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Contents

Our cover photo of a liquefied gas carrier was supplied by the Coast Guard's Office of Boating, Public and Consumer Affairs.

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Regulation of Liquefied Gas Ships in the United States

LT Kevin S. Cook

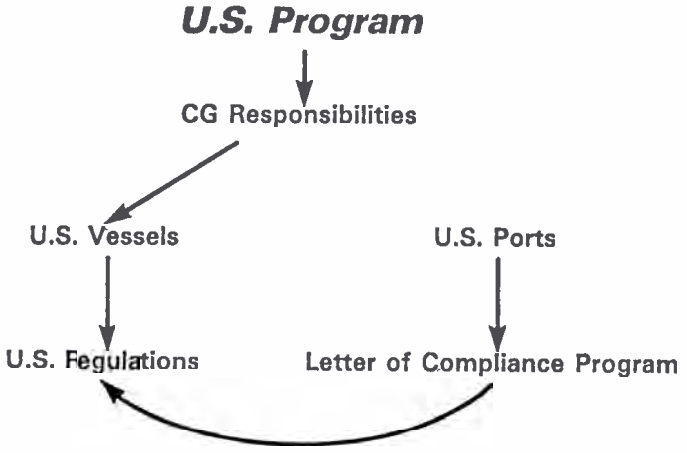
The production, use, and transport of liquefied gases in the United States has increased dramatically during the past two decades. To accommodate this expanding trade, there has been a marked increase in the number of ships dedicated to the carriage of liquefied gases. Today there are over 100 gas ships certificated for trading in the United States.

Throughout this period of growth, the U.S. regulatory program for the carriage of liquefied gases in bulk has ensured the safety of U.S.- and foreign-flag ships in U.S. ports. Maintaining the effectiveness of this regulatory program is a dynamic process. The Coast Guard actively participates in the International Maritime Organization (IMO) and continues to update U.S. regulations to reflect internationally agreed upon standards. Additionally, through concept review of novel liquefied gas containment systems, the Coast Guard maintains an awareness of the technological developments in the liquefied gas shipping industry.

U.S. Regulations

The U.S. program for regulating the carriage of liquefied gases is founded in two separate yet related Coast Guard responsibilities. These are outlined in figure 1. First is the Coast Guard's responsibility for ensuring the safety of U.S. vessels. This is accomplished by the development and enforcement of standards for the design, construction, repair, maintenance, and operation of U.S.-flag merchant ships, including liquefied gas ships.

Figure 1



The second responsibility is for the safety of U.S. ports. Most of the liquefied gas imported and exported is carried on board foreign-flag vessels. While the inherent dangers of liquefied gas carriage and handling could be addessed adequately on U.S. vessels by procedures in place, a program was necessary to ensure an adequate level of safety on foreign-flag vessels. This need was recognized in the early 1960s and precipitated development of the Letter of Compliance (LOC) program for the regulation of all foreign-flag vessels carrying dangerous bulk cargoes, including liquefied gases, in U.S. waters.

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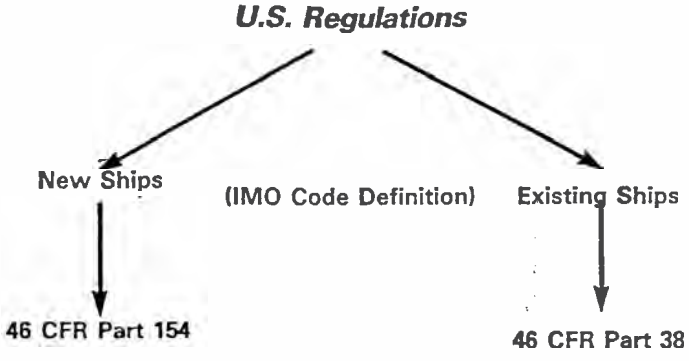
With the LOC program, all foreign-flag gas ships in service to the United States were required to meet nearly the same high standards as were required for U.S.-flag ships. Ensuring compliance with these unilateral standards was a tremendous task. Soon the Coast Guard recognized that the issue of standards for gas ship safety was an international problem requiring an international solution.

The Coast Guard put forth a U.S. initiative at IMO to raise international standards for all gas ships to the level already required for U.S. service. This effort was very successful, culminating in the adoption in 1975 of the IMO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IMO Gas Carrier Code). Under the code, a gas ship's flag administration is responsible for ensuring compliance with the applicable standards. Thus, the Coast Guard was able to relieve itself from much of the work associated with enforcing unilateral standards without diminishing the level of safety provided to U.S. ports.

Both the IMO Gas Carrier Code and U.S. regulations contain definitions for "new" and "existing" gas ships. Generally, those vessels with a building contract signed after October 31, 1976 are considered "new" ships. New ships are constructed to the high standards recommended by the IMO Gas Carrier Code. Those vessels contracted before October 31, 1976 are considered "existing" ships and are constructed to a variety of standards.

As shown in figure 2, the regulatory standards applicable to new ships trading in the United States are located in Title 46, Code of Federal Regulations (CFR) Part 154. U.S. regulatory standards applicable to existing ships can also be found in Title 46; however, they are located in Part 38.

Figure 2



New Ships

The Coast Guard implementation of the recommendations of the IMO Gas Carrier Code into U.S. regulations occurred in 1979. These regulations contain the standards applicable to new ships, Part 154, "Safety Standards for Self-Propelled Vessels Carrying Bulk Liquefied Gases." Part 154 closely parallels the recommendations of the IMO Gas Carrier Code both in organization and content, with the notable exception of four areas where the Coast Guard requires standards differing from the minimum recommendations of the IMO Gas Carrier Code. These standards include the following:

(1) Use of enhanced grades of hull steel for crack-arresting purposes.

(2) Higher design stress factors for certain independent tanks.

(3) Lower design ambient air and seawater temperatures.

(4) Prohibition of tank venting as a means of cargo tank pressure/temperature control.

When a current project to incorporate amendments to the IMO Gas Carrier Code into Part 154 is completed, U.S. regulations will be up to date with the complete IMO Gas Carrier Code. The regulations also will be current with the International Gas Carrier Code since it is nearly identical to the IMO Gas Carrier Code. The International Gas Carrier Code, adopted in 1983 as an amendment to the International Convention for the Safety of Life at Sea (SOLAS), became effective in July 1986.

Part 154 also prescibes how a foreign-flag owner may place his vessel into U.S. service. (This information is discussed in the Letter of Compliance section of this article.)

Existing Ships

Initially and for many years, Coast Guard acceptance of all existing gas ships was based only on a detailed review of vessel design plans ("plan review") intended to ensure compliance with the standards in Part 38. Although some member nations of IMO insisted on developing a code applicable to existing gas ships, many of the recommendations of the Existing Gas Ship Code were not supported by the United States and were not implemented into U.S. regulations. This was primarily because this code was silent on or recommended standards below the

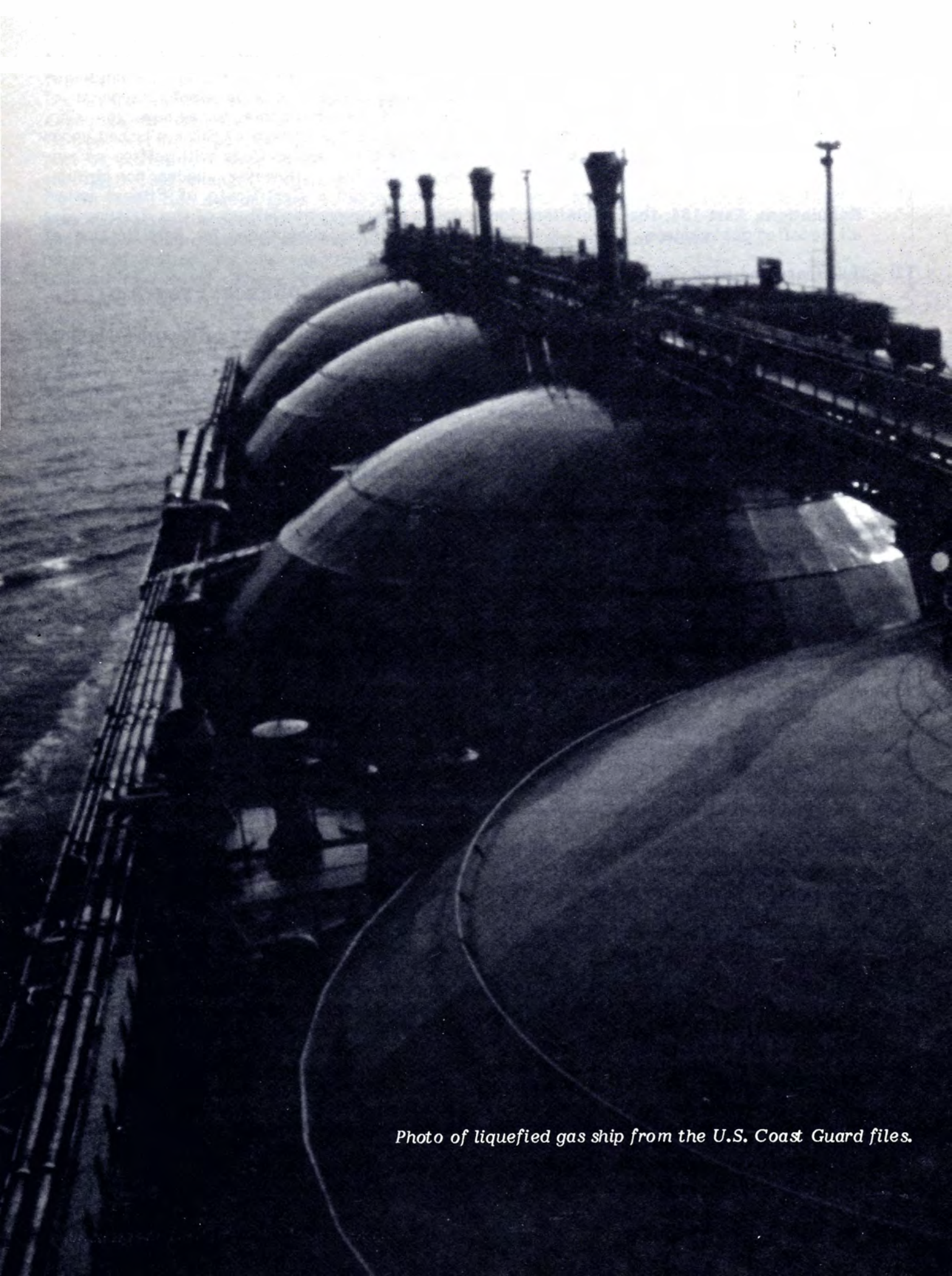


Photo of liquefied gas ship from the U.S. Coast Guard files.

corresponding U.S. standards for the design of cargo tanks and piping systems.

