 9,000-barrel barge, a gain of 36,000 barrels for the same amount of line-haul service. The lower water resistance provided by the new streamlined barges cuts towing costs and makes possible greater efficiency than would result from transportation with older and slower types.

A recent interesting development for improving barge transportation is the articulated tow or vessel composed of integrated units which has proven its adaptability for the movement of automobiles, petroleum products, and other commodities. In connection with this method the barges are fitted together so that units of two or more will have the same streamline effect as one large barge, thereby reducing the power necessary to tow the barges at a given speed, or conversely, increasing the speed obtainable through the application of a given horsepower. It is said that the new articulated tows can reduce the transportation costs as much as 25 percent depending upon the type of traffic involved.

One of the first applications of high speed articulated tows for the transportation of dry bulk cargo on inland waterways occurred in 1949, with the building of six large-sized covered cargo barges in integrated units of two barges each, for operation between points on the Gulf Intracoastal Waterway and the Mississippi River System in the movement of sulphur, salt, and chemicals. Special provisions have been made for the carriage of automobiles on return trips downstream.

These barges are of welded steel construction throughout, 240 feet long, 50 feet wide, and 11 feet, 8 inches deep, and have specially designed weather-tight rolling hatch covers to facilitate loading and unloading. Each barge has a sweeping 50-foot long bow rake with toed-in corners and a square stern, and can transport approximately 2,500 net tons of dry cargo, or more than twice as much as can be carried in a standard Ohio River hopper barge, the type most generally used for such service. While being pushed by a fast towboat in tandem, the square ends of two barges are butted to form, in effect, a single streamlined barge 480 feet long of 5,000 net tons total capacity. Their design permits minimum towing resistance as well as increased towing speeds. Two of the barges, fully loaded and in tandem, can be towed at between 10 and 11 miles per hour in contrast to normal river towing speeds of 3 to 5 miles per hour for older type barges.

There have been installed in the wings and bottom of each barge four transverse watertight bulkheads to minimize the danger of sinking in the event of a collision that punctures the hull. The hold contains one transverse bulkhead with two openings each large enough for the passage of automobiles and small trucks. Three of the six barges have been equipped with a new patented retractable rudder-like skeg on the centerline of the hull to prevent yawing and enable the barges to maintain their course when being towed astern on a hawser on the Gulf Intracoastal Waterway. The skeg is raised and lowered, by a hand-operated winch, through a slot in the bottom plating of the rake or bow end, which becomes the stern when two barges are butted together in an integrated unit.

For the loading of automobiles, a doorway has been provided in the forward bulwark of each of the six integrated barges. Automobiles can be driven from the dock over ramps to the forward rake deck of the barge and thence into the hold where there is space for four rows of 12 each. The hatch covers have been strengthened and steel channels have been welded to their tops for the wheels of automobiles so that four additional rows of 12 automobiles each can be transported thereon, consequently increasing the total load to 96 per barge.

Another significant effort to improve the service of inland waterway transportation is apparent in the recent construction of a semi-integrated tow of 15 tank barges for a large oil company now being used in the transportation of crude petroleum on the Mississippi and Ohio Rivers. These all-steel barges are 195 feet long, 35 feet wide, and 11 feet deep in the hull, their individual capacities being approximately 10,000 barrels. All piping has been installed in the hold so that, in addition to the upstream loads of crude petroleum, deck cargoes of new automobiles or other types of freight may be carried on downstream trips. There is deck space available on the 15-barge tow to accommodate 500 or more automobiles on each trip.

The 15-barge tow was designed for easier and faster towing than can be attained with the conventional and older types of river barges, and when loaded can be towed at speeds of from 6 to 12 miles per hour. In towing formation, the 15 barges will be three abreast and five deep, thus making what amounts to a single craft 975 feet long, 105 feet wide, and 11 feet deep, with an aggregate capacity of about 150,000 barrels or 22,000 tons. Including the towboat, the total length of the tow is more than 1,100 feet or longer than the 1,020-foot trans-Atlantic liner "Queen Mary." Both the forward and aft barges have a sloping rake on one end and are square or box-like on the other. The middle barges with square bows and sterns are integrated between the square ends of the forward and aft barges. The long rake on the bows of the forward barges slopes backward 36 feet from the extreme forward end in a gently rounded contour while the rake slope on the aft barges is 34 feet.

The shape of the rakes on the forward barges materially facilitate towing and obviates the tendency to dive or "run under" as is the case with some of the older type barges when they are heavily loaded and being pushed at a good rate of speed. In operation the semi-integrated 15-barge tow is said to have 20 percent less towing resistance than if standard barges are used. Hence, much of the benefit of full integration is available without sacrificing the flexibility of standard barges. The tow can be broken into smaller integrated units of two or three barges to meet the requirements for tows of various sizes. The design of the tow is conducive to low maintenance and repair costs.

Inland waterway transportation service will be further improved in the future.

NSA SAFETY PROGRAM

The latter part of August the National Shipping Authority released an analysis of accident reports submitted by general agents during the period January 1, 1953 to March 31, 1953. The following excerpts from that report could well be the basis of a Shipboard Safety Committee discussion.

DATA

No. of reports analyzed	35
No. of shipboard accidents reported	265
No. of lost-time accidents	71
Proportion of minor to lost-time injuries	4–1
No. and types of ships concerned in this report	102
Victory	78
Liberty	8
C1–M–AV1	8
Mariner	7
Other	1
	102
No. of calendar days	90
No. of man-hours exposure x 1 million	10
No. of lost-time injuries per million man-hours	7.1

Distribution of 265 accidents by departments:

Deck	44%
Engine	35%
Stewards	21%

Distribution of personnel on 102 ships:

Deck	43%
Engine	36%
Stewards	21%

Causes of the 265 accidents reported:

	No.	*%*
Slips and falls	46	17.36
Handling materials	37	13.96
Using hand tools	26	9.81
Heavy weather	35	13.21
Miscellaneous	74	27.92
Unknown	47	17.73
Total	265	99.99

SLIPS AND FALLS

The largest single block of accidents recorded during the first quarter of 1953, 17 percent, resulted in slips and falls:

(1) On decks, floor plates, and gratings due to oil or water spills, loose gear, and other temporary ob-

(Continued on page 158)

Your Fact Forum

Q. Describe the so-called suction effect on a vessel navigating in a narrow channel close to the bank.

A. A ship proceeding in a narrow channel close to the bank is exposed to two forces: bank suction and bank cushion.

On one hand, the water between the bow and the bank is built up to a higher level than that on the other bow. This is called bank cushion and tends to force the bow of the ship to sheer away from the bank.

