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Cover

The Coast Guard is becoming increasingly concerned about the shipment of hazardous materials and is conducting a random, "spotcheck" program to determine the problem's scope. LCDR John P. Aherne, author of the article beginning on page 3, took this photo of unsafe packaging while participating in an inspection.

Hazardous Materials in Freight Containers :

The Coast Guard Is Looking

LCDR John P. Aherne
Hazardous Materials Branch
Marine Technical and Hazardous Materials Division
U.S. Coast Guard

In the port of Houston, a freight container explosion from improperly packaged aluminum phosphide on board the M/V RIO NEUQUEN killed one dock worker. When inspectors from the Mobile, Alabama, Marine Safety Office opened a freight container, boxes of high explosives came tumbling out and crashed open on the deck. In the same freight container, they found detonators marked, "Do not store with high explosives." New York's Captain of the Port found nine drums of an oxidizer in a freight container without the required hazardous material warning placards. The shipping papers indicated that there were no dangerous goods in the container. They also found a freight container shipment of explosives being imported from the United Kingdom in total disarray with no blocking, bracing, or securing within the container. Many of the packagings were badly damaged.

One one of these instances resulted in a casualty. All, however, had the ingredients of a major incident. The Coast Guard is becoming increasingly concerned about

Inspectors required this load to be repacked and secured before leaving the marine terminal. Photo by John P. Aherne.

the shipment of hazardous materials and is conducting a program to determine how big the problem is.

Twenty- and forty-foot freight containers have become one of the primary means of shipping cargo in the United States. Weekly, thousands of freight containers filled with hazardous materials are imported and exported through U.S. marine terminals. Freight containers are rarely opened until they reach their final destination, and, therefore, little control is exercised over how hazardous materials are shipped.

As part of this effort to determine the extent of the problems with containerized hazardous materials, Coast Guard Captains of the Port and Marine Safety Offices are conducting random spotchecks inside freight containers as they pass through U.S. marine terminals. The Coast Guard spotcheck of the containers is being coordinated with other U.S. Department of Transportation (DOT) modal agencies, the National Cargo Bureau, Inc., and the U.S. Customs Service. In some ports, the U.S. Customs inspectors may open up to 40 percent of all imported freight containers. Customs officials can notify the Coast Guard when serious problems are found.

The DOT Office of Hazardous Materials Transportation is also helping in this effort. They have begun inspections of the freight consolidator facilities outside the port area, in New York and elsewhere, where the Coast Guard does not have regulatory authority. This is where many of the freight containers are packed.

The Coast Guard is looking for problems such as incompatible or improperly secured packages in the container, undeclared hazardous materials, and missing placards. Rear Admiral (Lower Half) J.W. Kime, Chief of the Coast Guard's Office of Merchant Marine Safety, said, "Previously in most ports the Coast Guard responded only if there was a hazardous materials incident. Now we are trying a more preventative approach -- find the problem before it becomes a casualty."

Unsecured drums may roll and break open during shipment. Photo by John P. Aherne.

Insufficient blocking and bracing of goods within a container may be the greatest safety problem with hazardous material shipments. Packages approved to carry a particular hazardous material are not meant to withstand the punishment that can occur during transportation when improperly secured in a freight container.

A primary concern is freight containers packed outside the port area by freight consolidators. They receive cargo from various shippers and pack the cargo into freight containers with similar destinations. Indications are that many consolidators are not totally familiar with the DOT Hazardous Materials Regulations.

Industry sources -- in particular, vessel operators -- have told of the economic pressures that go along with accepting cargo. These are difficult times for the maritime industry, and there is strong competition among the shipping lines. Each container moved means business for the vessel operator. As a result, some carriers may be reluctant to ask too many safety-related questions for fear that the shipper may take his cargo someplace else.

Ron Bohn, Hazardous Materials Coordinator for the National Cargo Bureau, agrees, "The carrier that makes the person offering the hazardous material aware of a restriction should know that he is taking a chance." He cites a case in which a freight forwarder offered a nitrate product in the same container with a flammable liquid. The carrier pointed out that this

was strictly prohibited. The forwarder then contacted another line, which accepted his cargo.

Both the DOT regulations found in Title 49 of the Code of Federal Regulations and the International Maritime Dangerous Goods (IMDG) Code require packages of hazardous materials be tightly packed within the freight container or adequately braced and secured to prevent cargo movement during the voyage. This requirement is a performance-oriented requirement and must be used with sound judgment on the part of the freight container packer. The load must be able to withstand the rigors of the transportation system.

Indications are that approximately 20 percent of the containers inspected by the Coast Guard in this program have been found in violation of the regulations. Some ports are worse than others. The Miami Marine Safety Office found a number of serious problems, including import freight containers holding 100-pound cylinders of anhydrous ammonia, a poisonous gas, rolling around loose without any means of securing within the container. Another container was found packed with 55-gallon drums of toluene diisocyanate, a poison, stacked on top of each other with no dunnage in between.

The San Francisco Marine Safety Office has determined that most of the problems they found could be traced to certain shippers. They are working directly with these shippers to ensure that the regulations are followed.

The New York Captain of the Port has an active freight container inspection program. Although they are finding their share of discrepancies, generally most shippers appear to be complying with at least the minimum standards of blocking and bracing within the container. There may be other problems. LTJG Bart Polizzotti, Hazardous Materials Officer, said, "I am concerned with those freight container consolidators who try to avoid Coast Guard inspections by documenting hazardous materials in freight containers as general cargo or freight-all-kinds. This may be a real problem."

Since the Coast Guard began this hazardous materials inspection effort, there are indications that shippers are trying to become more aware of the regulations and are making a greater effort to comply. One hazardous materials supervisor for a major U.S. vessel operator said that the number of inquiries from freight consolidators on "how to do it right" has increased dramatically. A National Cargo Bureau inspector noticed that fewer freight containers are missing the hazardous materials warning placards.