Currently there are proposed Coast Guard regulations for existing gas ships awaiting publication as a final rule. As summarized in figure 3, the rule will do several things:

(1) Consolidate into one Part of the Federal Regulations, Part 154, the regulations for all liquefied gas carriers.

(2) Eliminate the need for Coast Guard plan review of existing foreign-flag vessels in most cases.

(3) Upgrade U.S. regulations for all existing gas ships by generally incorporating those standards contained in the IMO Code for Existing Gas Ships which introduce a higher level of safety than presently found in Part 38.

The impact of the new rule is minimal for U.S.-flag existing gas ships and foreign-flag existing gas ships now in the Letter of Compliance program or having previously completed Coast Guard plan review. Once the rule becomes effective, compliance with the changes will be expected when a vessel's recertification is due. Existing foreign-flag gas ships must possess an IMO Certificate of Fitness suitably endorsed to indicate compliance with the recommended upgrades of the Existing Gas Ship Code.

For those foreign-flag existing gas ships not presently in the Letter of Compliance program and not having completed Coast Guard plan review, the impact is severe. Once the final rule becomes effective, applications for U.S. service for this category of vessel must demonstrate that the vessel is in compliance with the design and equipment standards of Part 154 as applicable to a new gas ship. Generally, a Certificate of Fitness issued under the IMO Gas Carrier Code will suffice as evidence of this. However, under no circumstances would a Certificate of Fitness issued under the recommendations of the Existing Gas Ship Code be acceptable for certification of these vessels.

Figure 3

Proposed Rulemaking for Existing Gas Ships

- Place Regulation of All Gas Carriers Into Part 154
- Significantly Reduce CG Plan Review
- Upgrade U.S. Regulations

Letter of Compliance Program

All foreign-flag ships loading, discharging, or carrying bulk hazardous liquid in the United States are required to obtain a Letter of Compliance (LOC) from the Coast Guard. Issuance of an LOC is evidence that a particular vessel meets or exceeds the standards contained in U.S. regulations and, through biennial examinations, that the vessel is maintained and operated safely.

The LOC program emerged from concern for the risk posed to U.S. ports by foreign-flag ships carrying hazardous cargoes, including liquefied gases. Since instituted in the early 1960s, the program has undergone a number of changes. The most significant change was the implementation of the IMO Gas Carrier Code into U.S. regulations in 1979. This is the change which allowed IMO Certificates of Fitness issued by the flag administration under the IMO Gas Carrier Code to be accepted as evidence the ship meets the recommended standards contained in the code. It replaced the need to conduct Coast Guard plan review in many cases, resulting in a substantial resource savings without a reduction in the level of safety.

More recently, in April 1985, several administrative changes to the LOC program became effective. Owners, operators, and U.S. agents of foreign-flag vessels should take special notice of these changes to facilitate certification of their vessels for U.S. service.

First, recent U.S. laws mandated a name change from "Letter of Compliance" to "Certificate of Compliance"; however, the new form will not be available until later this year. To avoid confusion until the new Certificate of Compliance form is available, the LOC will continue to be used. Additionally, vessels in possession of a valid LOC will not have to obtain a Certificate of Compliance until the LOC expires. The name change will not affect the manner in which a liquefied gas ship is certificated.

Second, owners of gas ships accepted into the LOC program on the basis of an IMO Certificate of Fitness must now request LOC examinations directly from the Officer in Charge, Marine Inspection (OCMI) at the local port by providing 7 days notice. Additionally, the April 1985 changes include a requirement for an inspection set of plans to be on board. This eliminates the need for Coast Guard Headquarters to forward plans and has allowed the period of notice for an examination to be reduced to 7 days. These recent changes did not affect the required 14 days' notice to Headquarters for those existing ships in the LOC program on the basis of Coast Guard plan review.

For the owner of a new liquefied gas ship making an application to the LOC program, the procedure is quite simple, as demonstrated in figure 4. Application is made to Coast Guard Headquarters and should contain the following:

(1) Certificate of Fitness (issued under the IMO Gas Carrier Code or International Gas Carrier Code).

(2) Verification of compliance with the applicable special areas.

(3) A description of the vessel.

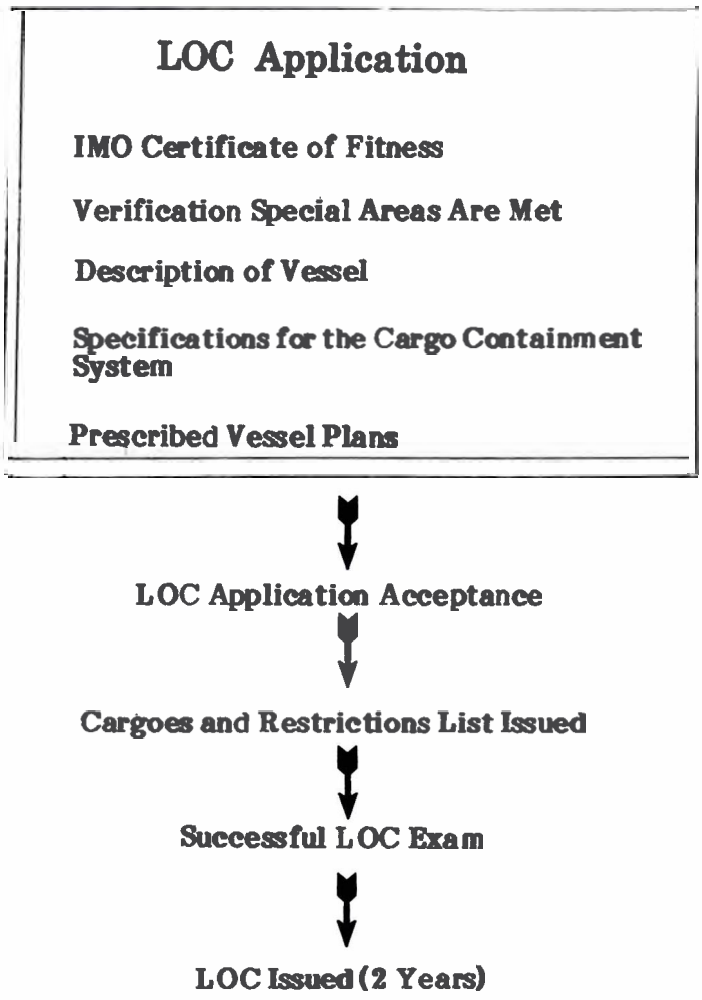
(4) Specifications for the cargo containment system.

(5) Prescribed vessel plans which include a general arrangement, midship section, schematics of the liquid and vapor cargo piping, and a firefighting and safety plan.

The application is then reviewed. Particular attention is paid to the containment system design, compliance with the special design areas, authorized cargoes, notes from the administration issuing the Certificate of Fitness, and compliance with applicable amendments to the IMO Gas Carrier Code. Based on this, a Cargoes and Restrictions List (Subchapter O Endorsement) is issued which makes reference to the vessel's current IMO Certificate of Fitness and provides information on operating the vessel in U.S. waters.

Once the Cargoes and Restrictions List is generated, the vessel is eligible to undergo an LOC examination. Notice should be provided to the local OCMI as mentioned above and, upon successful completion of the examination, the LOC is issued for a period of 2 years.

Figure 4



A vessel possessing an LOC also is subject to the general requirement that all foreign-flag tankers operating in the United States undergo an annual Tank Vessel Safety Examination (TSVE). The scope of the LOC examination includes those items normally covered during a TVSE; therefore, the examinations are conducted concurrently when the LOC is issued. One year following the LOC examination, the TVSE is conducted, and the results are recorded on the reverse side of the LOC form.

Concept Review of Novel Liquefied Gas Containment Systems

The Coast Guard has enjoyed a long and beneficial involvement in "concept review" of liquefied gas containment systems. Concept review is a pre-construction Coast Guard/ Industry design consultation available to U.S. vessel designers and designers of foreign-flag vessels intended for trade in the United States. The purpose of the review, as outlined in figure

5, is to confirm the design meets the following criteria:

(1) The concept is rational.

(2) The design contains no "fatal" flaws.

(3) The design is capable of meeting U.S. standards.

Though not required by the Coast Guard, this exchange of information prior to construction facilitates later acceptance of the design for U.S. service. It also enables Coast Guard personnel to remain abreast of state-of-the-art gas ship developments. As such, concept review is a fundamental component in the Coast Guard's ability to ensure the safe transportation of liquefied gases in U.S. ports.

Requests for concept review should be made to the Hazardous Materials Branch of the Marine Technical and Hazardous Materials Division, Coast Guard Headquarters, Washington, DC. A meeting with Coast Guard personnel shortly after submitting a design is encouraged so that containment system designers can highlight their analysis and answer preliminary questions.

Review of gas ships has traditionally been divided into two stages by the Coast Guard. First is the conceptual stage as just mentioned. Second is the "design review" stage in which a detailed review of vessel drawings is conducted after a contract is obtained. As would be expected, the first vessel built to any new design is particularly scrutinized.

The full design approval stage remains intact for review of all U.S.-flag gas ships; however, due to acceptance of IMO Certificates of Fitness in lieu of plan review, Coast Guard involvement in foreign-flag vessels is greatly diminished. A limited design review is conducted only for the containment system of the first foreign-flag ship utilizing a newly approved concept. It is conducted when application for an LOC is made. The scope of this limited design review is normally outlined in the concept approval letter.

The remainder of the first ship and all subsequent deliveries (same containment system) are demonstrated to the Coast Guard to be built to U.S. standards by submission of an IMO Certificate of Fitness and supporting items required to apply for an LOC.