On the other hand, due to the restricted space between the body of the ship and the bank, the water level along the ship is lowered, resulting in a suction toward the near bank. This suction force is, in turn, increased by propeller suction at the stern. The two suction forces are known as bank suction.

The resultant effect of the forces in play is to create a tendency for the ship to swing into a heading towards the opposite bank. This tendency is minimized by (1) proceeding slowly in a narrow channel, (2) preventing the ship from running unduly close to either bank.

Q. If while at sea the index mirror on the vessel's sextant were broken and no spares were available, how would you make temporary repairs?

A. A substitute index mirror can be made by cutting a piece of glass from a mirror and inserting it in the index mirror frame. Another method is to use a plain piece of glass silvered by tin foil and mercury.

Q. What is the responsibility of a watch officer who has a new man on watch with him if that man is making his first trip to sea?

A. The watch officer should:

a. See that the new man is taught the watch routine and the work he is expected to perform.

b. Watch the man closely until he has learned the ship's routine.

c. Conduct the indoctrination in the duties expected with a way of tolerance and helpfulness.

Q. What is meant by "fishing" a boom? When is it done?

A. A boom is fished when it is damaged or when a long slight boom is to be used to take a heavy weight on board. It is fished to guard against extensive stress. One or more timbers are placed around the boom and seized securely with good wire. The wire seizing is then hove taut and wedges are driven home to take up any remaining slack.

Q. How can you tell to what date a chart has been corrected?

A. Charts issued by the Hydrographic Office are corrected to the date of issue and stamped to that effect on the chart. Corrections beyond the issue date are made from notices to mariners by shipboard personnel, a record of which should be readily available.

Q. Explain why cargo booms are usually shaped with a slight increase in diameter in the middle.

A. Buckling stresses are greater in the middle portion of the boom.

Q. What is the danger in using a carbon dioxide extinguisher in a closed compartment?

A. CO_2 gas is heavier than air and will smother the unwary. Spaces flooded with CO_2 gas should not be entered except with an oxygen breathing apparatus.

Q. How should fire hose and canvas be cleaned?

A. Fire hose and canvass should be washed with mild soap and fresh water. If necessary, a soft or bristle brush may be used. Sand, holystone, or stiff wire brushes should never be used on fire hose or canvass.

Q. Which is more important, good fire-fighting equipment or good fire prevention?

A. Good fire prevention, of course.

Q. If your clothing were to catch on fire, what should you do?

A. Lie down and roll up lightly in a blanket, coat, or anything available nearby that will smother the flames. If nothing is available, lie down and roll over slowly, beating out the flames with the hands.

Q. Should gasoline be used for cleaning purposes?

A. No!

Q. What is the difference between a flashing light and an occulting light?

A. A flashing light is off for longer periods than it is on, while an occulting is on more than it is off.

Q. Where does the ship first receive the driving force, or thrust, from the propeller?

A. On the thrust block.

Q. In gas freeing a tanker in port, what is the danger of mounting the warning sign at the top of the ladder leading to the main deck?

A. Unless the warning sign is posted where it can be seen as the man approaches the ladder, there is always the possibility he will fail to note the warning intended.

THE TOP BRASS

Sudden death came to an electrician sent aloft to repair a light on a mast when part of the mast fell off, and the workman plummeted to the deck over 40 feet below. It was a very special type of light and mounted in a very special way. The light was an aircraft warning light installed on a piece of 2-inch steel pipe. This pipe, as a standard for the light, was arc welded to the top of a brass dome which served as the cap on the after-mast. The cap itself was a half round brass casting.

The electrician, a man with approximately 20 years' experience in shipboard work, ascended the after-mast in order to disassemble the light. Upon passing the height of the cap, he fastened his safety belt around the steel pipe standard and leaned back against the belt to start the disassembling job. Immediately, the weld between the brass dome and the steel pipe failed completely, and the electrician and steel pipe fell to the deck. The man died almost instantaneously of multiple internal injuries.

While no data is available as to the type of welding rod used in attempting to weld the steel pipe to the brass dome, it is certain that the proper type of rod was not used and that the surfaces to be joined were not adequately or properly prepared. Examination of the ruptured surfaces indicated (see figure 1) the pipe was set flush on top of the dome and attached to the cap with a fillet weld. The penetration of weld metal at the joint was negligible.

Joining of brass and steel and other dissimilar metals by arc welding calls for the use of suitable rods and fluxes or electrodes which have been manufactured for such special purposes. For example, special purpose electrodes such as aluminum bronze electrodes are adaptable for these difficult weldments.

Of equal importance to the use of the correct electrode is adequate preparation of the member to be joined. Surfaces to be welded must be free of dirt, paint, grease, oxidized metal, and other foreign substance. Chamfering or proper edge preparation of the components to be joined is to be utilized on the same principles as in welding similar materials.

In the above fabrication which failed, if the brass dome had been counter bored to provide a socket for the pipe, if the pipe had been chamfered to obtain proper weld penetration, and if the proper electrode had been used, the weld would not have failed as it did. Indeed, a proper silver or bronze brazing job on the above pipe and dome would have been a satisfactory means of joining the two members.

Welding dissimilar metals is a specialized job requiring specialized procedures. Don't guess on a job like the broken standard. It may be fatal.