Coast Guard units are making efforts not to disrupt the ongoing vessel and terminal activities. The Coast Guard is going after the persons who are responsible for the violations. In many cases, this is the freight consolidator and shippers who packed the container and not the terminal and vessel operators. Shippers should know that the Coast Guard is now looking at shipments of hazardous materials, and violations will be issued to those responsible. Violators can be fined up to $10,000 for each violation. The Hazardous Materials Transportation Act also provides for criminal penalties up to $25,000 and/or 5 years' imprisonment. ‡

Letters to the Editor

October 3, 1985
Bangkok, Thailand

To the Editor:

I refer to the article "Blind Spots in Front of Tows" by LCDR Chris Walter and LT Roy Nash, appearing in your October 1985 issue.

The accident described there is certainly most regretful. The need of TV cameras or human lookouts on such extra-high barges is however of common sense, and is practiced by all sensible waterways operators. It is a tradition since centuries past, when deck barges loaded with cotton or other bulky cargoes were the most common sight on U.S. rivers; even in this century, deck barges of the Federal Barge Lines had deckhouses running on most of their length, and this feature perdures today in Asia, in China, and above all in India. Barges carrying cars in Europe have also quite high superstructures aft, and navigate in very restricted waterways. Cargoes of pipes piled up high above deck level in hopper barges are still common in the U.S., and extra-high barges are the rule today on the Columbia.

Besides, whatever its height loaded, a barge is always a bit high on the water by the bow when it is empty, and every trained skipper knows it; a special device, similar in principle to a periscope, is even used on self-propelled barges in western Europe to cope with it, and although the contraption is a

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An Update from the Port of New York

LCDR Kevin J. Eldridge
Chief, Port Safety Division
Coast Guard Captain of the Port,
New York

The Port of New York/New Jersey (or of New Jersey/New York, depending on your loyalties), reportedly can have upwards of 10,000 freight container moves on any given day. We share top honors with Rotterdam as one of the largest container ports in the world. A conservative estimate by local terminal operators places 10 percent of those boxes as containing hazardous materials. Thus, at least 1,000 containers of hazardous materials move through the port each day.

As a former writer of both domestic and international regulations (49 CFR and the IMDG Code), I was not fazed by this number at first. I figured that people were earnestly following those well-written regulations. After all, they were penned in the name of safety. Now, after spending a year as chief, port safety division, Coast Guard Captain of the Port of New York, I find my views slightly altered.

Five Recent Incidents

I have personally been on-scene in the hold of two container ships in "level B" entry gear (self-contained breathing apparatus and chemical splash suit) surveying the contamination caused by the leakage of Poison B liquids and trying to figure out how to safely off-load the ship, placate apprehensive longshoremen and OSHA inspectors, and decontaminate the ship and surrounding containers. These two significant incidents, along with at least three others involving freight containers that occurred in the Port of New York/New Jersey this last year, have brought me to the realization that not all shippers are motivated by safety.

I certainly do not want to paint a picture of doom and gloom. However, if you were to ask that delayed ship's master, agent, or owner, or that terminal operator whose pier is tied up longer than planned, or better yet, that shipper who's footing the bill for the cleanup contractor and related costs, I'm sure you'll get the same response -- one incident is too many.

Fortunately, none of these shipboard incidents has resulted in injury. They did, however, succeed in raising my level of concern.

Compliance Inspection Program

Working through the New York Shipping Association's safety committee and along with the local container terminal operators and National Cargo Bureau, the Captain of the Port of New York developed a container safety inspection program. On May 16, 1985, the Commandant of the Coast Guard established a nationwide inspection program. The resultant statistics are being compiled by Coast Guard Headquarters. Early data indicate that a problem may exist industrywide.

So, how is New York stacking up? After 10 months of inspections, we found that 26 percent, or one in four freight containers opened, has a problem. The discrepancies being found span the entire spectrum, from documentation irregularities to hazardous materials being moved in containers without placards.

Many of these discrepancies are minor and are corrected on the spot by the Coast Guard inspector. Normally these result in an official letter of warning to the shipper. Other discrepancies are more serious and result in the containers being placed on hold and violation reports being submitted for assessment of penalties. Thus far, none has appeared to be the result of a total disregard of the regulations, but more along the line of an ignorance of the regulations -- or at least only a casual understanding.

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MAYDAY! We're Taking on Water, We're Going Down

LT Albert W. Horsmon, Jr.
Marine Technical and Hazardous Materials Division
U.S. Coast Guard

On October 27, 1983, the tug EAGLE was towing two barges in the Gulf of Alaska 25 miles west-southwest of Cape Fairweather. At about 1530 Pacific Daylight Time, in a full gale, the tug heeled sharply to starboard and began flooding. It sank within a few minutes, the towing hawser still attached. Only one person from the crew of nine survived. Often, the exact cause of casualties like this cannot be positively determined. However, the lone survivor was able to recall the liquid loading at the time of the sinking. With this information and knowledge of the wind and sea conditions, we can attempt to reconstruct what may have happened to the tug EAGLE.

This picture was taken while the EAGLE was in the locks in Seattle, just prior to leaving for Anchorage. The EAGLE's captain is standing on the bridge deck. He and seven crew members perished on the return trip; only the chief engineer survived. (Photo © 1984 by David J. Holdsworth)