Figure 5

CG Concept Review

- Concept Is Rational
- Design Has No Fatal Flaws
- Capable of Meeting U.S. Standards

Conclusion

The Coast Guard is committed to maintaining an effective program for the regulation of liquefied gas carriage in the United States. Implementation of the IMO Gas Carrier Code into our regulations has been very beneficial, particularly for regulation of "new" foreign-flag gas ships through the LOC program. The 1985 changes have streamlined LOC administrative procedures, allowing for examinations to be arranged and conducted locally with only 7 days notice. Implementation of the International Gas Carrier Code and the recommended upgrades of the IMO Existing Gas Ship Code into Part 154 will further benefit the U.S. regulatory program. Through these improvements and continued involvement at IMO, together with concept review of novel containment system designs, the Coast Guard will continue to ensure the safe carriage of liquefied gases in the United States. ‡

Acknowledgments

A more detailed paper on this subject was presented by LT Cook at the 11th International LNG/LPG Conference and Exhibition (GASTECH 85), Nice, France. The paper, entitled "U.S. Coast Guard Program for the Regulation of New and Existing Liquefied Gas Ships," was coauthored with Dr. Anthony L. Rowek and has been published in GASTECH 85 Proceedings.

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Hurricane Warning

Why You Should Be Wary Now!

Imagine for a moment that a hurricane is coming. The sky has an ominous yellow tinge, and there is an almost eerie stillness. Birds and small animals are scurrying for shelter. You're in your car and headed for your boat. Now quickly — what's your plan of action?

Maybe you already have a comprehensive hurricane plan that you've thought out and rehearsed. Maybe you already know the safest place to secure your boat and have purchased the extra line, chain, anchors, etc. Maybe you've already installed extra cleats and chafe protectors and taken care of the myriad details that go into making a good hurricane plan. If this is the case — congratulations — you have significantly increased the chances of your boat's surviving the upcoming tempest.

But if you've never given hurricane preparation much thought, and all you're planning to do is check the docklines and maybe add a fender or two, your boat doesn't have nearly as good a chance of surviving the surging tides, waves, wind, and drifting boats that will soon be threatening the area.

Securing a boat against something as extraordinary as a hurricane requires more than just an ordinary effort on your part. There isn't much time — maybe 24 hours or less — so you can't wait until a warning has been posted to decide whether to move the boat, buy extra lines, and contemplate what should or shouldn't be stripped off of the deck. The time to formulate an intelligent plan of action is NOW.

You Can Run, But You Can't Hide

There are no guarantees when you secure your boat for a hurricane: not at a dock, not at a mooring, not in a hurricane hole, not on a trailer, not even in a storage shed ashore. The only certain way to avoid any damage from high winds and coastal flooding is to ship your boat far inland, and unless your boat is trailerable, this just isn't practical. But the chances of your boat's being damaged can be reduced considerably by choosing the most secure location possible.

Where Will Your Boat Be Safest?

In the Water

Unless you own something the size of an aircraft carrier, don't even think about taking your boat to sea and riding out a hurricane. Any boat in the water should be secured in a snug harbor. The trick is deciding which harbors are truly snug.

There are several things to keep in mind when you're contemplating the relative merits of any harbor. One of the most important is wind direction: where will the wind be coming from? Windage is greatly reduced if the wind strikes the boat directly on the bow or, on some boats, the stern. Unfortunately, until you know exactly where the hurricane's eye will pass, predicting wind direction can only be, at best, an educated guess.

Storm surge (high water) is another consideration. It is this deadly storm surge — not wind or waves — that is responsible for wrecking most boats and causing nine out of ten hurricane-related deaths. Storm surges of 10 feet or more are not uncommon in a hurricane. So a harbor with a seawall or a harbor that is surrounded by a low bank or sandy spit may be unprotected after the water surges only a few feet.

Crowded, rock-strewn harbors are picturesque, but they may not be the best place to keep your boat in a hurricane. If a harbor is crowded, the chances of other boats breaking loose and banging into your boat are that much greater. And, should your boat come loose, would you rather have it bang into other boats, picturesque rocks, or an ugly, but soft, mudbank?

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Finally, what is the bottom of the harbor like? If you plan to anchor, check your charts to see what you will be setting your anchors in. Also, water can sometimes be blown out of a harbor, leaving boats stranded briefly. Obviously, if this happens, you wouldn't want your boat to settle onto rocks. Mud — thick, gooey mud, the kind kids use to make mud pies — is good to have around in a hurricane.

At a Dock

Most boats weather hurricanes at their docks, but this is not necessarily the best place for a boat in a hurricane. Boats that were bobbing gently next to a dock before a storm sometimes wind up on top of, underneath, or sunk next to that dock. And in sailboat marinas, especially when berths are close together, masts can get hopelessly tangled and battered when the weather is on the beam.

Some docks are a better bet than others. Pilings that are rotten and splitting probably won't survive, and floating docks cannot always be trusted. A storm surge can lift a floating dock off its pilings if the pilings are too short. Dock and boats are then free to float off and wreck other boats.

But a dock — fixed or floating — that has sturdy pilings and is well-sheltered from open waters may offer a reasonable degree of protection. If you do decide to leave your boat at a dock, you'll have to do a lot more than merely check the dock lines, although this is certainly important. A second set of docklines (nylon, because it absorbs shock) should be used that are a size larger than those you are already using. A weighted heaving line, incidentally, can come in handy securing docklines in high winds.

Chafe protectors (see **Checklist**) must be on all lines at the chocks and any other potential chafe points. Lines should be led to pilings that are as far away as possible to accommodate tidal surges of 10 feet or more.

Obviously, you should arrange docklines to minimize the chances of the boat's coming in contact with pilings. Nonetheless, fenders and fenderboards are essential — the more the better. If possible, space them along the entire length of the hull.

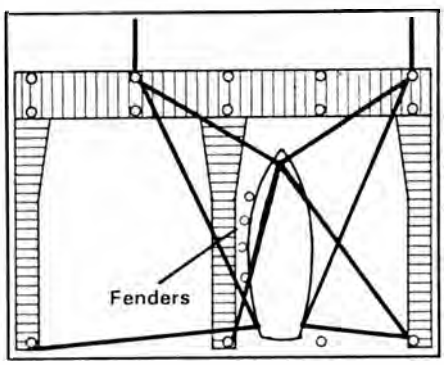


Figure 1. The longer the docklines, the better a boat will be at coping with high tides. It is also essential to double up on all lines and use chafe protectors at any potential chafe points.

If your boat is docked in a marina, nobody, even in the best of marinas, should entrust their boat's hurricane preparation to marina personnel. For one thing, they are very busy, and besides, they probably won't do as good a job as you will.

But after the tempest has past, roads will proably be blocked, and you will almost certainly have to place some trust in your marina manager. Will he have a crew ready to move damaged boats, pump flooded bilges, secure lines, guard against vandals, etc., or will he walk up and down the battered docks shaking his head, drinking coffee, and waiting for you to show up? Talk to your marina's owner now and encourage him to plan ahead.

At a Mooring, at Anchor, or Both

Mooring or anchoring, especially in a harbor that isn't too crowded, is a good bet for many boats. For one thing, a boat can swing to face the wind, which reduces windage. And a boat that's anchored or moored in open water won't bang into a dock unless, of course, the anchor or mooring drag.

The chances of the boat's dragging can be reduced considerably by using a mooring that has been inspected recently (either by you or a competent diver) along with two storm anchors. This increases the mooring's holding power and decreases the room a boat will need to swing (see figure 2). A third storm anchor can be used instead of the mooring.

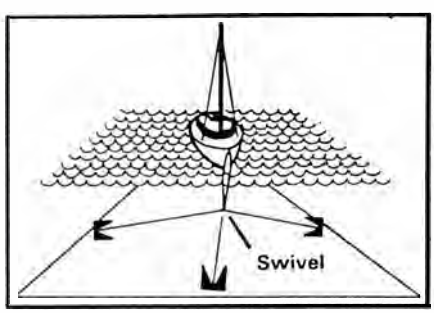


Figure 2. Using three anchors set 120 degrees apart allows the boat to swing and face the wind. This is an especially good technique in crowded harbors because the boat will not swing in as wide an arc as a boat that is riding on only two anchors.

In either case, it is important to have plenty of scope — at least 10:1 — and a lot (the more the better) of heavy, oversized chain. The scope on a mooring can be increased by lengthening the mooring pennant. A riding weight, or sentinel (see figure 3), placed at the nylon/chain juncture, will lower the angle of pull on the anchor and reduce jerking and strain on the boat.

Obviously, you'll want to use an anchor which is suited to the bottom (mud, sand, etc.) where you'll be anchoring. Use anchor sizes that are well above the weights you normally use.

Hurricane Holes

A hurricane hole — deep and narrow, with lots of young, sturdy trees along high, sheltering banks — is the ideal place to leave your boat in a hurricane. To be ideal, the hurricane hole should be far enough inland to provide shelter from high coastal winds and tidal surge but not so far as to be prohibitively difficult to reach in a relatively short time.

The chances are good that you'll have to settle for a hurricane hole that is less than ideal, but this shouldn't prevent you from looking. Clever use of anchors and lines to the shore (see figure 4) increase the number of suitable holes.

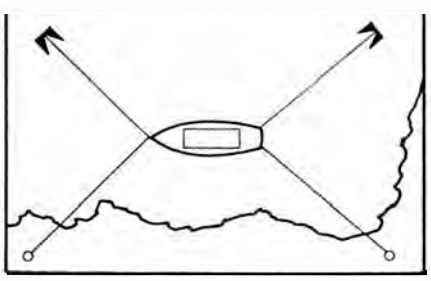


Figure 4. One of many possible arrangements that can be used to secure a boat in a hurricane hole.

Scout out the possibilities well before hurricane season, making test runs and visiting nearby landowners. If possible, try and get a written agreement with whomever owns all of the sturdy, young trees you'll be using.

You can begin your search by talking to members of the Coast Guard Auxiliary or Power Squadron to find out where the best potential hurricane holes are located. Marina owners and other boat owners are two other good sources. A few things to remember while you're looking: A hurricane hole that ordinarily takes an hour to reach may take two hours to reach when winds and seas are building. Bridges may not open as frequently when a hurricane warning is posted, or they may be locked down to evacuate cars. Also, other boats may be eyeing the same spot you've chosen.

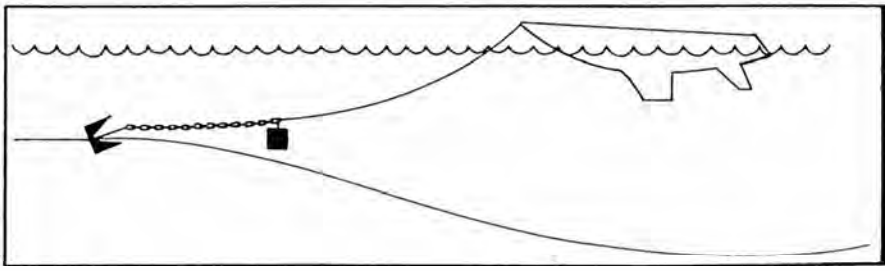


Figure 3. A riding weight or sentinel will lower the angle of pull on an anchor and also reduce the jerking motion on the boat. Some skippers object to this technique because the downward pull of the weight can prevent the bow on some boats from rising above larger waves.