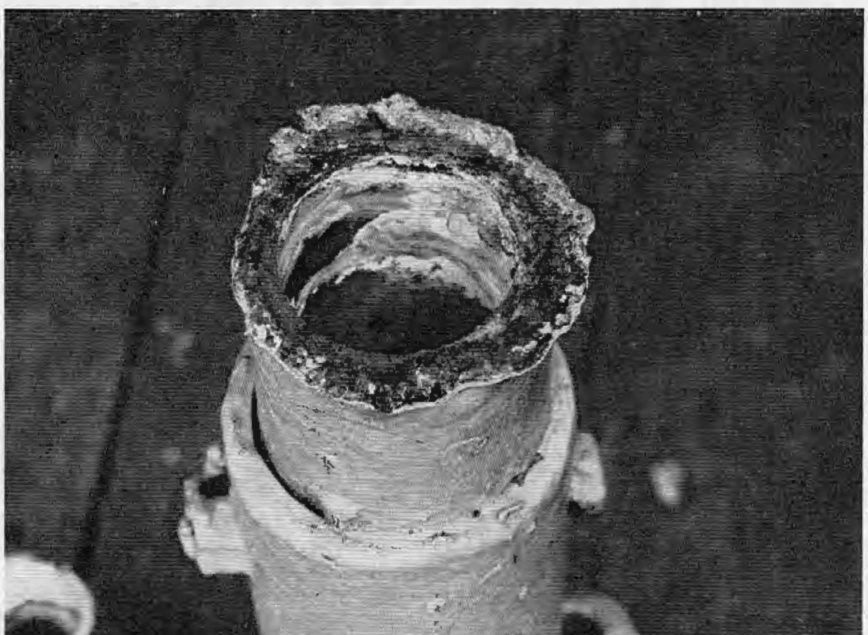

Figure 1.

TRIAL BY FIRE

A grim reminder of the terrible consequences of failing to have a crew trained to cope with emergencies occurred a few months ago when a foreign combination passenger-freight vessel burned at night in an American port. See figure 2. The deaths of 8 passengers and 3 crew members were directly attributable to the breakdown of the smooth functioning of the crew when it was presented with a disastrous situation for which it had been poorly trained.

With the ship at anchor in an open harbor, the fire apparently started in a maze of wiring, distribution panels, and ventilating and heating ducts installed in a 14'' void space between the ceiling and the deck above it in the midship passenger and crew berthing area. Smoke was detected issuing from the paneling; the master was notified; but, no general fire alarm was rung or any positive action taken for several minutes. Consequently, dense smoke and darkness caused by the failure of several lighting circuits hampered subsequent fire-fighting efforts. Streams of water from the burning ship's fire hoses were played at the general overhead area. Passengers were aroused and directed to assemble at the smoking lounge on the upper deck. When all the passengers had gathered in the lounge, and were accounted for, the Master returned to the scene of the fire. By this time dense clouds of smoke had engulfed the entire midships area. Realizing that conditions were beyond control, the Master ordered abandon ship.

In lowering lifeboats No. 2 and No. 4, the after end of No. 4 was dropped, and the boat ended up hanging vertically with two crew members clinging to seats. When it was finally lowered, the boat was partially filled with water. Some passengers climbed down into this boat.

An attempt was made to lower a liferaft, but it was dropped and lost, and flames prevented any attempts to lower Nos. 1, 3, 5, and 6 lifeboats. However, the crew members did manage to lower and cast off 2 small dinghies near the stern.

The Chief Mate blew a distress signal on the ship's whistle. Fortunately, due to the nearby presence of service installations, this distress was heard and immediately answered. Within fifteen minutes a Navy fireboat and a Coast Guard picketboat were alongside searching for and picking up survivors. All those who were in sight in the water, on the burning ship, or in lifeboats or dinghies were safely delivered to the Coast Guard Depot. However, the count of sur-

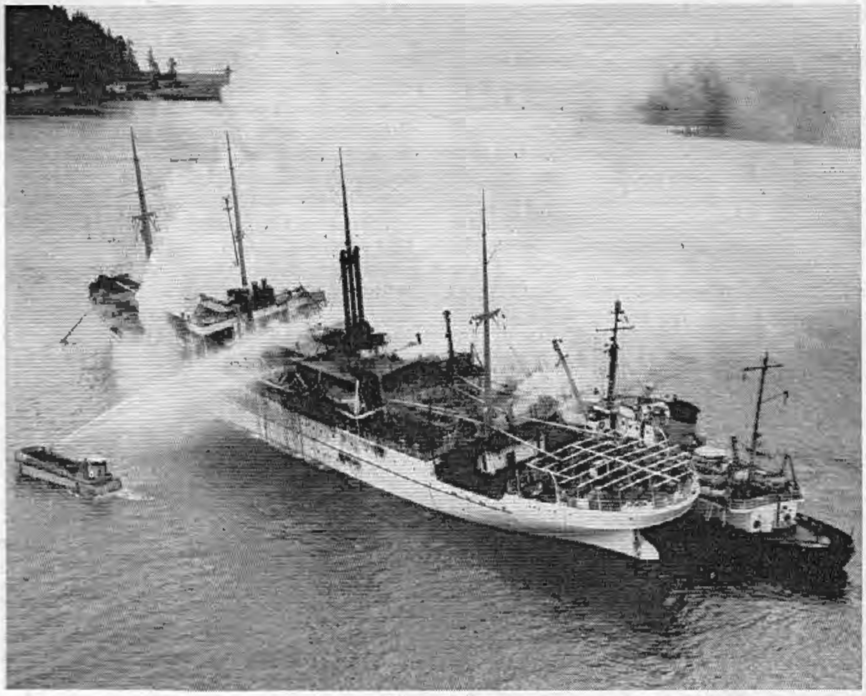

Figure 2.

vivors ashore revealed 3 crew members and 8 passengers to be missing.

With the arrival of two Coast Guard Cutters on the scene, efforts to combat the fire and rescue the missing were intensified, but it was impossible to get into the areas below decks where the fire was raging. Several days later, when it was possible to enter the midship area, the 8 passengers were found in a sitting position in the lounge, apparently asphyxiated by toxic gases, and the 3 crew members were found burned to death in the crew quarters and in the promenade.