The Casualty

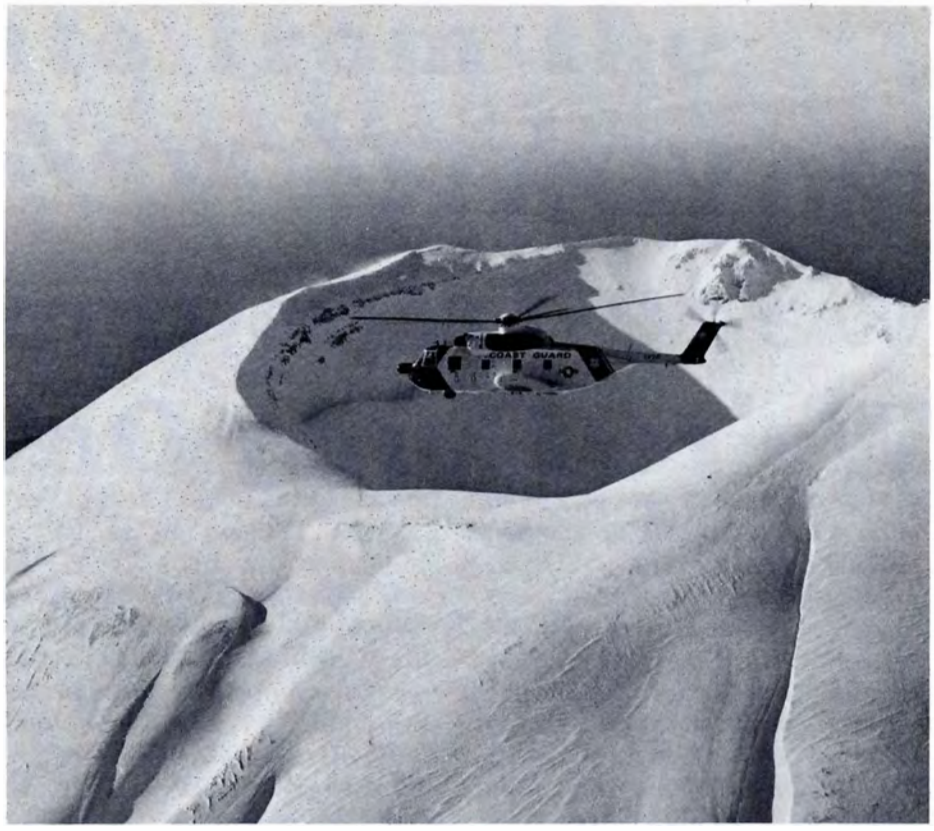
The last voyage of the tug EAGLE was to have been from Anchorage to Seattle. The EAGLE, with two lightly loaded barges in tow astern, encountered rough weather the first day out and hid in Prince William Sound until the weather cleared. The National Weather Service issued an improved forecast for 25 October, so the EAGLE and her barges sailed into the Gulf of Alaska headed for Seattle.

Early in the morning of 27 October, the weather started to deteriorate and got worse throughout the day. By mid-afternoon, the seas had grown to 25 to 30 feet with occasional 50-foot waves, and the wind was gusting to 65 knots. The weather was so bad that the EAGLE and

another tug in the vicinity with a similar tow were losing ground to the storm.

At about 1530, the EAGLE rolled about 45° to starboard, hung there momentarily, then continued over to 80° and began to downflood through the engine room vents and other topside openings. "Mayday, we're taking on water, we're going down" were the last words heard from the vessel. The tug sank in about 10 minutes, taking with it five of the nine crew members. Of the four who got out, only one had his exposure suit to protect him from the chilling water. He was the only one who the crew of Coast Guard H-3F 1470 from Sitka was able to find and rescue.

At first glance it might appear that this was purely a weather-related casualty. The wind-driven barges were pulling the EAGLE astern faster than the tug was pulling them forward. In this situation the tug was overcome by a wave and rolled over. A likely conclusion. However, a closer look at the stability criteria for tugs and the liquid loading of the tug EAGLE bring to light some other possible causes.



This Coast Guard H-3 helicopter from Sitka, Alaska, searched for the EAGLE's crew. Only one crew member had donned an exposure suit. He was the sole survivor. (Official Coast Guard photo)

The Stability Criteria

The tug EAGLE was built in 1973 and was required to obtain a load line. The Coast Guard regulations for load lines include providing stability information to the masters of load lined vessels. As part of the procedure for providing this information, the Coast Guard has developed stability regulations for the various classes of vessels. Generally, the requirements applied to towing vessels in 1973 were that

- the area under the vessel's righting arm curve meet or exceed a specified value;
- the vessel meet a towline pull criteria which establishes a minimum required metacentric height (GM). This was intended to prevent the vessel from pulling itself over (self-tripping) as a result of the overturning moment created by the towline and the propeller forces.
- the vessel meet a weather criterion by having a metacentric height equal or greater than that required based on weather taking a given wind force acting on the hull above the waterline and the deckhouse.

At that time, the only loading condition evaluated was that which produced the full load line draft. The assumption was that for a tug to be effective in towing, it had to keep its screw deep in the water, i.e., maintain its full draft.

As a result of casualties and advancements in design during the last decade, the Coast Guard has revised the stability requirements for towing vessels to include an optional dynamic towline pull criteria, twice as much GM for the static towline pull criteria, and a specified minimum angle of downflooding. Additionally, tugs must meet these requirements at all operating drafts which is usually covered by evaluating the full load, intermediate (part ballast), and burned out (10 percent consummables)

loading conditions. Novel design features that may adversely affect stability, such as special propulsion systems, rudders, or raisable pilot houses, are separately evaluated.

The Stability Analysis

To support his investigation, the investigating officer from Marine Safety Office Juneau requested the Twelfth Coast Guard District technical office to analyze the vessel's stability at the time of the casualty. The chief engineer (unlicensed) and sole survivor of the tug EAGLE recalled the liquid loading of the tug when it sank and related it to the investigator. This loading condition came from taking fuel suction from and adding ballast to various tanks to maintain draft and trim on the long voyage from Seattle to Anchorage and part way back. The information was used to reproduce the casualty loading condition, which is shown in part in figure 1.

The vertical center of gravity (VCG) in this condition was estimated as being 15.13 feet above the baseline when corrected for the free surface of the slack tanks. GM was estimated at 2.63 feet, and the available righting energy (the total area under the righting arm curve) was 13.19 foot-degrees to the 42° range of positive righting arm.

To determine the effect that the liquid loading had on the casualty, an additional analysis was done by rearranging the fuel load from the slack No. 1 P/S and No. 3 P/S fuel tanks to the lower No. 2 fuel tanks while maintaining the same total fuel load. The tanks involved are listed in figure 2.