Storage Ashore

Storage ashore is a must for smaller boats, especially trailerable boats. Boats that have low freeboard, such as high performance powerboats, will be safer ashore. Engines and upholstery on these boats are frequently damaged because their low freeboard is easily overcome by waves, spray, and rain. Inboard/outboard units and outboard motors are especially vulnerable to damage from docks and drifting boats. And small boats rarely have cleats and chocks that will stand up to hurricanes.

For larger boats, storage ashore is a good idea if there's time to have the vessel pulled out of the water and if it will be sheltered from high tides, falling trees, and flying debris. Remember also that a boat on shore creates more windage than the same boat in the water. This is especially true of deep-keel sailboats. And, with any boat, a cradle offers much better protection than jackstands.

Storing your boat indoors is an attractive idea if — and here's the rub — the building it will be stored in is sturdy. Many marinas have indoor storage facilities that are about as sturdy as a backyard toolshed.

Trailer Boats

A trailer is — or should be — a ticket to take your boat inland, far from the storm surges, waves, and high winds that pound the coast. But your boat won't get far on a neglected trailer that has

two flat tires and rusted wheel bearings. Inspect your trailer regularly to make sure it will be operable when it's needed.

If you take your boat home, you may want to leave it, and not your car, in the garage. A boat is lighter and more vulnerable to high winds than a car. If this isn't practical, put boat and trailer where they will be sheltered from wind, falling branches, flying gravel, etc.

Let some of the air out of the trailer tires and block the wheels. You can increase the weight of lighter outboard boats by leaving the drain plug in and adding water with a garden hose (rain will add a lot more). This has the added advantage of giving you emergency water (non-drinking) if the main water supply gets knocked out by the hurricane. You'll want to place wood blocks between the trailer's frame and springs to support the added weight. Obviously, with inboard boats, the drain plug should be removed so that the engine isn't damaged by flooding.

Secure the trailer, either to trees or a deadman anchor. (A deadman anchor is any object that can be secured into the soil.) Strip all loose gear, bimini tops, canvas covers, electronics, etc., and then lash the boat to the trailer.

Critical Points Checklist

☐ Cleats and Chocks

Many boats suffer from having cleats and chocks that are woefully inadequate. This problem becomes critical when a second set of larger diameter lines is used with the existing lines. If necessary, add more and larger cleats and chocks now — they'll come in handy all year.

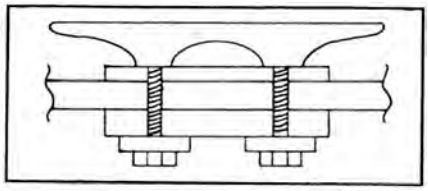


Figure 5. A properly backed cleat. Note the washers and the backing plate. This is essential in a hurricane and is a good idea in quieter times as well.

Assess the ability of cleats and chocks to carry heavy loads. This means making sure that all are backed properly with stainless steel or aluminum plates or, at the very least, large diameter washers (see figure 5). On sailboats, winches and even keel-stepped masts can also be used to secure lines.

Don't lead too many lines to a single cleat. If the cleat goes, the boat will soon follow. Also, a cleat is not reliable when lines are led perpendicular to the cleat's base. The cleat can be wrenched out by the heavier loads (see figure 6).

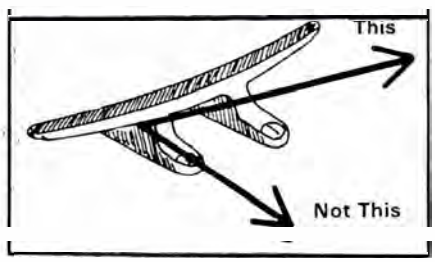


Figure 6. Lines led perpendicular from a cleat can wrench the cleat out of the deck. Two-hole cleats are more vulnerable than the four-hole cleat pictured.

☐ Chafe Gear

Chafe protectors are essential on all lines -- at a dock, at a mooring, or at anchor. Lines that aren't adequately protected will almost certainly chafe through. Ready-made chafe protectors are available through BOAT/U.S., or you can make your own using neoprene hose or heavy canvas.

For a super system, if your chocks are large enough, fit a second, larger diameter hose around another hose that fits snugly to the line. Drill holes in both hoses and use cord to tie them securely to the line. In a pinch, you can use a single hose.

If you need chafe protection quickly, use a lot of duct tape to secure several layers of heavy canvas fabric to the lines. This system won't be as rugged as neoprene hose, but it is certainly better than leaving the line unprotected. The traditional method of sewing the canvas securely onto the line takes more time but is also a good technique.

☐ Stripping the Boat

Before leaving the boat, strip all gear that will create windage: canvas covers, bimini tops, outriggers, antennas, anchors, running rigging, booms, life rings, dinghies, (portable) davits, etc. Remove cowl ventilators and seal the openings. Anything else on deck that can't be taken off should be lashed securely.

Sails, particularly roller furling headsails, should be removed from sailboats. Roller furling headsails create a lot of windage, especially when they are unfurled, which is almost guaranteed to happen no matter how carefully they're secured. Halyards should be run to the masthead and secured with a single line led to the rail. This reduces windage and minimizes flogging damage to the mast. The line can be used later to retrieve the halyards.

Loose gear down in the cabin should be removed from cabinets and the cabinet doors secured. Take all electronics off of the boat. Not only can they be damaged by water, electronics are also the first to go when vandals crawl aboard. Use duct tape around hatches, ports, lockers, etc., to prevent water damage below.

Close all but the cockpit drain seacocks and bang a plug into the engine's exhaust pipe to prevent water getting into the exhaust pipe and up to the engine's cylinders.

Finally, collect all ship's documents and take them home for safekeeping.

A Boating Buddy

It is nice to have friends, especially when a hurricane is coming and you're out of town or sick. At such a critical time, you need a very special friend. You need a friend who is familiar with your boat's hurricane plan and can implement it in your absence. You need a boating buddy.

A friend who is reliable and lives near your boat makes the best boating buddy. Make sure the friend is familiar with your boat's idiosyncrasies (a sticky starter?) and has a set of keys to your boat. If possible, rehearse your hurricane plan with your buddy, including visits to alternate docking sites or hurricane holes. ↨

An Essay Contest -- An Opportunity To Speak Out

RADM W.F. Merlin
Chief, Office of Command, Control and Communications
U.S. Coast Guard

The evolution of the merchant marine community and the Coast Guard is intertwined throughout the history of this great land. The Naval Institute has just announced a prize essay contest, "What Does the Future Hold for the Coast Guard?", and it is only natural that those of you who serve the maritime needs of this country have an opportunity to speak out on this theme. I encourage you to participate. Three cash prizes of $1,000, $750, and $500 will be awarded, and other entries may be purchased for publication as well.

Essay Contest Rules

1. Articles must be original and no longer than 3,500 words.

2. All entries should be directed to Editor-in-Chief, **Proceedings** (USCG Contest), U.S. Naval Institute, Annapolis, MD 21402.

3. Articles must be received on or before 1 November 1986 at the U.S. Naval Institute.

4. Letters notifying the award winners will be mailed on or about 1 January 1987.

5. All articles should be typewritten, double-spaced, and on 8-1/2 x 11 paper.

6. The winning articles will be published in **Proceedings** (published by the Naval Institute, not to be confused with this magazine). Some entries not awarded a prize may be selected for publication. The authors of such articles shall be compensated at the rate established for the feature for which they are bought.

7. The Naval Institute's Editorial Board will judge the competition.

You see the Coast Guard from a slightly different perspective from the rest of our fraternity, and I encourage you to share your unique view with the maritime community served by the Naval Institute. Good luck. I look forward to seeing your work in print. ↨

SOLAS, Steering Gear, and 1986

LT Peter L. Randall

Reliable steering gear is vital to the safety of a ship, its personnel, and the marine environment. As the result of a number of major marine casualties, considerable effort has been directed toward improving both domestic and international steering gear standards. On September 1, 1984, the first set of amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS) became effective. SOLAS Regulations II-1/29 and II-1/30 represent a major upgrading of steering gear requirements for commercial vessels in international service. September 1, 1986 is significant in these regulations, as it marks the end of relief from certain failure criteria for **new** SOLAS vessels. It also marks the deadline for **existing** tankers, chemical tankers, and gas carriers (referred to in this article as tankers) to comply with certain requirements.

These regulations have already had an impact on the marine community, as many owners, operators, and designers have anticipated the deadlines and have already made necessary changes. Others are modifying their vessels and designs at this time. The following is a brief, "heads-up" synopsis of the SOLAS steering gear regulations effective September 1, 1986. It includes the applicable regulations and a brief discussion of what each regulation means to U.S.-flag vessels with SOLAS Certificates.

September 1, 1986 Deadlines for New U.S.-Flag Construction

SOLAS REGULATION II-1/29.6

6.1 Where the main steering gear comprises two or more identical power units, an auxiliary steering gear need not be fitted, provided that...

6.1.3 the main steering gear is so arranged that after a single failure in its piping system or in one of the power units, the defect can be isolated so that steering capability can be maintained or speedily regained.

6.2 The Administration may, until 1 September 1986, accept the fitting of a steering gear which has a proven record of reliability but does not comply with the requirements of paragraph 6.1.3 for a hydraulic system.

Comments on Regulation II-1/29.6. All ships are required to have a main steering gear and an auxiliary steering gear, so arranged that the failure of one of them will not render the other one inoperative. Regulation II-1/29.6.1.3 further refines this requirement for dual power hydraulic steering gears by applying a single failure criteria to the entire hydraulic system, except the actuators. Dual power hydraulic systems that have traditionally been accepted, but cannot withstand the single hydraulic component failure criteria or provide the rapid resumption of steering, will no longer be acceptable for new installations after September 1, 1986. This assumes that an indepenent auxiliary steering gear is neither provided nor required by another regulation.

SOLAS REGULATION II-1/29.16

Every tanker, chemical tanker or gas carrier of 10,000 gross tonnage and upwards shall, subject to paragraph 17, comply with the following:

LT Peter L. Randall is a Staff Engineer in the Coast Guard's Engineering Branch, Hazardous Materials Division, Office of Marine Safety, Security and Environmental Protection.