Investigation of this tragic casualty pointed up the deficiencies in the training of the vessel's crew to meet emergencies. Effective organization, instruction, and drilling of the crew had not been established or carried out. Many of the crew had not been thoroughly acquainted with their duties for emergencies. There was no clear cut indication by whistle signal or other means when the emergency organization should change from fire fighting to abandoning ship. There was no effective plan for the warning and safeguarding of all passengers. Abandon ship was a fiasco. Such organization as had existed seemed to vanish in the overwhelming holocaust of flame and smoke.

The three stark words FIRE AT SEA must ever remain indelibly imprinted on the subconscious minds of mariners, not as an omen of fear, but as a finger of warning.

NO STRAIN

A Victory ship en route from the Far East to the native strand was delayed several days when an oiler turned a lever a little too far in the wrong direction. The flow of lube oil to the turbine gears and bearings was interrupted, and several bearings were badly wiped. All the trouble started because someone had removed a small metal tab on a wrench, so it could be easily stowed in a slot cut in the floor plates.

The oiler and the third assistant engineer were performing a routine task of shifting lube oil pressure from one side of a duplex pressure strainer to the other, in order to clean the strainer which had been in use. This duplex strainer (see figure 3) was located in the lube oil system, just before the inlet to the starboard side of the engine, at the maneuvering platform level. Changing pressure from one side to the other was a simple process, consisting of using a box wrench, normally kept close at hand, on the 2-inch square plug at the top of the valve mechanism and making a 90° turn.

Originally the wrench referred to was fitted with an integrally cast tab or extension on one side, approximately under the shank, which, in turning, moved within a 90° arc cut into the neck of the valve body. By coming up against the limits of this 90° arc, this tab prevented the valve body from turning past the two points where the internal ports lined up to send oil into one strainer or the other. Otherwise, if the valve body were turned more than the 90° arc, and

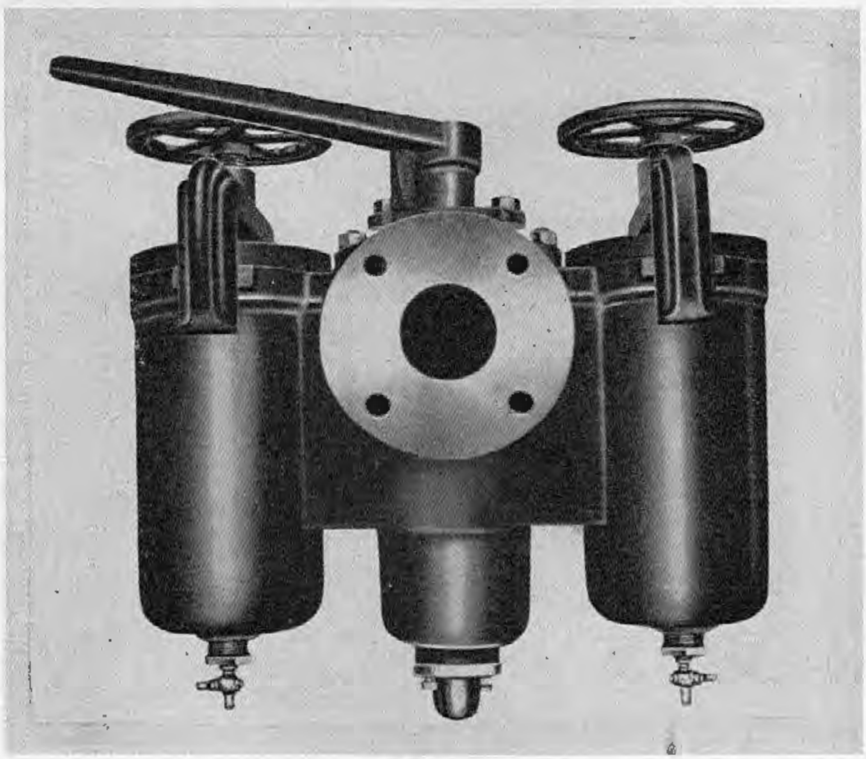

Figure 3.

over into the other 270°, the result would be a blockage of flow into either strainer.

Some enterprising soul, noting that the box wrench would fit nicely into a convenient slot in the floor plates if the tab was removed, had performed the operation, removed the tab, and set the stage for a nice big repair bill. And, so it happened at the time of the above casualty that the oiler on watch took hold of the wrench and threw it over through approximately a 90° arc. While it cannot be proved, the most logical conclusion is that he assumed he was moving from one strainer to the other, while he was actually moving from one strainer to the 270° arc, where lube oil was blocked.

At the time, the assistant engineer on watch was standing by the throttles, as was his practice when changing over the supply strainers. As the valve plug was turned, the engineer observed the lube oil pressure gauge which indicated pressure between the strainer and the engine drop to zero. He immediately started to close the throttle and called to the oiler to shift the strainer handle back to its previous position. This was done, and oil was again flowing by the time the turbine had stopped.

Bearing temperatures had increased rapidly, but they returned to within normal limits as the turbine was started again. However, during the subsequent run at slow speed into the nearest port, the bearing temperatures remained near the upper allowable limits. Consequently, all casings were lifted to inspect for damage.

It was found that the L. P. Rotor bearings and Rotor thrust shoes were badly wiped; the H. P. Rotor bearings and thrust shoes were moderately wiped; the astern blading had rubbed, scoring the nozzle block and damaging astern blading and shrouding; the H. P. forward high speed pinion bearing was badly wiped; and there was other lesser damage..... All because someone had removed the tab from the wrench.

A word to the wise should be sufficient. If you have dual position controls on your lube oil strainers, check them for positive stopping at the correct flow positions. Don't depend on human memory.

Figure 4.

BATS ARE WISER

A prominent scientific theory holds that bats, flying in the dark, like ships sailing in poor visibility, navigate by radar. Bats, it appears, emit rapid, extremely high-pitched squeaks. These squeaks are so high-pitched that they are generally inaudible to the human ear. However as bats are equipped with an unusually good pair of ears they are able to detect the reflected sound waves or echoes of their own squeaks whenever the waves strike solid objects. Result . . . natural radar.

