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of the Marine Safety Council

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of the Marine Safety Council

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When you have finished reading this issue, please pass it on.

Contents

features

departments

cover

The SS POET disappeared in October 1980, leaving no traces. Since a conventional investigation was impossible, the Coast Guard turned to its Merchant Marine Technical Division to aid it in reconstructing the hypothetical chain of events which may have led to the vessel's disappearance. "SS POET: Lost at Sea, A Case Study in Vessel Casualty Analysis," beginning on page 177, highlights the services provided by this Division.

Coast Guard Roles and Missions Study Completed

On March 31, 1982, Secretary of Transportation Drew Lewis sent to Congress a 195-page report examining Coast Guard responsibilities in 14 areas ranging from search and rescue to law enforcement. This was the first such thorough review in 20 years.

"Our basic conclusion," Secretary Lewis said, "is that the Coast Guard should continue to carry out its traditional responsibilities—particularly wherever safety is concerned. It should continue, for example, as the U.S. maritime search and rescue coordinator and as the primary Federal maritime law enforcement agency. It should continue to establish construction standards for recreational boats and related equipment and to utilize the Auxiliary to promote boating safety. However, in each area there are recommendations for ways the jobs can be done more efficiently, more effectively, or at less cost to the taxpayer."

He added that some Coast Guard responsibilities had increased dramatically in recent years. Search and rescue activities, for example, have doubled in the past 30 years, largely as a result of the growth in recreational boating.

Extension of the fishing zone to 200 miles and the increase in drug interdiction responsibilities also added greatly to the Coast Guard's responsibilities in the 1970s. During the same period, Coast Guard activities in port and environmental safety increased significantly.

At the same time, Secretary Lewis noted, technological advances have enabled the Coast Guard to streamline operations in some areas, such as lightships and aids to navigation.

"The net result, however, has been increased demand on Coast Guard resources," Lewis said. "The Roles and Missions Study serves as the beginning in a planning process to provide overall strategies and direction for the next 20 years."

The report assesses the changes that have occurred in the Coast Guard over the past two decades, suggests functions which should be retained by the Coast Guard and those which could be shared with others or transferred, and addresses the Coast Guard's role for the period 1984 – 2000.

In addition to its recommendations on search and rescue and law enforcement, the report suggests that the states assume a larger role in recreational boating safety, that the potential for private-sector contracting of aids to navigation services be explored, that the Coast Guard and the Maritime Administration work more closely together in areas such as training and licensing merchant marine personnel, that the Coast Guard Auxiliary be used to greater purpose, and that user fees be adopted to recover the costs of various vessel safety functions, waterways management, aids to navigation, routine icebreaking operations, and other Coast Guard-provided services.

The report, which represents a year-long effort, was produced by an interagency group representing the Office of the Secretary of Transportation, the Office of Management and Budget, the Department of Defense, and the U.S. Coast Guard. Copies can be obtained from the Department of Transportation, Office of Public Affairs, S-80, 400 7th Street SW, Washington, DC 20590.

User Guide for Satellite Data Published

The *tracking* of environmental satellites is a fairly routine operation today.

Tracking down data available from these spacecraft, however, once required months of searching. The University of Rhode Island (URI), through its Sea Grant Program, has published a user's guide to environmental satellite data designed to make application of the data routine.

Environmental satellites measure a variety of characteristics. These include color (reflected solar radiation), temperature (emitted terrestrial radiation), surface roughness, and atmospheric content of water vapor and carbon dioxide.

Dr. Peter Cornillon, the URI oceanographer who wrote the guide, first became interested in the use of remotely sensed data from space for oceanographic studies in 1977. He looked for a user's guide which could acquaint him with the terminology of remote sensing and the information which was being collected. "I was shocked to find there was no single source, and so I began to gather the materials

which have gone into this guide," Cornilon explained.

The guide begins with an introduction which tells what agencies distribute information from 14 environmental satellites. For those unfamiliar with remote sensing techniques, the various sensors which these satellites carry and what types of information they produce are covered. The heart of the guide is an overview of the characteristics and objectives of each satellite and the characteristics of the data which are available.

"A Guide to Environmental Satellite Data" has been published in a looseleaf format to allow users to easily update it, since changes in this area are rapid. It can be ordered for $20 from the Publications Unit, University of Rhode Island Marine Advisory Service, Narragansett, RI 02882. Checks should be made payable to the university, and P 894 should be specified. A pamphlet explaining other URI publications on remote sensing is also available.