16.1 the main steering gear shall be so arranged that in the event of loss of steering capability due to a single failure in any part of one of the **power actuating systems** (emphasis added) of the main steering gear, excluding the tiller, quadrant, or components serving the same purpose, or seizure of the rudder actuators, steering capability shall be regained in not more than 45 seconds after the loss of one power actuating system;

16.2 the main steering gear shall comprise either:

16.2.1 two independent and separate power actuating systems, each capable of meeting the requirements of paragraph 3.2; or

16.2.2 at least two identical power actuating systems which, acting simultaneously in normal operation, shall be capable of meeting the requirements of paragraph 3.2. Where necessary to comply with this requirement, interconnection of hydraulic power actuating systems shall be provided. Loss of hydraulic fluid from one system shall be capable of being detected and the defective system automatically isolated so that the other actuating system or systems shall remain fully operational;

16.3 steering gears other than of the hydraulic type shall achieve equivalent standards.

This vessel, the INCA TUPAC YUPANQUI, suffered a loss of steering on the Mississippi River. It collided with a butane dock and barge, resulting in twelve deaths in the ensuing explosion and fire. (Photographer unknown)

SOLAS REGULATION II-1/29.17

For tankers, chemical tankers or gas carriers of 10,000 tons gross tonnage and upwards, but of less than 100,000 tons deadweight, solutions other than those set out in paragraph 16, which need not apply the single failure criterion to the rudder actuator or actuators, may be permitted provided that an equivalent safety standard is achieved and that:

17.1 following loss of steering capability due to a single failure of any part of the piping system or in one of the power units, steering capability shall be regained within 45 seconds; and

17.2 where the steering gear includes only a single rudder actuator, special consideration is given to stress analysis for the design including fatigue analysis and fracture mechanics analysis, as appropriate, to the material used, to the installation of sealing arrangements and to testing and inspection and to the provision of effective maintenance. In consideration of the foregoing, the Administration shall adopt regulations which include the provisions of the Guidelines for Acceptance of Non-Duplicated Rudder Actuators for Tankers, Chemical Tankers and Gas Carriers of 10,000 Tons Gross Tonnage and Above but Less than 100,000 Tons Deadweight, adopted by the Organization.

SOLAS REGULATION II-1/29.18

For a tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards but less than 70,000 tons deadweight, the Administration may, until 1 September 1986, accept a steering gear system with a proven record of reliability which does not comply with the single failure criterion required for a hydraulic system in paragraph 16.

Comments on Regulations 29.16, 29.17, and **29.18.** These three regulations define criteria for tanker hydraulic steering gears that are more stringent than the general criteria of Regulation II-1/29.6.1.3 above, which applies to all new SOLAS vessels. While Regulation II-1/29.6.1.3 applies the single failure criteria to the power units and piping and requires the ability to speedily resume steering, these three regulations extend the single failure criteria to include the actuators. They also define "speedily" as being within 45 seconds after loss of the power actuating system. The 45 second criteria dictates the use of detection equipment and either remotely controlled or automatically

controlled hydraulic system reconfiguration capabilities. Regulation I-1/29.17 offers some relief from the application of the single failure criteria to non-duplicated rudder actuators, e.g., rotary vane actuators, if they meet certain criteria for robust construction.

Traditional systems that cannot meet the hydraulic system single failure provisions of Regulations II-1/29.16 and 29.17 will no longer be acceptable on newly constructed tankers between 10,000 gross tons and 70,000 deadweight tons after September 1, 1986.

September 1, 1986 Deadlines for Existing U.S.-Flag Tankers, Chemical Tankers, and Gas Carriers of 10,000 Gross Tons and Over Constructed Before September 1, 1984

SOLAS Regulation II-1/29.19

29.19 Every tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards, constructed before 1 September 1984, shall comply, not later than 1 September 1986, with the following:

19.1 the requirements of paragraphs 7.1, 8.2, 8.4, 10, 11, 12.2, 12.3 and 13.2;

(Each of these is listed and commented on individually below.)

SOLAS REGULATION II-1/29.7.1

Steering gear control shall be provided...for the main steering gear, both on the navigating bridge and in the steering gear compartment;

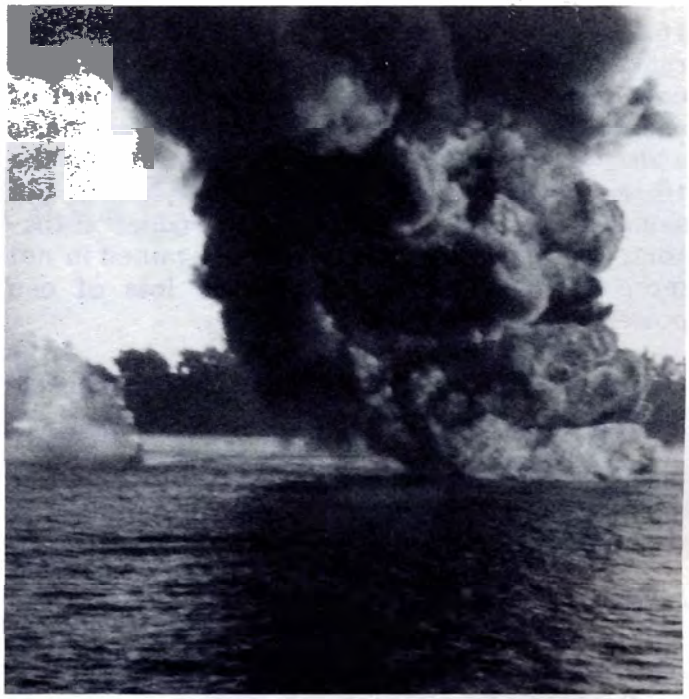
Comments on Regulation II-1/29.7.1. This regulation is similar to the requirements that already exist in 33 CFR 164.39(c) and (f)(1), and U.S.-flag tankers should already comply.

SOLAS REGULATIONS II-1/29.8.2 and 29.8.4

Any main and auxiliary steering gear control system operable from the navigating bridge shall comply with the following:

8.2 means shall be provided in the steering gear compartment for disconnecting any control system operable from the navigating bridge from the steering gear it serves;

8.4 in the event of a failure of electrical power supply to the control system, an audible and visual alarm shall be given on the navigating bridge; ...



One of the butane barges hit by the INCA TUPAC YUPANQUI burns out of control on the Mississippi River. (Photographer unknown)

Comments on Regulations II-1/29.8.2 and 29.8.4. Regulation II-1/29.8.2 is intended to allow a remote control system to be disconnected from the steering gear it serves, thereby permitting the steering gear to be controlled by another control system. This regulation requires disconnection of the remote control **system**, not **just power** to the remote control system. This allows isolation of damaged remote control components. Regulation II-1/29.8.4 is similar to the requirements that already exist in 33 CFR 164.39(d)(3), and U.S.-flag tankers should already comply.

SOLAS REGULATION II-1/29.10

A means of communication shall be provided between the navigating bridge and the steering gear compartment.

SOLAS REGULATION II-1/29.11

The angular position of the rudder shall:

11.1 if the main steering gear is power operated, be indicated on the navigating bridge. The rudder angle indication shall be independent of the steering gear control system;

11.2 be recognizable in the steering gear compartment.

Comments on Regulations 29.10 and 29.11. These regulations are similar to requirements that already exist in 33 CFR 164.39(f)(3), (f)(4), and (f)(5) respectively, and U.S.-flag tankers should already comply. Usually, the means of communication is part of the sound-powered telephone system required by 46 CFR Subchapter J. The requirement for the rudder angle indication to be independent of the control systems is particularly important, as it permits independent indication of steering gear malfunction.

SOLAS REGULATIONS II-1/29.12 and 29.13

12 Hydraulic power-operated steering gear shall be provided with the following: ...

12.2 a low level alarm for each hydraulic fluid reservoir to give the earliest practicable indication of hydraulic fluid leakage. Audible and visual alarms shall be given on the navigating bridge and in the machinery space where they can be readily observed; and

12.3 a fixed storage tank having sufficient capacity to recharge at least one power actuating system including the reservoir, where the main steering gear is required to be power operated. The storage tank shall be permanently connected by piping in such a manner that the hydraulic systems can be readily recharged from a position within the steering gear compartment and shall be provided with a contents gauge.

The INCA TUPAC YUPANQUI casualty occurred because the vessel lacked independent control systems, such as are now required by SOLAS on tankers. In the fire which followed the collision and explosion, the vessel was burned out from the deck up. (Photographer unknown)

13 The steering gear compartment shall be ...

13.2 provided with suitable arrangements to ensure working access to steering gear machinery and controls. These arrangements shall include handrails and gratings or other non-slip surfaces to ensure suitable working conditions in the event of hydraulic fluid leakage.

Comments on Regulations 29.12 and 29.13. These are new requirements, with no comparable counterparts for existing tankers in U.S. regulations. The low level alarm has been required by 46 CFR 111.93-13(a) for **new** U.S.-flag tankers since 1982. This alarm is required for the reservoirs of the power actuating system, but it is not required for the storage tank of Regulation II-1/29.12.3. The fixed storage tank should have sufficient capacity to permit the recharge described with the reservoir level, at minimum, in the middle of its operating range. If possible, the storage tank should be located in the steering gear room, the recharge arrangements should permit immediate recharge from within the steering gear room.

SOLAS REGULATION II-1.29.19

Every tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards, constructed before 1 September 1984, shall comply, not later than 1 September 1986, with the following: ...

19.2 two independent steering gear control systems shall be provided, each of which can be operated from the navigating bridge. This does not require duplication of the steering wheel or steering lever;

19.3 if the steering gear control system in operation fails, the second system shall be capable of being brought into immediate operation from the navigating bridge; and

19.4 each steering gear control system, if electric, shall be served by its own separate circuit supplied from the steering gear power circuit or directly from switchboard busbars supplying that steering gear power circuit at a **point on the switchboard adjacent to the supply** to the steering gear power circuit.