Figure 1

CASUALTY LOADING CONDITION

TANK	% FULL	VCG at 100%	FREE SURFACE CORRECTION
1. FORE PEAK BALLAST	100.0	11.2	0
2. PORT & STBD BALLAST	0	13.3	0
3. NO. 1 P/S FUEL	45.0	9.6	.12
4. FUEL OIL DAY TANK	81.2	13.2	.03
5. NO. 2 P/S FUEL	0	4.0	0
6. NO. 2 CENTER FUEL	0	3.7	0
7. P/S WING BALLAST	100.0	11.2	0
8. NO. 3 P/S FUEL	84.3	13.3	.11
9. NO. 3 C FUEL	93.2	13.2	.04
10. AFT P/S BALLAST	15.1	14.9	.17
		FREE SURFACE - FUEL & BALLAST	.46
		FREE SURFACE OTHER TANKS	.03
		TOTAL FREE SURFACE EFFECT	.49

Figure 2

REARRANGED FUEL LOAD

TANK	% FULL	VCG at 100%	FREE SURFACE CORRECTION
3. NO. 1 P/S FUEL	0	9.6	
4. FUEL OIL DAY TANK	95.0	13.2	
5. NO. 2 P/S FUEL	100.0	4.0	
6. NO. 2 CENTER FUEL	100.0	3.7	
8. NO. 3 P/S FUEL	0	13.3	
		FREE SURFACE - FUEL TANKS	.03
		OTHER FREE SURFACE (includes ballast)	.23
		TOTAL FREE SURFACE EFFECT	.26

The result was to lower the actual center of gravity by 0.67 feet with a further 0.23-foot reduction in the free surface correction gained by eliminating the free surface in the fuel tanks. The VCG of each tank at 100 percent capacity is listed to show the relative vertical location of each tank. A 0.90-foot effective reduction in the height of the center of gravity to 14.23 feet above the baseline is significant in that the metacentric height (GM) is increased by 0.90 feet. GM grows from about 2.63 feet in the estimated casualty loading condition to 3.53 feet in the condition with the fuel load redistributed. Even more signifcant is the increase in the available righting energy to 37.06 foot-degrees, nearly a 300 percent increase with the fuel load rearranged.

The Casualty Analysis

A stability criteria attempts to set a safety standard which should ensure a minimum amount of safety. However, it remains the operator's responsibility to maintain the vessel in the minimum safe loading condition. Stability is not something one can point to and say that (referring to this casualty) 3.53 feet of GM is safe, and 2.63 feet of GM is unsafe, or that having three times as much righting energy available is excessively safe. However, one can easily see that 3.53 feet of GM is more stable than 2.63 feet of GM and that extra righting energy is desirable to help survive extreme situations.

There are other factors which may have contributed to this casualty in addition to the severity of the weather. The

National Transportation Safety Board, in its report on the casualty (NTSB/MAR-84-07), alluded to the idea that the hold-down device or fair-lead for the towing cable could have failed, allowing the towing cable to tend from the winch instead of the main deck. This would have increased the towline pull heeling moment arm (by which the towline could upset the tug) by 3.5 feet or about 25 percent. Second, a technical study done for the Coast Guard indicated that a vessel perched on a wave can have significantly reduced stability. Third, the same study showed that tow-induced tripping (the tow pulling the tug) is a more dangerous situation than tug self-induced towline pull tripping. The tug EAGLE was certainly in a position to be perched on a wave, and in the gusting winds, the barges were actually towing the tug.

Any one or a combination of the factors mentioned above may have caused or contributed to the casualty. Additionally, other factors not mentioned or known to anyone involved in investigating or analyzing this casualty may have influenced the fate of the tug EAGLE. We will never know with any degree of certainty. ↕

LETTERS TO THE EDITOR

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bit crude, it does render efficient service.

So your article was right in attracting the attention of the readers to this issue, and will hopefully result in less casualties on this wonderful medium shared by both commerce and recreation navigation, the Waterway.

However, I would like to point out that the calculation in the article is valid only if it is a swimmer who is in the blind spot, because it fails to take into consideration the height of the other craft over the water; incidents with sailing craft are for instance much unlikely, taking the height of the mast into consideration; besides, towboats are known to be able to stop within a distance not exceeding the length of their tow, thanks to the use of the flanking rudders, which was involved in the mishap, and they are not that manoeverable. But I would caution strongly against applying "blindly" the above-mentioned method to all cases, as it would become obviously vitiated in a number of instances due to the size of the incoming boat. If the facts reported there are true, then it involves human error, and the principle of extra-high barges is not at fault.

Could there be some technical solutions to help in the navigation of such bulky barges? Besides having a lookout and/or a TV camera in front with a monitor in the wheelhouse, a remote control wheelhouse on the barge is feasible, as was shown by the carriage of the Saturn rockets down the Tennessee and the Mississippi Rivers in the past decades. The Coast Guard is well aware of this technical success, as these barges were constantly monitored by one of its cutters. A special short range radar fitted in front of the barge with all the anti-clutter devices available could also help in a big way. Finally, collapsible wheelhouses could actually be raised higher than usual when a closer watch has to be maintained. But in channels jampacked with small boats not paying any attention to the incoming traffic (the accident described is a case in point), it is not enough to be informed: One must be also able to take action if for instance its sound signals fail to bring the adequate response from the incoming boat.

Apart from the use of flanking rudders, which render a stop faster by enabling a tow to keep on course even in extreme deceleration conditions, fixed-angle bow rudders have proved effective when they are both lowered at the same time, acting as a kind of "water-brake" much akin to the "aero-brakes" used by commercial airliners. In normal service they are used only one at a time, the depth of immersion of their surface giving the same control as the angle of rotation of a normal rudder; besides, they do not protrude out of the hull when not in use, thus being less prone to damage and producing no drag. A similar, more sophisticated service is given by some bow-thrusters, if their action can be directed aft while keeping the vessel in line.

All or a combination of these passive and active safety features are the key to a safer Waterway, particularly when tows have only one or two barges; they appear to be a must when extra-high barges are considered.