Understandably a strong presumption in favor of bats enters the analogy between human-manned ships and bats—to wit—bats are far more capable of correctly interpreting echoes and swerving or adjusting course to avoid collision. This was attested to by the pilots of two ferries which were in collision last winter. They were considerably less adept in interpreting their radar echoes.

Fortunately, in the collision which ensued nobody was injured, though one of the ferries (see figure 4) came out much the worse for wear.

Both ferries were engaged in their regular routine, traversing their regular run. Both had radar sets working competently; each had noted the other on the radar screen well in advance of the collision; each correctly assumed the identity of the other; and, each took some evasive action to avoid the other. Visibility was about 300 feet. Radar sets on both vessels were set on the 1½ mile scale.

Ferry No. 1 detected No. 2 dead ahead a few minutes after leaving its dock. No. 1 changed its course ½ point to the right. The relative bearing of No. 2 did not change, so No. 1 changed course one more point to the right. The bearing still did not change, so No. 1, which had been making standard cruising speed, slowed her engines and put the rudder hard right.

In the meantime No. 2, which had been making half speed, detected No. 1 on the radar screen on its starboard bow. Having noticed two vessels at anchor near the channel on the starboard hand, she was somewhat reluctant to alter course in that direction, so she altered course to the left, by several small changes, and proceeded at slow speed. Then, since her radar indicated No. 1 to be drawing closer and No. 1's fog signal was heard off the starboard bow, No. 2 stopped her engine and put her rudder hard left.

At about this instant No. 1 loomed out of the fog close aboard on No. 2's starboard beam. No. 1 rang up full speed astern. However, on this type of diesel installation, the engine could not be reversed until it had come to a full stop, so there was a delay of over 20 seconds before the propeller was backing. Some way was removed before the collision, but No. 1 still had headway on when it plowed into the starboard quarter of No. 2. That there were no deaths or injuries was due to the greatest of good fortune.

The necessity of properly evaluating and interpreting radar information cannot be overstressed, nor the need to act promptly and effectively in the face of that information. Radar is no cure-all for man's limitations. On the contrary it is limited by man's limitations.

TUBE BLOWOUT

The rapidity with which a boiler can be damaged when its water is low was clearly illustrated on the Eastern Seaboard recently as a Victory ship steamed slowly out to sea. See figure 5.

Within a few miles from the harbor, the First Assistant experienced difficulties keeping feed water flowing to the boilers. He noted pressure from both the turbine feed pump and the reciprocating feed pump was falling, but, as he had had considerable experience as Chief Engineer of Victory ships, he felt no apprehension at first as to his ability to keep water in the boilers. (No doubt this was the reason he did not immediately call the Chief Engineer or secure the fires.) Very shortly, however, the water level fell out of sight in both boiler gauge glasses. He thereupon called the Chief Engineer, who immediately descended to the engine room, and, seeing no water in the gauges, ordered fires put out in both boilers and the plant secured.

The Chief then informed the pilothouse of the action taken and the vessel dropped anchor.

Upon opening the port furnace, it was discovered that the fifth waterwall tube in the front row of that boiler had burst. This tube apparently ruptured, due to low water and overheating of the metal, at about the time the Chief Engineer arrived in the engine room—whereupon the port boiler lost all its remaining water through the rupture—because before the furnace could be cooled, 22 other tubes were badly distorted due to overheating.

It is believed that a small leak developed in the fifth waterwall tube before it ruptured, causing the initial difficulty in maintaining sufficient water in the boilers. However, with proper surveillance by engineering personnel, a leak of this type is usually readily detectable. Operating on a normal working pressure of 525 p. s. i., a leaky water tube can set up quite an audible hissing sound which can be heard in the vicinity of the furnace front, especially while changing burners or adjusting the draft. Indeed, upon noting unusual behavior of the feed pumps, a logical conclusion on the part of any engineer is loss of water in the boilers.

The main propulsion should have been immediately slowed or stopped to cut steam consumption and the fires in the port boiler secured. Had this been done the power plant of this vessel probably would not have been lost. As is happened, the leaking port boiler required so much feed water that the water level was also low in the starboard boiler, and when the port boiler let go, the starboard had to be secured also, resulting in a most embarrassing and expensive blackout *and a repair bill over $5,000.*