Comments on Regulation 29.19. The intent of Regulations II-1/29.19.2 and 29.19.3 is to ensure that a single failure in a steering gear control system operated from the bridge will not prevent immediate restoration of steering control from the bridge. The requirement for immediate change of control systems dictates that the changeover be initiated entirely from the bridge, without personnel starting, stopping, or re-aligning steering gear equipment from the engineroom or steering gear room. In some cases, this may mean that remote pump start and stop capabilities have to be added, or that remote or automatic 6-way transfer valve operation has to be provided. Equipment added for these purposes should maintain the intended ability to function independently in the event of a single failure in the remote controls. Regulation II-1/29.19.2 raises the question of whether controls in the steering gear room, such as feedback devices, differential units, "hunting gears," and actuators for 6-way valves are required to be duplicated to meet the requirement for two **independent** control systems. Tankers constructed prior to the revision of the Coast Guard Electrical Engineerinng Regulations in 1982 have not been required to duplicate these control devices during upgrading unless their steering gears undergo substantial re-design or replacement. Control components that are not duplicated, however, should meet the criteria of SOLAS Regulation II-1/29.2.1, which calls for "robust" construction of non-duplicated components. New vessels, and vessels whose steering gear undergo substantial redesign or replacement, must duplicate **all** control system components.

Regulation II-1/29.19.4 is similar to the requirements of 33 CFR 164.39(d)(2)(ii), and U.S.-flag tankers should already comply.

* * *

General Comments on Existing Tankers. Many of the above requirements for existing tankers are the same as longstanding regulations in 33 CFR 164.39 and 46 CFR Subchapters F and J. The 33 CFR 164.39 steering gear regulations resulted from the Port and Tanker Safety Act of 1978 and already require all U.S.-flag tankers over 10,000 gross tons to comply. As a result, U.S.-flag tankers should already be in compliance with the majority of the SOLAS regulations mentioned above.

Changes to steering gear systems made solely to comply with SOLAS are not considered "major modifications," and SOLAS steering gear requirements other than those mentioned above are not applicable. These changes are **new installations** in the context of U.S. Regulations, however, and provisions of 46 CFR Subchapters F and J and 33 CFR 164.39 generally do apply to any SOLAS-mandated changes. For example, if a component is added to comply with SOLAS Regulations, the arrangement and construction of the new component should meet the applicable U.S. Regulations. ↕

If you have any questions on SOLAS steering gear regulations, contact the Engineering Branch of the Coast Guard's Marine Technical and Hazardous Materials Division at (202) 267-0026.

Hazardous Chemical Guide Available (Again)

In the February 1986 issue of **Proceedings**, we informed our readers that the **Hazardous Chemical Data Manual** was available for purchase through the Government Printing Office. This publication proved so popular that the GPO was completely sold out of the **Guide** within weeks. However, the **Guide** was reprinted, and sufficient quantities are now available for those readers who may wish to order it.

Manual I, the **Condensed Guide to Chemical Hazards** ($14.00) can be ordered by its stock number, 050-012-00224-0. The corresponding binder ($3.50) can be ordered using stock number 050-012-00151-1.

Manual II, the **Hazardous Chemical Data Guide** ($41.00) was also reprinted. The stock number for this manual is 050-012-00215-1. Although the manual will fit in any standard 2-1/2" three-ring binder, you may order GPO's binder ($5.00) using stock number 050-012-0223-1.

Interested persons may call the Government Printing Office's purchasing department at (202) 783-3238 for details on how to order. Please note that there is an additional 25 percent charge for foreign orders.

These two manuals are part of the Chemical Hazards Response Information System (CHRIS), used by the Coast Guard in responding to hazardous material spills in or around large bodies of water. ↕

This material originally appeared as part of the "Shipper's Clip and Save Corner" series in the ***Journal of Commerce.*** *"Clip and Save" is an exclusive* ***Journal of Commerce*** *feature. Reprinted with permission.*

Ocean Shipments of Packaged Hazardous Materials: Top Questions

Ron Bohn

Mr. Bohn is the Hazardous Materials Manager for the National Cargo Bureau, Inc. The NCB is authorized under 49 CFR 176.18 to assist the Coast Guard in administering the DOT's Hazardous Materials Regulations (49 CFR Parts 171-179) with respect to the loading and stowage of hazardous materials on merchant vessels. A certificate of loading issued by the NCB may be accepted by the Coast Guard as evidence that a vessel's cargo is stowed in accordance with statutory and regulatory requirements.

Mr. Bohn's article follows:

The following questions and answers are based on my years of responsibility for ocean shipments of packaged, containerized dangerous cargoes. The questions reflect concerns or needs frequently expressed by shippers, exporters, freight forwarders, and brokers.

1. We may be marketing our Department of Transportation regulated commodity overseas. Must we figure out the applicable international requirements or could our international freight forwarder do that for us?

The shipper has the primary responsibility to do so. It would therefore be wise to determine the international hazard classification, shipping description, packaging, labeling, etc., yourself.

Relatively few forwarders/brokers have such expertise. (It's not a requirement for a license from the Federal Maritime Commission.) The special and often technical knowledge required, the costs of maintaining a library of updated DOT regulations and international codes — plus the liability exposure — probably discourage many from taking on such special cargo responsibilities.

In such situations the shipper may consider using (1) international carriers who have established expertise and demonstrable regulatory knowledge, (2) professional consultants, and (3) freight forwarders/brokers who already serve other chemical exporters that monitor their performance.

In addition, of course, you should consult with the manufacturer of the commodity involved. (Caution: I have found that few chemists are familiar with the transportation regulations. They can, however, at least provide chemical data sheets for the product concerned. Such starting information is vital.)

2. Our shipments are going to be containerized. Is there anything special we should know about such moves?

Yes. Packaging, marking, and labeling requirements are not relaxed. All packaging units must still be marked with the regulated commodity's proper shipping name and UN number near the hazard label. The only DOT requirement that is waived is the one for the consignee's or consignor's name and address.

General segregation is given in Title 49, Code of Federal Regulations (49 CFR) Part 176. "Carriage by vessel," section 176.83, Table 2. If any segregation is required between the hazard classes in question, then those two may not be in the same container — in any quantity. **Specific** segregation applicable to individual regulated commodities is indicated in the 49 CFR's Hazardous Materials Tables, column 7c, "Water Shipments/Other Requirements" or "Vessel Stowage Requirements," depending on which table is used.

Ron Bohn joined the National Cargo Bureau, Inc., in 1985 after many years with Hapag-Lloyd (New York) as Hazardous Materials Manager. His book, ***Hazardous Materials,*** *was published in June 1985 by International Thomson Transport Press, and his monthly "Hazardous Materials" column appears in* ***Brandon's Shipper & Forwarder*** *and* ***Pacific Shipper.***

All packaging must be secured to prevent movement in any direction using "dunnage" (undefined in 49 CFR) secured to the floor. (Consult 176.76 and the Coast Guard's Marine Technical and Hazardous Materials Division, (202) 267-1577.

3. *How can we determine if our commodity qualifies as a dangerous cargo? It's not regulated by DOT, so it's probably not covered internationally either. Right?*

Wrong on the last part. The definitions and criteria for DOT's "hazardous materials" are not identical to the International Maritime Organization's "dangerous goods." The criteria differ significantly for flammable liquids, poisons, and corrosives. There is a basic, general parallel between the DOT class names and the IMO (formerly IMCO) class numbers, but the IMO criteria tend to be broader than DOT's.

Call them "hazardous materials" or "dangerous goods" or "regulated commodities," but be aware that they cover not only materials (mostly chemicals) but also some manufactured articles, e.g., ammunition, electric storage batteries, cigarette lighters, toy caps and fireworks, signal flares, and aerosol dispensers, to name a few.

DOT's hazard class criteria are in 49 CFR Part 173. Find specific 173 section numbers by looking up class name in 171.8, "Definitions and Abbreviations," Note 172.102(h) for DOT to IMO class conversion.

The IMDG Code describes IMO class "properties" in the preface to each class section of the Code. For 6.1 poisons, note toxicity table and definitions in section 2.1.

4. *What U.S. and international regulations for ocean shipments should we have? Where can we buy them, and how do we update them?*

The U.S. (DOT) regulations are in 49 CFR Parts 100 to 177 and Parts 178 to 199. The first volume mentioned sells for $19.00, the second for $15.00 when purchased from a federal bookstore or the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. (Telephone for credit card orders and information is (202) 783-3238.) Be sure to order the November 1985 edition with the blue cover.

The international ocean "regs" aren't regulations but IMO recommendations that became regs in the maritime countries that adopted the Code into their national laws. That five-volume, ring-binder set is published in London by IMO but is available in the United States with current amendments from the following sources: Labelmaster, Chicago, telephone (800) 621-5808; New York Nautical Instrument, (212) 962-4522; and Southwest Instrument Company, San Pedro, California, (213) 519-7800. The full name of the IMDG Code (still called "IMCO books" by some) is the **International Maritime Dangerous Goods Code.** (Its latest amendment, No. 22-84, became effective on July 1, 1986.) These firms also sell the 49 CFR but at a slightly higher price than the Government Printing Office.

The 49 CFR update service, using a loose-leaf version of the 49 CFR, is available on a subscription basis from such firms or organizations as AAR/Bureau of Explosives, Washington, DC, telephone (202) 639-2555; J.J. Keller Co., Wisconsin (800) 558-5011; Bureau of National Affairs, Washington, DC (301) 258-1033; and the Regulations Management Company, Vincentown, New Jersey (609) 859-0060. (Suggestion: Call for literature and prices first. By the way, the two bureaus mentioned here are not government agencies.)

5. *How do we go about getting our people trained — and then keep up with regulatory developments?*

Free training materials and guides plus periodic recaps of available courses are available from DOT's Training Services Branch (DHM 51), O.H.M.T., Department of Transportation, Washington, DC 20590; telephone (202) 366-2301.

My "Hazardous Materials" column appears every fourth Monday in **Brandon's Shipper & Forwarder** and **Pacific Shipper.** Larry Bierlein also recently started an excellent hazardous materials column in **Traffic Management.**

Publications that specialize in coverage of hazardous materials include the **Courier,** published by the Hazardous Materials Advisory Council; the biweekly newsletter **Hazardous Materials Transportation** by Washington Business Information, Inc., and, from London, the **Hazardous Cargo Bulletin.**

A closing suggestion: have at least one staff member specialize in regulatory matters and be responsible for keeping the 49 CFR and IMDG Code up to date. Competence and professionalism won't come from a number of people just dabbling with it. Incompetence in this area of knowledge is the one area that can result in death or serious injury. ↕

New Publications

Merchantman? or Ship of War?

(Available from Ensign Press, P.O. Box 638, Camden, Maine 04843. Price is $18.75. Include $1.25 postage for the first book and $.75 for each additional book.)