Sincerely yours,
J.M. Deplaix

Authors LT Roy Nash and LCDR Christopher Walter reply:

We have read Mr. Deplaix's letter with

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Update: Navigation and Vessel Inspection Circulars

To date, the Coast Guard has published the following Navigation and Vessel Inspection Circulars (NVICs) in 1985:

NVIC No.	Title of NVIC	Price
10-81, CH-1	Change 1 to NVIC 10-81, "Coast Guard Certification and Inspection of Certain Categories of Existing Vessels"	$1.75
10-82, CH-1	Change 1 to NVIC 10-82, "Acceptance of Plan Review and Inspection Tasks Performed by the American Bureau of Shipping for New Construction of Major Modifications of U.S. Flag Vessels"	1.75
0-85	Index of Navigation and Vessel Inspection Circulars (NVICs)	NC
1-85	Fire Safety Standards for Foreign Passenger Vessels	1.75
2-85	Notification to the U.S. Coast Guard for Enforcement of Load Line Requirements	1.75
3-85	Bulk Liquid Cargo Finding Aid	1.75
4-85	Recalls and Other Corrective Measures for Lifesaving Equipment	1.75
5-85	Proposed Voluntary Stability Standards for Uninspected Commercial Fishing Vessels	1.75
6-85	Radio and Shipboard Navigation Equipment; Proposed Voluntary Standards for Uninspected Commercial Fishing Vessels	1.75
7-85	Fire Safety Measures; Proposed Voluntary Standards for Uninspected Commercial Fishing Vessels	1.75
8-85	Lifesaving Equipment and Protection of the Crew; Proposed Voluntary Standards for Uninspected Commercial Fishing Vessels	1.75
9-85	Hull, Machinery and Electrical Installations; Proposed Voluntary Standards for Uninspected Commercial Fishing Vessels	1.75
10-85	Oversight of Technical and Administrative Aspects of Load Line Assignment	1.75
11-85	Coast Guard Guidance Regarding Requirements for Automatic Radar Plotting Aid (ARPA) and Device to Indicate Speed and Distance (Speed Log)	1.75

NVICs published in 1986 may be purchased separately or by subscription from the following address:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

For additional assistance or information please call (202) 426-0173.

Requests for back issues of NVICs (1985 and earlier) may be directed to the address listed below. NVIC No. 0-86, an Index of Navigation and Vessel Inspection Circulars in effect as of January 1, 1986, can be obtained free of charge by calling (202) 426-0173 or by writing to:

Commandant (G-MP-2)
U.S. Coast Guard
Washington, D.C. 20593
ATTN: NVICs

LETTERS TO THE EDITOR

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*interest and appreciate his comments on our article "Blind Spots in Front of Tows" (**Proceedings**, October 1985). We also found Mr. Deplaix's discussion of towing vessel use in other parts of the world and towing vessel maneuvering very interesting.*

Mr. Deplaix's point that our calculation is only valid for objects right at the surface of the water is certainly correct, and we qualified our calculation to account for this very fact. Even with the size of the object taken into acount, we maintain that a properly stationed lookout can provide the operator with vital information until the tow safely passes any given object. In this case, if a sailboat with a mast 22 feet above the water were ahead of the tow, it would have been completely obscured by the barge when it was about 720 feet in front of the barge (over 1,000 feet from the operator's eye). Our concern dealt with the lack of a proper lookout, rather than the size of the barge being pushed or the maneuvering characteristics of towing vessels and tows.

The article was written for several reasons. First, both licensed operators on this tug grossly underestimated the length of the blind spot by a factor of six. Second, tugboat operators can learn valuable lessons from this casualty, such as how to calculate a blind spot. Third, we wanted to point out that the Administrative Law Judge considered the failure to post a proper lookout in this case to be gross negligence.

We do not feel that technical solutions can replace the experience and prudent judgment of the mariner nor the eyes of a trained lookout who is posted to a position where he can clearly see hazards in the tow's path. Some technological approaches may have application as enhancements to the sight, hearing, and judgment of the mariner. However, we do not believe that safety at sea can be served by reliance upon such devices in lieu of a lookout. In the case of a towing vessel pushing a large barge in a crowded waterway, it is simply asking too much fo the operator to monitor short-range radar, video cameras, sound pickups (Rule 5 of both the Inland and International Navigation Rules require the maintenance of a proper lookout by both sight and hearing) and the like while trying to maintain control of a large, unwieldy barge. Technological approaches also have not solved problems that accompany wide ranges of environmental conditions such as glare, fog, reduced lighting intensity (night), and depth perception that the human eye/mind/experience combination handles with ease on a routine basis. The human mechanism is still the most widely adaptable and useful form of lookouts on vessels.

CDR R.B. Meyer, Chief, Ship Design Branch, offers further comments:

Mr. Deplaix has raised some good issues in his discussion of navigation visibility. This topic has received much international attention in the last few years and is the subject of a current U.S. regulatory project. The Coast Guard was instrumental in the preparation of an international standard for bridge visibility, which resulted in the International Maritime Organization's (IMO) passing of Draft Guidelines on Navigation Bridge Visibility in May

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Marine Safety Manual, Vol. II, Now Available

The **Marine Safety Manual** (MSM) is a 10-volume publication which provides information and guidance to Coast Guard personnel assigned to marine safety duties. First published in 1978, the MSM is being revised to update the subject matter and to comply with the Coast Guard Directives System. Volume IV, "Technical," became the first MSM volume to be published on 26 December 1984.

Seven of the volumes will be available to the general public when revision has been finalized (two volumes are being developed and one is classified):

Volume No.	Title	COMDTINST No.
I	Administration and Management	M16000.6
II	Materiel Inspection	M16000.7
III	Marine Industry Personnel	M16000.8
IV	Technical	M16000.9
V	Investigations	M16000.10
VI	Ports and Waterways Activities	M16000.11
VII	General (MOUs, Acronyms)	M16000.15

The second of the revised MSM volumes, Volume II, "Materiel Inspection," is now available from the U.S. Government Printing Office (GPO). For your convenience, we are including a GPO order form in this publication.

Volume II presents the authority, background, and rationale for the various activities performed by the Merchant Vessel Inspection Division (G-MVI) at Headquarters, and certain branches of the Marine Technical and Hazardous Materials Division (G-MTH) and the Port and Environmental Safety Division (G-WPE). Along with field marine safety units, these activities comprise the federal program for accomplishing vessel, facility, and equipment inspections. This volume describes essential functions which must be performed to attain the overall marine safety objectives of the Coast Guard.