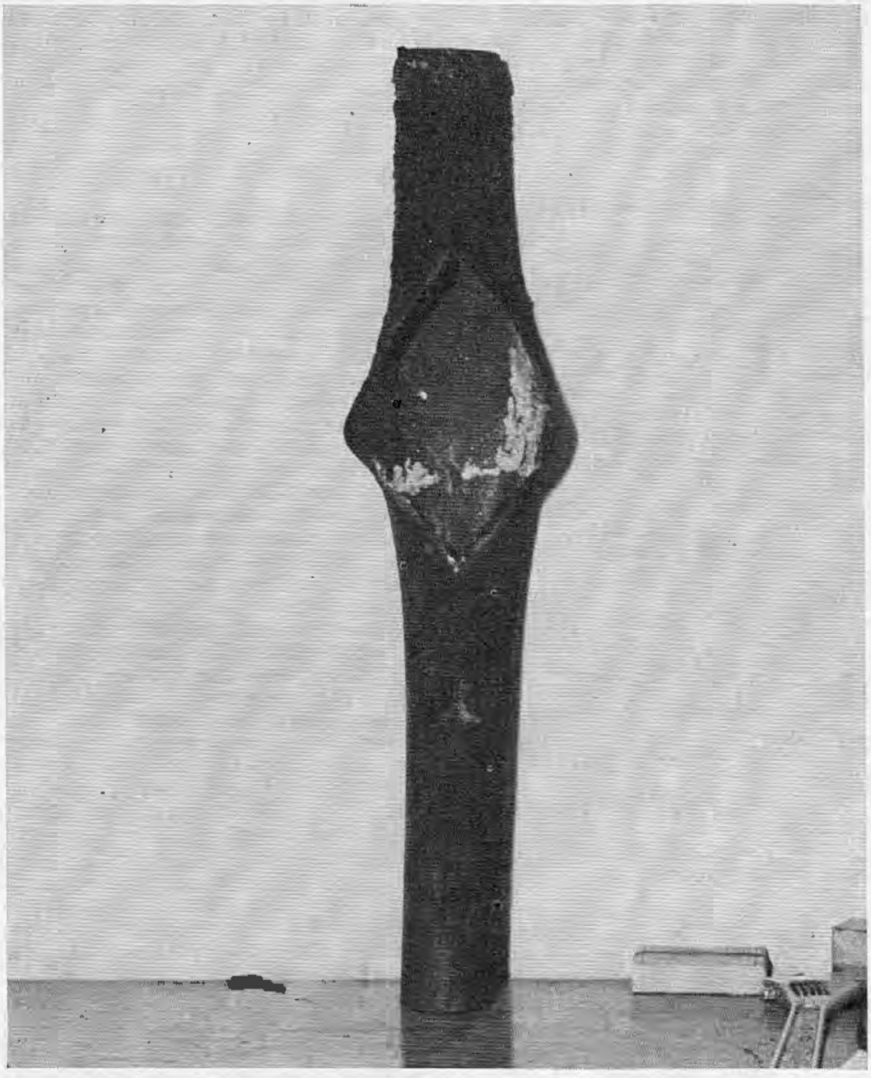

Figure 5.

NSA SAFETY PROGRAM

(Continued from page 153)

stacles, and running in passageways and on decks.

(2) Jumping from ship.

(3) Jumping from launch to pier or vice versa.

(4) Descending ladders and gangways in an unsafe manner.

(5) Working from ladders.

The number of such accidents occurring on ladders exactly equaled the number from all other sources, and an unusually large percentage occurred while men were working off ladders—insecure ladders, overreaching, etc. The obvious answer is to lash ladders in place when no one is available to hold them. Descending ladders in a lubberly fashion and forgetting the adage of "one hand for the ship and one for yourself" just about sum up the causes of all other ladder accidents. Only two cases were reported which indicated anything wrong with a ladder and only one case of anything wrong with a gangway.

HANDLING OF MATERIALS

The second largest group of injury accidents occurred incident to the handling of materials—almost 14 percent of the total. Few of these involved mechanical handling of materials. One of each three of the accidents incident to the hand handling of materials and objects aboard ship indicated insufficient help or failure to use mechanical means. The bulk of the cases, however, were traceable to such unsafe acts as "insecure footing when lifting," "lifting with back instead of legs," "improper or insecure grip while lifting." Although the number of accidents incident to the mechanical handling of materials were few in number, the causes are important because of the greater severity of the injuries:

(1) Conflicting signals to bos'n while operating winch.

(2) No signal given to stop winch.

(3) Man not in clear when working cargo.

(4) Faulty lashings used to secure block to boom.

USE OF HAND TOOLS

A third major group of injuries involved the use of hand tools—almost 10 percent of the total. They may be classified as:

(1) Using wrong tool.

(2) Using tools incorrectly.

(3) Insecure footing while using hand tools.

(4) Abusing tools.

(5) Failure to check surroundings before using hand tools. Cuts from knives accounted for almost half the accidents in this category, all but one involving Steward Department personnel. Almost every case listed in the tabulation reports was passed off as "carelessness on the part of the employee." We find no mention of the use of a meat hook which has proved to be one safe means of preventing finger cuts when butchering meat. Wire mesh gloves have been adopted by many large meat handlers and the Quartermaster Corps of the U. S. Army for the prevention of accidents of this type. Only one ship's committee, as reflected by the tabulation reports, indicated it was doing something about knife cuts—"when cutting meat bend fingers that are holding meat, keeping flat of knife against knuckle and edge away from hand on meat." The same hand hold should work on a cucumber or any other vegetable.

HEAVY WEATHER

The fourth large category, heavy weather, includes accidents which may also fall into other classifications but have been grouped together because they are related or incident in some way to a condition peculiar to ship operation—heavy weather. This report covers three of the winter months when usually heavy weather is more prevalent. Heavy weather is not an accident cause, however; it is a circumstance existing at the time an accident occurs. The accident toll from this cause may be reduced if ship's safety committees will acknowledge that something can be done about the accidents in spite of weather.

The accidents in this category recorded during the first quarter of 1953 may prove beneficial in guiding the committees toward adoption of more effective preventive measures:

(1) Men working or crossing open decks: Outside work and movement during heavy weather may be reduced to the minimum necessary for safe navigation. Life lines can be rigged.

(2) Insecure benches, tables and other furniture: If these cannot be permanently secured, steps can be taken to lash them properly during heavy weather.

(3) Loose gear on deck: Good seamanship and "good housekeeping" dictate that this cause of accidents be eliminated during all kinds of weather.

(4) Loose gear and tools below decks: Proper storekeeping will eliminate this cause entirely.

(5) Grasping doors by the edge: Seamen should be instructed where not to grasp doors during heavy weather.

(6) Oil spills, water spills, loose rugs: Special precautions should be taken during heavy weather to keep all deck surfaces free of slippery materials.

(7) Unsteady footing of ladders and passageways: Movement of personnel between decks and in passageways should be reduced during heavy weather to the greatest possible extent.

MISCELLANEOUS

Many diversified categories of accidents are grouped under "miscellaneous". This group accounted for almost 28 percent of the accidents recorded. They are:

(1) Fights and altercations, 5.

(2) Intoxication, 8.

(3) Protruding nails in lumber.

(4) Unsafe handling of wire and manila lines.

a. Man in bight of line.

b. Insecure grip on mooring line.

c. Insecurely rigged bos'n's chair, 2 (each a potential death).

d. Insecure stage.

e. Unsafe handling of lifeboat lines.

f. Portable stanchions and man ropes not replaced after working cargo.

(5) Chipping, grinding, cutting without goggles, 3.