Author Charles Dana Gibson has served the merchant mariner well by providing a history of sacrifices made by these sailors since the American Revolution. His thrust is the historical role of the merchant mariner in time of war. I particularly commend him for good organization, an excellent table of contents, and a good index. These features make this work easy to use as a reference tool.

The real strength of the work is the materials presented for the two World Wars. Mr. Gibson gives a good description of merchant marine administration and some operational activities during these wars. The author does not limit his research to the American experience but also includes information about allies and enemies when it is germane to his subject.

I do believe that the author needs to share more information concerning the sources that he used, particularly for 18th and 19th century materials. For example, on page 4 he cites an outstanding quotation from **Memoirs of John Adams** as to the value of the merchant marine, but he does not tell us the page location within this large work. Also, while addressing the 19th century, Mr. Gibson makes some broad generalizations, which may be true, but do need to be supported with source citation. For example, on page 7, he states "[merchant mariners] were highly successful, providing more of a harassment to Britain [during the War of 1812] than did our Navy." On pages 19-20, Mr. Gibson states, "Peace Negotiations [to end the Spanish-American War] started on the first of October of 1898, just four months following the start of hostilities." This cannot be. The MAINE blew up on 15 February, a blockade of northern Cuba was proclaimed on 22 April, and the Battle of Manila occurred on 1 May. All of these events occurred more than four months prior to 1 October, and at least one of these must be a hostile act.

This work is a usable research tool for the individual who can balance its information with that from other sources. *(Reviewed by Dr. Robert L. Scheina, U.S. Coast Guard Historian)* ↕

Thermal Spray Coatings for Controlling Corrosion in Marine Environments

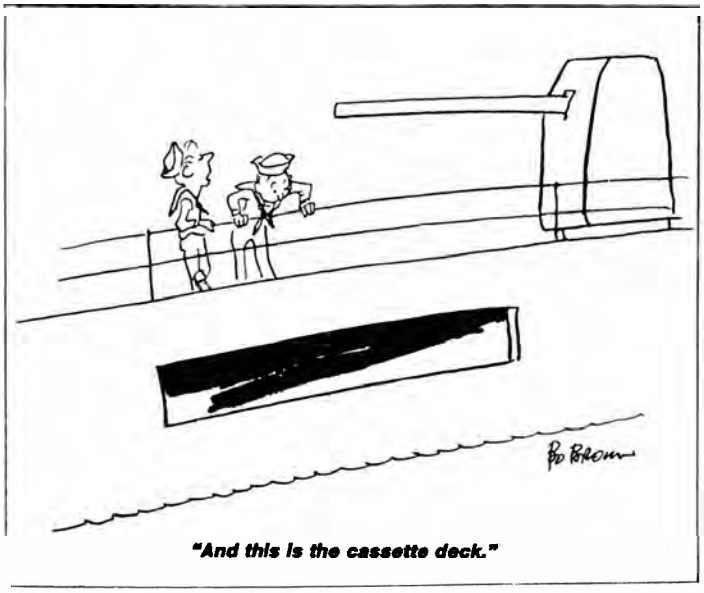
Commercial use of thermally sprayed zinc and aluminum coatings for the long-term corrosion protection of steel structures has been underway for 50 years. Over the last 10 years, increasing use has been made of thermally sprayed aluminum coatings for corrosion control on U.S. Navy ships. To understand the corrosion protection mechanisms of thermal spray coatings, the David Taylor Naval Ship R&D Center has been evaluating the coatings' performance using long-term exposures and electrochemical techniques. Long-term exposures in the marine atmosphere, the marine splash and spray zone, and under seawater immersion have been investigated for the last 3 years. Field exposure results show that sprayed aluminum coatings are capable of providing long-term, cost-effective corrosion protection for steel substrates in marine environments. *(From Navy Domestic Technology Transfer Fact Sheet, May 1986)* ↕

Correction

In last month's issue of **Proceedings** (Vol. 43, No. 8, August 1986), an error appeared in the article, "Drugs and the Merchant Mariner," by LCDR Christopher Walter.

On page 174, the final column in Table 1 is incorrectly labeled as "1985." This column should have been labeled "Total," as it reflects the total statistics for 1982, 1983, and 1984.

Our apologies to LCDR Walter and to our readers for this typographical error. ↕



"And this is the cassette deck."

Open Water Survival

LTJG Robert S. Spears, Jr.

Imagine yourself washed overboard into a 30-foot sea. As the personal flotation device (PFD) you donned in preparation to abandon ship forces you to the surface, you think it's all over. How can a mere mortal survive hurricane conditions in open water? Fortunately, you've managed to swim or drift to a liferaft that was launched seconds before you inadvertently followed it. You prepare to climb aboard, then hesitate — for through the spray, which is being blown by 70-knot winds, you can see an oil rig you reckon to be not more than a half-mile away. The four other crew members of your sunken tug have also found their way to the liferaft. Should you stay put or swim to the rig?

Just after dawn on August 17, 1983, a 112-foot, offshore uninspected towing vessel, the JOEL ROBIN, was being tossed about by nearly 35-foot seas and winds between 70 to 90 mph. The vessel's operator felt something was wrong with the tug's motion and directed the engineer to take a look. The engineer found the engineroom flooding. Attempts to use the bilge pumps failed, since seawater had apparently shorted them out. With the vessel sinking and no way to save it, the operator ordered the crew to abandon ship. Five men mustered on the bow of the foundering vessel, each wearing a PFD. They inflated and launched a 12-man liferaft and tended it by the sea painter. Although it was damaged by repeated collisions with the hull, the liferaft remained afloat. Suddenly, the crew was swept overboard, and they had to swim for the liferaft. Moments later, the JOEL ROBIN was swallowed up by the hurricane-tossed waters. For reasons we will never know, the first man to reach the raft decided to continue swimming, apparently headed for an oil production platform about a quarter- to a half-mile away. As the other members of the crew beckoned him to return to the liferaft, the lone swimmer disappeared and was never seen again.

The following day, the JOEL ROBIN was reported missing. The survivors were spotted by a private company's helicopter just one and a half days later. A Coast Guard helicopter recovered the men and took them to a hospital in Galveston, Texas, for treatment of exposure. Aside from one crewman who suffered a puncture from a boat hook they were in good shape. A futile search for the other crewman continued an additional day.

There are several lessons to be learned from this case. The first and foremost has to be the demonstrated need for training in open-water survival techniques. This is an established fact, and the International Maritime Organization's Standards of Training, Certification and Watchkeeping for Seafarers Convention of 1978 has outlined areas to be included in open-water survival courses. We encourage all seafarers to attend this training whether required or not, since the situation described in this article can happen to anyone. "Getting the survival craft clear of the ship" and "how to jump into the sea from a height and reduce the risk of injury when entering the water" are just a couple of the topics mariners will be exposed to in a training environment. Thereafter, if the real thing occurs, they will have the knowledge and "experience" to make the right decsion. For information about the availability of such courses, write to Commandant (G-MVP-3), U.S. Coast Guard Headquarters, 2100 Second Street SW, Washington, DC 20593. Remember, regardless of how strong a swimmer you are, the current will take you with it, and not necessarily in the direction you are heading. Your chances of survival, detection, and rescue are best if you remain in or near the survival craft. ⚓

LTJG Spears is a member of the Coast Guard's Training and Qualifications Branch, Merchant Vessel Personnel Division, Office of Marine Safety, Security and Environmental Protection.

Marine Safety Council Membership

RADM Edwin S. Daniels, Sr.

Rear Admiral Edwin H. Daniels, Sr., Chief Counsel for the U.S. Coast Guard, retired on June 30, 1986.

RADM Daniels was graduated second in the U.S. Coast Guard Academy Class of 1953 and was commissioned an Ensign. His duty stations included tours on the USCGC ABSECON, Commanding Officer of the LORAN Station Cape Christian, Baffin Island in the Canadian Arctic, and as Rescue Coordination Center in the Seventh Coast Guard District in Miami.

Following his graduation in 1963 from the George Washington University Law School, he became a member of the Bar of the District of Columbia. During his tour as Assistant Legal Officer for the Third Coast Guard District, he was temporarily assigned as Coast Guard Liaison Officer to the American Consul General in Nassau, Bahama Islands, during the Cuban crisis.

During his tour as Commanding Officer of USCGC DIGILENCE in Key West, Florida, he received the Coast Guard Achievement Medal. The Coast Guard Commendation Medal was awarded him during his tour as Legal Officer for the Seventh Coast Guard District in Miami. RADM Daniels became Commanding Officer of the Support Center on Governors Island where the Coast Guard Meritorious Unit Citation was awarded for its role in the New York Harbor Operation Sail in 1976. The Coast Guard Meritorious Service Medal was awarded RADM Daniels upon completion of his tour as "Mayor" of Support Center, Governors Island.

On March 31, 1981, RADM Daniels assumed command of the Ninth Coast Guard District, Cleveland, Ohio, and was designated as Chief Counsel for the Coast Guard in June 1981.

Other awards presented to RADM Daniels are the Coast Guard Expert Pistol Medal, the Arctic Service Ribbon, the Coast Guard Unit Citation, and the Coast Guard Commendation Ribbon. He was inducted into the Coast Guard Academy Athletic Hall of Fame in October 1976.

RADM Daniels is married to the former Rebecca Plemmons of Asheville, North Carolina. They have four children: Edwin, Jr., LT, USCG, stationed on the USCGC EAGLE in New London, Connecticut; Nan Elizabeth, Celia Catherine and Amy Susan.

RADM and Mrs. Daniels are making their retirement home in North Carolina.

Captain Robert F. Ingraham

Captain Robert F. Ingraham, Executive Secretary of the Marine Safety Council and Executive Director, Towing Safety Advisory Committee, retired from the Coast Guard on June 30, 1986. At a retirement luncheon on June 18, 1986, RADM Clyde T. Lusk, Chief of Staff of the U.S. Coast Guard, awarded CAPT Ingraham the Coast Guard's Meritorious Service Medal.

CAPT Ingraham and his wife, Grace, are returining to their home on the Nansemond River in Suffolk, Viriginia. The Captain has no immediate plans other than for some travel in the United States; however, in time he may interest himself in some facet of our maritime industries.