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Vessel Exemptions Termination Notice for Inland and International Navigation Rules

This notice was originally published in the September 1985 issue of ***Proceedings.*** *Because the Coast Guard has received numerous calls on this material, we are publishing a revised notice in this* ***Proceedings*** *to emphasize the information.*

Several of the exemptions authorized in Rule 38 of the Inland and International Navigation Rules are due to expire during the next year. These exemptions were created to facilitate the transition from the requirements of the old International, Inland, Western Rivers, and Great Lakes Rules to those of the new Inland and International Rules. Some of these exemptions have time limits of 4 or 9 years after the effective date of the rules; others are permanent.

The Inland Rules' 4-year exemptions are due to expire on December 24, 1985, for all inland waters excluding the Great Lakes, which will expire on March 1, 1987. These exemptions deal with the range and color specifications of navigation lights. More information can be found in Inland Rule 38 paragraph d(i) and (ii) and Annex I.

The International Rules' 9-year exemptions are due to expire on July 15, 1986. These exemptions pertain to the horizontal and vertical positioning of navigation lights. They also deal with the requirements for sound signals. These exemptions are stated in International Rule 38 paragraph d(ii), e, f, and g. The technical information for lights is found in Annex I and for sound signals in Annex III of the Navigation Rules.

The Coast Guard considers the time allowed by these exemptions sufficient to provide for the effective and efficient transition to the new requirements. The Coast Guard has no plans to grant time extensions for these exemptions beyond those stated in Inland and International Rule 38.

The Coast Guard will not grant certificates of alternative compliance to vessels that have not converted to the new requirements, when this failure to convert is based on the fact that they failed to do so within the time frames allowed in Rule 38. Such request, based solely on the failure to meet these time frames, will not meet the requirements for granting an alternative compliance.

Those who might be affected by the expiration of these exemptions are encouraged to examine Rule 38, Annex I and III of both sets of rules in COMDINST M16672.2A, Navigation Rules International and Inland. If you have any questions, contact LTJG E. Zacharias, U.S. Coast Guard Headquarters, Navigation and Information Branch, phone (202) 245-0108. ⚓

LETTERS TO THE EDITOR

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1985. Contained in these guidelines are standards for bridge design which limit blind zone length and width due to obstructions created by fixed structure and cargo. Our regulatory project will be based on the IMO guideline; a Notice of Proposed Rulemaking should be published early next year.

In developing the U.S. position for the IMO we considered Mr. Deplaix's points. One principle we adhere to is that lookouts or secondary means of visual aids for the conning officer should never be applied in lieu of proper design of the conning station. TV cameras, periscopes, and short-range radars may be useful under certain circumstances but should not substitute for a minimum-obstruction view of the water near the vessel. These secondary aids are also susceptible to damage and don't provide the depth perception inherent in the human eye.

We agree that the line of sight projection to the waterline is a conservative approach, since other craft will normally be visible inside the blind zone for some distance. However, it provides a workable basis for comparison that can be easily computed and is consistent with the approach used in the IMO Guidelines. ■

Tugs and barges present particular problems when trying to apply a standard for visibility. Barges can be pushed or towed behind, the tugs may change for each trip, and tug arrangement as well as barge cargo configuration can vary greatly. Maneueverabil-

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Pivot Pin Failure

An equipment failure report of July 1985 brings to attention the importance of close examination and lubrication of the smaller parts of a lifeboat davit. This particular report dealt with the failure of a pivot pin in a sheath-screw davit of the basic design shown in figure 1. In this design, hand-cranking the sheath screw causes the davit arm to move in or out as it pivots about the pin marked "A." According to the report, "During abandon ship drill, as the No. 1 boat was being cranked in (sheath screw), the after davit arm pivot broke off at the junction of the arm and the forward mounting bushing. The weight of the boat pulled the arm back, bending the pin and mounting bushing at the after end until the boat's keel landed on the deck edge. Boat was not damaged."

The report describes the failed pivot pin as twisted because "...both sections froze in the bushings (figure 2). After end of same pin was bent up and back. After pivot bushing housing and mounting pad were bent, as was the forward bushing housing and the lower sheath screw mounting bracket." The report gave the cause of failure as "binding of pin in bushings due to lack of lubrication and maintenance."

The out-of-the-way location of pivot pins makes it easy to overlook their maintenance. Lubrication via the "existing grease fittings" shown in figure 2 may be impossible if they are missing or have become clogged under several layers of paint. Lubrication is necessary to permit a