(6) Working on "hot line"; throwing knife switch with heavy load on line.

(7) Insecure stowage of stores, particularly of paint.

(8) Men working below men working above.

(9) Uncovered steam pipes, 3.

(10) Wearing wooden shower clogs, 2.

(11) Working in escape trunk of shaft alley alone.

Observations of the Old Mariner

DON'T WALK IN A DAZE—
LOOK BOTH WAYS.

SAFETY IS THE ONLY COMMODITY THAT COSTS YOU NOTHING UNTIL YOU FAIL TO USE IT.

BE ALERT
DON'T GET HURT

THERE IS A WAY TO ANY JOB.
THE RIGHT WAY IS THE SAFE WAY.

APPENDIX

AMENDMENTS TO REGULATIONS

[EDITOR'S NOTE: The material contained herein has been condensed due to space limitations. Copies of the documents may be obtained by writing to Coast Guard Headquarters, care of Commandant, Washington 25, D. C.]

TITLE 46—SHIPPING

Chapter I—Coast Guard, Department of the Treasury

Subchapter N—Explosives or Other Dangerous Articles or Substances and Combustible Liquids on Board Vessels

[CGFR 53-26]

PART 146—TRANSPORTATION OR STOWAGE OF EXPLOSIVES OR OTHER DANGEROUS ARTICLES OR SUBSTANCES AND COMBUSTIBLE LIQUIDS ON BOARD VESSELS

PART 147—REGULATIONS GOVERNING USE OF DANGEROUS ARTICLES AS SHIPS' STORES AND SUPPLIES ON BOARD VESSELS

MISCELLANEOUS AMENDMENTS

A notice regarding proposed changes in the regulations governing the transportation and handling of class A explosives, corrosive liquids, anhydrous ammonia, combustible liquids, and hazardous articles was published in the FEDERAL REGISTER dated February 13, 1953, 18 F. R. 882, 883, as Items XIV to XVIII, inclusive, on the agenda to be considered by the Merchant Marine Council at a public hearing on March 24, 1953, in Washington, D. C.

The purpose for amending 46 CFR 146.01-1, 146.01-8, 146.02-19 (a) 146.02-21, 146.03-8, 146.03-18, 146.03-36 (a) (1) (i), 146.04-4, 146.04-5, 146.05-5 (b), 146.06-9 (c), 146.21-100, 146.24-50, 146.29-6 (a) (6), 147.01-4 (a), and 147.01-6 was to correct references and to revise the requirements to agree with changes made in previous amendments to the dangerous cargo regulations or by this document.

The purpose for amending 46 CFR 146.02-9, 146.02-10, 146.02-11, 146.05-14, 146.05-15 (b) (note), 146.06-6, 146.20-15 (b) (note), 146.20-85, 146.20-87, 146.29-1, 146.29-7, and 146.29-8 was to bring these requirements for the transportation and handling of class A explosives into agreement with Public Law 562, 82d Congress, approved July 16, 1952.

The purpose for amending 46 CFR 146.23-35 and for canceling 46 CFR 146.23-40 and 146.23-45 was to clarify, bring up to date, and to establish uniform requirements for the bulk transportation of sulfuric acid and spent sulfuric acid. The purpose for amending 46 CFR 146.23-50 is to clarify, bring up to date, and to establish uniform requirements for the bulk transportation of hydrochloric acid.

The purpose for amending 46 CFR 146.24-85 was to revise the requirements covering the method of lading, and safety relief valves, and to make other changes so that the requirements for anhydrous ammonia (compressed gas) will be compatible with similar requirements governing the transportation of other compressed gases.

The purpose for amending 46 CFR 146.26-1 to 146.26-100, inclusive, was to clarify, bring up to date, and to revise the requirements generally for combustible liquids, and to bring these requirements into closer alignment with those governing inflammable liquids.

The purpose for amending 46 CFR 146.27-1 to 146.27-100, inclusive, was to revise and bring up to date the requirements for the handling and transportation of hazardous articles.

The purpose for canceling 46 CFR 147.01-5, regarding existing rulings re explosives and other dangerous articles or substances by trade name, was that the regulation had served its purpose and was no longer necessary.

The detailed regulations governing the transportation of combustible liquids and hazardous articles have been revised and the sections renumbered to allow for future expansion if necessary.

COMPARISON OF OLD SECTION NUMBERS WITH NEW SECTION NUMBERS

Old section number	*New section number*
*146.26-1	*146.26-1
*146.26-2	*146.26-1
146.26-3	146.26-5
146.26-4	146.26-10
-------	*146.26-15
146.26-5	146.26-20
146.26-6	146.26-25
146.26-7	146.26-30
*146.26-100	*146.26-100
*146.27-1	*146.27-1
*146.27-2	*146.27-1
146.27-3	146.27-10
146.27-4	146.27-15
146.27-5	146.27-5
146.27-6	146.27-20
*146.27-100	*146.27-100

*Indicates that text of section has been revised.

TITLE 33—NAVIGATION AND NAVIGABLE WATERS

Chapter I—Coast Guard, Department of the Treasury

Subchapter L—Security of Waterfront Facilities

[CGFR 53-27]

PART 126—HANDLING OF EXPLOSIVES OR OTHER DANGEROUS CARGOES WITHIN OR CONTIGUOUS TO WATERFRONT FACILITIES

HANDLING OF EXPLOSIVES

Notice regarding proposed changes in the regulations governing the handling of explosives or other dangerous cargoes within or contiguous to waterfront facilities was published in the FEDERAL REGISTER dated February 13, 1953, 18 F. R. 882, as Item XIV on the agenda to be considered by the Merchant Marine Council at a public hearing on March 24, 1953, in Washington, D. C.

The purpose for amending 33 CFR 126.17, 126.19, 126.21, 126.25, and 126.27 was to revise the requirements governing the handling of explosives or other dangerous cargoes within or contiguous to waterfront facilities in order that such requirements would be consistent with the Dangerous Cargo Regulations in 46 CFR Part 146 and carry out the intent of the act of July 16, 1952 (Pub. Law 562, 82d Cong.), which further amended R. S. 4472 (46 U. S. C. 170).