Editor's Note: In the year CAPT Ingraham served as Executive Secretary of the Marine Safety Council, he directly supervised the preparation of this magazine. I would personally like to thank Capt Ingraham for his commitment to the ***Proceedings*** *and for his invaluable advice on technical matters. It was a pleasure to work for you, Captain.*

Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations:

ENGINEER

1. How is the concentration of dissolved oxygen in the feedwater of an auxiliary boiler maintained at acceptable limits?

A. Feedwater is cycled through a D.C. heater.
B. Feedwater is treated with phosphates.
C. Oxygen is liberated in the three stages of feedwater preheating.
D. Oxygen is liberated by maintaining the highest practical feedwater temperature.

Reference: NAV SHIPS, Bureau of Ships Technical Manual, Section 9510

2. A pressure drop in the refrigerant liquid line in an R-12 system may cause

A. the solenoid valve to seize.
B. the compressor to hunt.
C. flash gas to form in the liquid line.
D. the expansion valve to freeze open.

Reference: Gunther, Refrigeration, Air Conditioning and Cold Storage

3. Which fuel nozzle requires the LEAST maintenance?

A. Pintle
B. Singlehole
C. Multihole
D. Open

Reference: Stinson, Diesel Engineering Handbook

4. Distribution of lubricating oil throughout a turbine bearing is generally accomplished by the

A. oil wedge.
B. micrometer valves.
C. oil grooves in the bearing.
D. relief bevel.

Reference: Osbourne, Modern Marine Engineer's Manual, Vol. I

5. A nickel-cadmium battery is receiving a normal charge and gases freely. The charging current should

A. be increased.
B. be decreased.
C. be cut off and the battery allowed to cool.
D. remain the same.

Reference: Hubert, Preventive Maintenance of Electrical Equipment

DECK

1. Which of the following materials is most likely to cause compass error when carried in the vicinity of a magnetic compass?

A. Brass
B. Aluminum
C. Lead
D. Steel

Reference: Bowditch, American Practical Navigator

2. Under the IALA-B buoyage system, a square daymark would be colored

A. green.
B. red.
C. green and white.
D. black and white.

Reference: Bowditch, American Practical Navigator

3. Deviation changes with a change in

A. depth.
B. heading.
C. wind conditions.
D. sea conditions.

Reference: Bowditch, American Practical Navigator

4. A vessel 1 point on your starboard bow would be

A. dead ahead.
B. 11.25° relative.
C. 45° relative.
D. 78.75° relative.

Reference: Bowditch, American Practical Navigator

5. Sixty (60) fathoms is marked on the anchor chain by

A. one turn of wire on the first stud from each side of shackle.
B. two turns of wire on the second stud from each side of shackle.
C. three turns of wire on the third stud from each side of shackle.
D. four turns of wire on the fourth stud from each side of shackle.

Reference: Merchant Marine Officer's Handbook

ANSWERS

1-D; 2-A; 3-B; 4-B; 5-D

DECK

1-D; 2-C; 3-A; 4-C; 5-D

ENGINEER

If you have any questions about "Nautical Queries," please contact Commanding Officer, U.S. Coast Guard Institute (mvp), P.O. Substation 18, Oklahoma City, Oklahoma 73169; telephone (405) 686-4417. ‡

Keynotes

Final Rule

CGD 79-077, Workplace Safety and Health Requirements for Facilities on the Outer Continental Shelf (July 10)

The Coast Guard is issuing regulations concerning personal protective equipment and general working conditions on Outer Continental Shelf (OCS) facilities. These regulations address the need identified in the OCS Lands Act Amendments of 1978 to promote safe working conditions by regulating hazards in the workplace. This rule is part of a continuing effort by the Coast Guard to improve safety of life and property on the OCS.

The rule is effective on January 12, 1987.

Requests for copies of NPRMs should be directed to the Marine Safety Council. The address is Commandant (G-CMC), U.S. Coast Guard, 2100 Second Street, SW, Washington, DC 20593; telephone (202) 267-1477. The office, Room 2110, is open between the hours of 8:00 a.m. and 3:00 p.m. Monday through Friday. Comments are available for inspection or copying during those hours. ‡

American Seamanship Trophy for Rescue of Ten During Hurricane

Captain James Edward Bise and the crew of an integrated tug-barge, ITB BALTIMORE, have won the 1986 American Merchant Seamanship Trophy Award. They were cited for distinguished seamanship in rescuing 10 survivors from two sailing vessels lost or disabled in the West Indies during Hurricane Kate in November 1985.

In announcing the selection, John Gaughan, Maritime Administrator of the U.S. Department of Transportation and Chairman of the Select Committee for this prestigious award, said,

> *The Master and members of the crew of the ITB BALTIMORE, with extraordinary skill and courage, maneuvered their vessel in stormy seas and at great risk to their own safety, to effect not one, but two, rescues several miles and hours apart. Their feat was all the more remarkable when one considers that this class of vessel (the integrated tug-barge) is difficult to maneuver even in ordinary seas.*

Each of the wrecked sailing vessels, the 42-foot yacht TAXI DANCER and the 65-foot, two-masted ketch SUNQUEST, had five people aboard when they were caught in the hurricane. All were brought safely aboard the 47,000-deadweight-ton tanker, which is owned and operated by the Berger Group of shipping companies of Lake Success, New York.

The ITB BALTIMORE, loaded with jet fuel, gasoline, and heating oil, maneuvered directly alongside small craft to bring the 10 crew members aboard.

The Seamanship Trophy was established in 1962 by the U.S. maritime community to honor acts of distinguished seamanship by American citizens. This perpetual cup is preserved as a permanent tribute to deeds of extraordinary American seamanship and maritime skill. A unique award, it is not necessarily given every year. There was none last year, for example; the Select Committee (comprised of maritime labor, management, and government representatives) having determined that nominations fell short of the high standards established over the previous 23 years.

The 1986 award is the 19th in the series. It recognizes achievements of American seafarers in calendar year 1985.

As defined by the Select Committee, "distinguished seamanship" includes either a distinguished act of professional competence" in the presence of extreme peril to life or property, or an outstanding feat of seamanship exemplifying the highest standards of professional competence under severe, adverse weather conditions.

The award is given only to American seafarers, not to a company or institution.

The Seamanship Trophy normally remains in the possession of the awardee for half the calendar year from the

date of presentation and otherwise is on permanent display at the American Merchant Marine Museum located on the grounds of the U.S. Merchant Marine Academy at Kings Point, NY.

The saga of the ITB BALTIMORE is told in an official citation to the captain and crew which will be displayed with the trophy.

The citation reads as follows:

On November 17, 1985, Captain Ed Bise and the crew of the integrated tug-barge BALTIMORE located and rescued 10 survivors of two boats sinking in furious seas caused by Hurricane Kate. Five crew members of the 42-foot-yacht TAXI DANCER were pulled from their capsized vessel. Within 2 hours, the BALTIMORE crew rescued all five crew members of the 65-foot, two-masted ketch SUNQUEST from a liferaft, [the crew members] having abandoned their vessel 14 hours earlier.

They performed the tremendously difficult task of bringing their 47,000 dwt tanker, loaded with jet fuel, gasoline, and heating oil, directly alongside small craft to effect the rescues, with extraordinary maneuvering of a vessel which is difficult to maneuver in ordinary seas.

Captain Ed Bise and the crew of the BALTIMORE performed these heroic feats in a selfless manner, ignoring their own peril in the face of immediate and present danger. In the highest tradition of seafaring they came to the aid and rescue of their fellow mariners, bringing aboard all crew members. They performed the tremendously difficult task of bringing their 47,000 dwt. tanker, loaded with jet fuel, gasoline, and heating oil, directly alongside small craft to effect the rescues, with extraordinary maneuvering of a vessel which is difficult to maneuver in ordinary seas. Captain Bise and his crew exhibited the highest level of distinguished seamanship.

At midnight on November 17, 1985, the BALTIMORE was about 200 miles north of St. Croix, V.I., bound for Port Redding, New Jersey, and amid Hurricane Kate. At 0300 hours, the Second Mate heard the first of several garbled messages from a Coast Guard search plane. It reported a vessel in distress. Before a position could be given, the message faded out. His efforts to contact the Coast Guard in San Juan were to no avail. After two and one-half hours of fruitless effort, he tried and succeeded in reaching Radio WOO (a long-range commercial station) in southern New Jersey. They patched him through to San Juan Coast Guard, which relayed the TAXI DANCER's position.

Six hours later, after diverting his ship, Captain Bise sighted the stricken TAXI DANCER. After difficult maneuvers to prevent the small craft from being crushed against the hull, BALTIMORE's Chief Engineer and First Assistant took deck positions to pull the survivors aboard.

Waves were breaking over the BALTIMORE's bow. Winds were buffeting the Second Mate, who was handling the Kilgore gun. Three shots were fired before a line could be secured to the TAXI DANCER. Survivors underwent a scary ordeal scaling the Jacob's ladder to BALTIMORE's wave-lashed deck. The rescue was completed by 1100 hours.

About two hours later, the BALTIMORE reached the liferaft of the SUNQUEST, which had radioed earlier via an ingeniously repaired EPIRB antenna on the liferaft.

A crew member, with the aid of a pair of scissors from the first-aid kit, cut a spiral metal strip from a soft-drink can and fashioned a replacement for the antenna which was lost in the fury of the hurricane.

After three perilous tries, and despite a snapped mooring line, the raft was brought alongside and its crew members struggled aboard the BALTIMORE.

By 1400 hours, some five hours after the first rescue was begun, and eleven hours after the BALTIMORE had diverted its course to find the TAXI DANCER, it headed north to resume the journey to Port Redding, New Jersey. The collective crews of the TAXI DANCER and SUNQUEST were safely on board.

(Each of the vessels had been bound from Bermuda — the TAXI DANCER for St. Maarten; the SUNQUEST for St. Thomas — when they encountered the hurricane. The TAXI DANCER had turned turtle, lost its mainsail, mizzen, and booms, then righted itself and was kept afloat for 16 hours by the crew until the BALTIMORE arrived. Some four hours after the TAXI DANCER was disabled, the crew of the SUNQUEST lost control of the ketch. It broke up, and around midnight the crew took to the liferaft.)

The extraordinary seamanship skills of Captain Bise and the heroic, persistent and gallant efforts of his crew under extreme weather conditions uphold the highest traditions of the sea. In saving human life and in the demonstration of the most excellent qualities of seamanship, Captain James Edward Bise, Jr., and the crew of the ITB BALTIMORE qualify as the winner of the 19th American Merchant Marine Seamanship Trophy Award." ⚓