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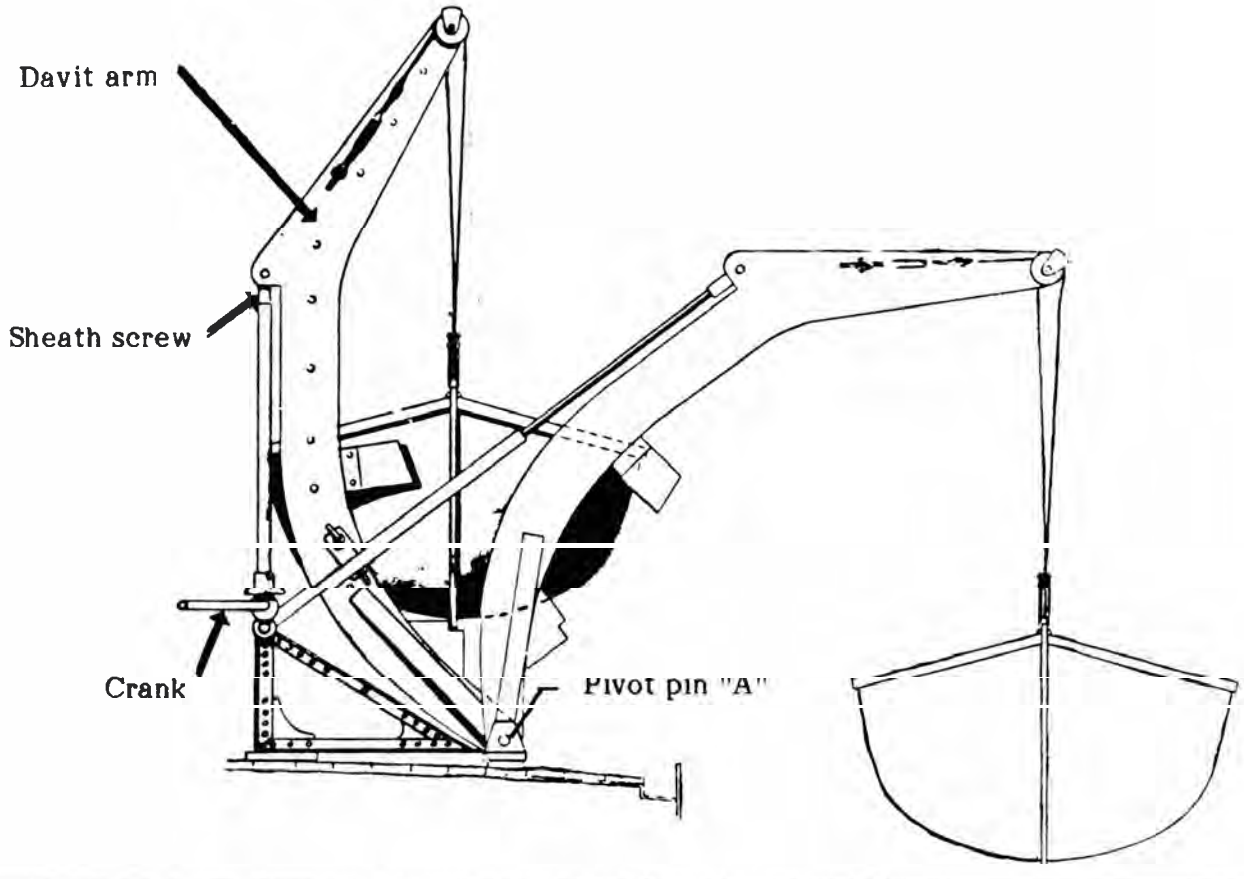
Figure 1 **Sheath Screw Davit, Crescent-Type**



Keynotes

Notice of Proposed Rulemaking

CGD 80-159, Damage Stability and Flooding Protection for Great Lakes Vessels (7 November)

The Coast Guard is proposing to amend the stability requirements for cargo vessels operating on the Great Lakes of North America. Comments must be received on or before January 6, 1986.

Withdrawal Notice

CGD 84-027, Documentation of Vessels (18 November)

The Coast Guard is withdrawing a notice of proposed rulemaking (NPRM) published November 19, 1984, at 49 FR 45623. The NPRM proposed changing the marking requirements for vessels documented under U.S. laws. The Coast Guard believes that rulemaking requiring the exterior marking of a vessel's official number is not necessary at this time.

Advance Notice of Proposed Rulemaking

CGD 85-061, Intervals for Required Internal Examination and Hydrostatic Testing of Pressure Vessel Type Cargo Tanks on Barges

The Coast Guard is considering amending the regulations that govern internal inspection and hydrostatic test intervals for pressure vessel cargo tanks on barges that transport liquefied gaseous cargoes and Grade A flammable liquids at ambient temperatures. This advance notice solicits information that the Coast Guard believes will be helpful in formulating any future proposed rulemaking. Comments must be received on or before March 3, 1986.

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) 426-1477. 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.

Slight Upswing in Sailing Berths for Academy Grads

Sailing jobs for last June's U.S. Merchant Marine Academy graduates have increased a bit since last year to highlight an encouraging marine employment survey for the federal institution.

Figures compiled on the Academy's class of 1985, which graduated on June 17, indicate that 20 percent of the class is employed in shipboard positions, up 3 percent from the previous year's class surveyed in October 1984. Academy officials are pleased with this upward movement in the face of a very tight market for licensed personnel aboard U.S.-flag merchant vessels.

The Academy superintendent, Rear Admiral Thomas A. King, revealed that in addition to the graduates who are sailing, 14 percent of the 1985 class entered active military duty — most with the U.S. Navy — and 51 percent are employed in the shoreside components of the maritime industry. Rear Admiral King noted that Academy midshipmen must seek their own employment opportunities after graduation, unlike students of the nation's other federal academies, who are assigned to duty in their respective services.

Moreover, according to Rear Admiral King, the numbers show that the overwhelming percentage of 1985 graduates are readily conforming to the intent of a law which does not apply to their class, but will take effect with the class that graduates next June.

This law, the Maritime Education and Training Act, passed by the Congress in 1980, mandates that Academy graduates must work in the maritime industry for a specified period of time after graduation.

According to the 1980 law, graduates must sail as merchant marine officers, serve on active military duty, or work in the shoreside

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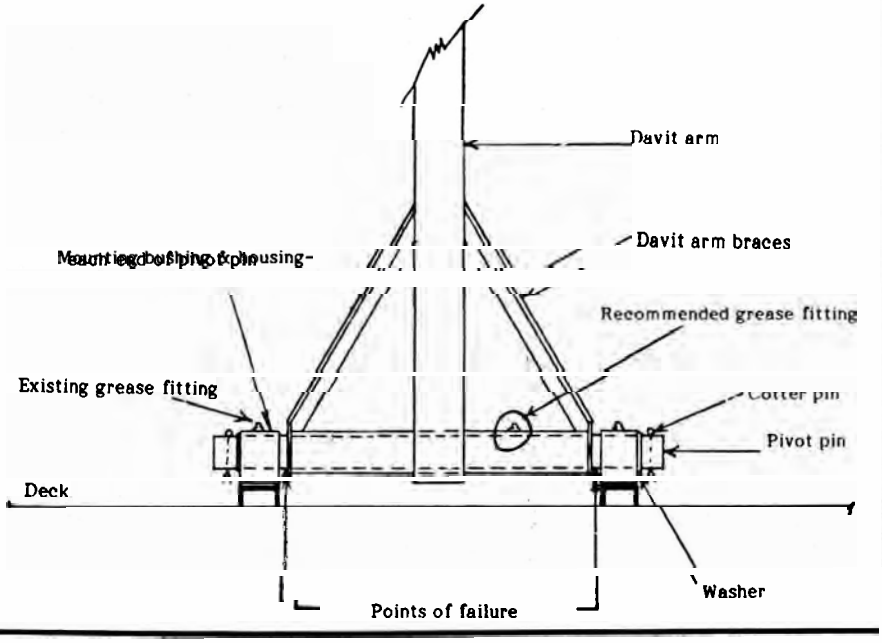
revolving fit of the pivot pin within its two mounting bushings while simultaneously applying a heavy coating of grease inside the cross tube by means of the "recommended grease fitting" shown on the diagram. Such grease inside the cross tube acts as a stopwater, the lack of which will ultimately permit corrosion to start within the tube and wastage of the pivot pin from the entrance of water. Lubrication of these pivot pins should aim for lubrication to (1) ease the movement of the davit arm about its pivot and (2) prevent internal corrosion.