ARTICLES OF SHIPS' STORES AND SUPPLIES

Articles of ships' stores and supplies certificated from 28 August to 28 September 1953, 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."

CERTIFIED

Brulin & Co., Inc. 2939-45 Columbia Ave., Indianapolis 7, Indiana, Certificate No. 122 dated 3 September 1953. "BRULIN'S SOLVENT DEGREASER."

AFFIDAVITS

The following affidavits were accepted during the period from 15 August to 15 September 1953:

Black, Sivalls & Bryson, Inc. Climax Controls Division, 15 N. Cincinnati, P. O. Box 1529, Tulsa 1, Oklahoma, VALVES & FITTINGS.

Valco, Inc. 1410 West Street, Cincinnati 15, Ohio, VALVES.

U. S. GOVERNMENT PRINTING OFFICE: 1953

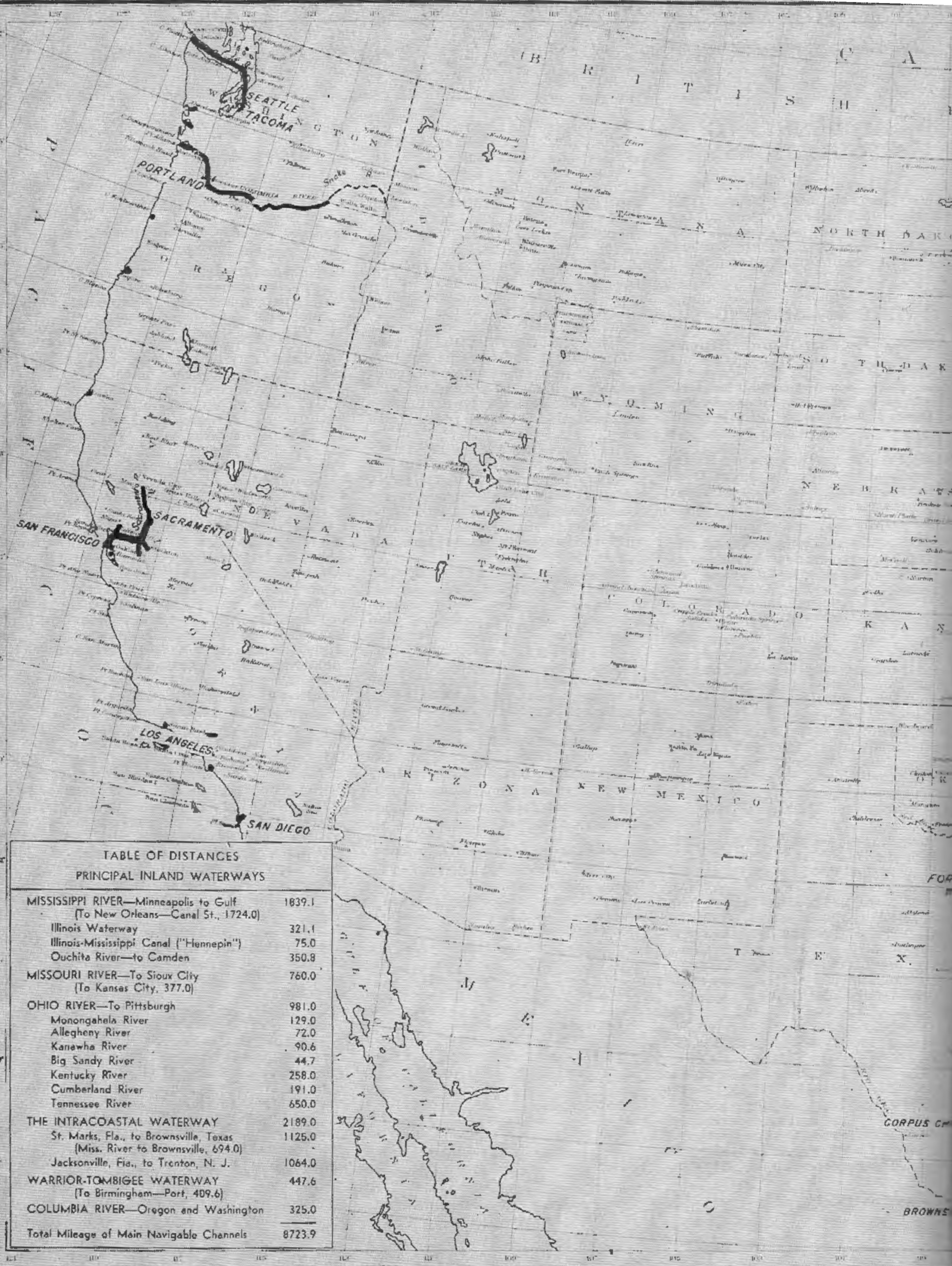

TABLE OF DISTANCES
PRINCIPAL INLAND WATERWAYS

MISSISSIPPI RIVER—Minneapolis to Gulf	1839.1
(To New Orleans—Canal St., 1724.0)	
Illinois Waterway	321.1
Illinois-Mississippi Canal ("Hennepin")	75.0
Ouchita River—to Camden	350.8
MISSOURI RIVER—To Sioux City	760.0
(To Kansas City, 377.0)	
OHIO RIVER—To Pittsburgh	981.0
Monongahela River	129.0
Allegheny River	72.0
Kanawha River	90.6
Big Sandy River	44.7
Kentucky River	258.0
Cumberland River	191.0
Tennessee River	650.0
THE INTRACOASTAL WATERWAY	2189.0
St. Marks, Fla., to Brownsville, Texas	1125.0
(Miss. River to Brownsville, 694.0)	
Jacksonville, Fla., to Trenton, N. J.	1064.0
WARRIOR-TOMBIGEE WATERWAY	447.6
(To Birmingham—Port, 409.6)	
COLUMBIA RIVER—Oregon and Washington	325.0
Total Mileage of Main Navigable Channels	8723.9