The vessel on which the above incident occurred was of 1958 construction. Given the quarter of a century that the davit was in service, it would be a matter of interest to know how many times it had been taken apart for an examination of its appendages and a check of their lubrication.

The addition of "recommended grease fitting" to the cross tube, figure 2, of the davits of this design now in service will be the subject of a forthcoming change to NVC 4-85, "Recalls and Other Corrective Measures for Lifesaving Equipment," dated 29 May 1985. ↕

Figure 2 **View of Davit Arm's Base Looking Inboard**



ACADEMY GRADS

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maritime industry for 5 years after graduation. Graduates must also maintain their mariners' licenses for not less than 6 years and Naval Reserve commissions for not less than 8 years. Attending an approved graduate school can postpone the terms of the obligation.

The survey shows that 85 percent of 1985 graduates are working in the industry and 2 percent are in graduate school. ↕

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. Which component of a refrigeration system is required for a two-box system but not for a one-box system?

A. Hand expansion valve
B. Automatic expansion valve
C. High pressure cutout switch
D. Liquid line solenoid valve

Reference: NAVPERS 10788, Principles of Naval Engineering

2. An LNG carrier has an approved type of gas-detecting system to detect methane leaks in the

A. barrier spaces.
B. cargo handling rooms.
C. boiler burner supply piping.
D. all of the above.

Reference: Wooler, Marine Transportation of LNG and Related Products

3. Excessive humming of AC contactors may be caused by

A. burnt arc shields.
B. shorted armature coils.
C. a broken shading coil.
D. high voltage.

Reference: Hubert, Preventive Maintenance of Electrical Equipment; Smith, Modern Electricity and Electronics

4. The purpose of a heat dam used in some diesel engine cast iron pistons is to

A. concentrate all heat in the piston crown.
B. increase the distance of travel for heat from the crown to the top ring groove.
C. ensure that all heat in the piston crown is conducted to the top ring.
D. provide a short, direct path for heat to flow from the crown to the top ring.

Reference: Stinson, Diesel Engineering Handbook

5. Embeddability is the characteristic of a bearing material which permits small dirt particles to embed themselves in it and is

A. desirable, as it will prevent damage to the journal surface.
B. undesirable, since the embedded particles will score the journal.
C. desirable, as it will assist in keeping the lube oil filters clean.
D. undesirable, since the particles will interfere with lube oil flow.

Reference: Gunther, Lubrication

DECK

1. To determine which grades of cargo that a tank vessel is permitted to carry, you should

A. refer to the vessel's Certificate of Inspection.
B. examine the cargo tanks and fittings.
C. ask the terminal supervisor.
D. check the Loading Order.

Reference: 46 CFR Part 31

2. You would expect to find the LEAST water over a bar at

A. low water neap.
B. low water spring.
C. slack flood.
D. maximum ebb.

Reference: American Practical Navigator

3. Atmospheric pressure at sea level is equal to

A. 14.7 pounds per square inch.
B. 29.92 inches of mercury.
C. 1013.25 millibars.
D. all of the above.

Reference: Donn, Meteorology

4. Under the IALA buoyage system as used in U.S. waters, which buoy may be even-numbered?

A. Mid-channel buoy
B. Unlighted nun buoy
C. Lighted green buoy
D. Spherical buoy

Reference: Dutton's Navigation and Piloting

5. On a gnomonic chart, a great circle track between Los Angeles and Brisbane will appear as a

A. loxodromic curve.
B. curved line concave to the equator.
C. straight line.
D. spiral approaching the poles as a limit.

Reference: Dutton's Navigation and Piloting

ANSWERS

1-A;2-B;3-D;4-B;5-C
DECK
1-D;2-D;3-C;4-B;5-A
ENGINEERING

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.

The November 1985 issue incorrectly stated that "B" was the answer for "Engineer" question 1 (p. 253). The correct answer is "D," momentary-contact start button. Our apologies for the error.

LETTERS TO THE EDITOR
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ity and stopping distance must also be considered. The IMO guide is directed more to ocean-going ships. We envision our adoption of the IMO guide as a tool for ship designers and plan reviewers to ensure bridge visibility is considered during vessel design.

We maintain that the Master is ultimately responsible for the safe navigation of his vessel or flotilla and that visibility guidelines do not displace prudent seamanship. Just like a speed limit sign when the roads are icy, this minimum standard cannot substitute for good judgment and may not mean the vessel is being operated safely simply because the standard is met.

We appreciate Mr. Deplaix's insight and experience concerning how others have improved their operational visibility, and we thank the editor of this magazine for a chance to comment on his letter.

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It is hoped that our efforts here in the Port of New York, coupled with those of our fellow Coast Guardsmen across the country, will cause shippers and freight consolidators to increase their efforts to comply with the regulations.

Each Coast Guard Captain of the Port office has many tasks to perform in order to meet mission performance standards and usually not enough people to perform them. The relatively short tenure of the container inspection program has yielded some results that seem to justify continuation of the program. Indications from Coast Guard Headquarters are that this will probably be the case.

As a postscript, of the five incidents mentioned earlier, four involved freight containers and one a portable tank. Two of the five shipments originated foreign.