Report on Maneuvering Standards Available

The Coast Guard's Office of Merchant Marine Safety recently released "Technical Basis for Maneuvering Performance Standards," a report prepared in connection with the notice of proposed rulemaking "Maneuvering Performance Standards for U.S. Flag Vessels" (CGD 80-136). *(See the Federal Register of September 14, 1981)*

The standards being developed are designed to provide a means for rating controllability under restricted water conditions where collisions, rammings, and groundings are likely to occur. The standards will apply to commercial oceangoing and Great Lakes vessels over 1,000 metric tons intended for the normal transport of cargo or passengers.

The Coast Guard contracted the firm Hydronautics, Inc., of Laurel, Maryland, to:

1. collect and analyze a large enough body of ship trials data to determine statistics of maneuvering performance and rate the performance of individual ships,
2. conduct maneuvering simulations on ships for which maneuvering qualities were known to determine behavior in standard maneuvers,
3. determine the effect of wind on ship controllability,
4. consider the effect of machinery on controllability,
5. determine whether a correlation between frequency of casualties and maneuvering performance could be established, and
6. establish proposed maneuvering performance standards.

Five levels of performance—superior, above average, average, below average, and marginal—were established based on full-scale trial data on over 600 vessels (tank vessels, cargo and container ships, and bulk carriers).

The proposed standards are based on ships' ratings in each of the following maneuvering trials:

- turning maneuver from full maneuvering speed with maximum rudder angle,
- 20-20 zigzag maneuver from full maneuvering speed,
- stopping maneuver from reduced maneuvering speed, and
- demonstrated ability to operate at a continuous speed between four and six knots.

The report (No. CG-M-8-81) is available to the public through the National Technical Information Service, Springfield, VA 22161.

Oil Spills in Ice-laden Waters Studied

To a large extent, the Coast Guard's environmental response capability has been tailored to incidents occurring in and along the coastal waters of the continental U.S. In recent years, however, the U.S. petroleum industry has expanded its area of interest to include onshore and offshore drilling along the coast of Alaska. With this drilling activity and the subsequent transport of the extracted petroleum has come the potential for environmental incidents.

To prepare for effective Coast Guard response in arctic and subarctic regions, such as arctic and subarctic Alaska (but also including the northern states in winter), the Coast Guard Research and Development Program has been studying the behavior of oil spilled in a broken ice field and defining appropriate spill response methods.

Recently, tests were conducted in a laboratory using a facility called an Ice Flume. This is an insulated glass-walled reservoir which holds oil, liquid water, and ice pieces and creates a flow of all three at pre-selected speeds. To create additional realism, a wind tunnel was built to direct a wind over the surface.

The spreading of oil caused by movement of the ice was investigated. The effects of current and winds, temperature, and other factors were noted.

A report summarizing these tests is now available. It presents information for determining the spread rate of oil spilled in a broken ice field. The results are mostly applicable to flow in one dimension, such as that encountered in a ship channel or a natural lead (i.e., a channel formed by solid ice). Various aids are recommended for use in oil spill response planning or for use by on-site response personnel in predicting the behavior of oil spilled in broken ice fields.

Copies of the report, "Laboratory Studies of Oil Spill Behavior in Broken Ice Fields," may be obtained from Commandant (G-DMT-4), U.S. Coast Guard, Washington, DC 20593. ⊥

Keynotes

The following items of general interest were published between March 22, 1982, and April 19,1982:

Final rules: CGD 12-82-MP1 Safety of Life on Navigable Waters, April 1, 1982. CGD 80-094 Safety Zone; Snake Island, Texas City, Texas; Mooring and Fleeting of Vessels, April 1, 1982. CGD 81-088 Great Lakes Pilotage Rules, April 1, 1982. CGD 81-099 Drawbridge Operation Regulations; Corte Madera Creek, California, April 8, 1982. CGD 17-82-01 Safety Zone; Fritz Cove, Juneau, Alaska, April 15, 1982. CGD 13-82-01 Seattle Opening Day Yacht Parade, April 15, 1982.

Notices of proposed rulemaking (NPRMs): CGD 7-82-05 Drawbridge Operation Regulations; Hillsboro River, Broward County, Florida, March 25, 1982. CGD 01-82-01 Drawbridge Operation Regulations; West Bay, Osterville, Massachusetts, April 1, 1982. CGD 8-82-01 Drawbridge Operation Regulations; Gulf Intracoastal Waterway, Algiers Alternate Route, Algiers, Louisiana, April 8, 1982. CGD 13-82-02 Regatta Regulations; Seattle Seafair Sea-Balley Trophy Race, April 8, 1982. CGD 07-82-08 Drawbridge Operation Regulations; Sarasota Pass, Gulf Intracoastal Waterway, Manatee County, Florida, April 15, 1982.

Advance notice of proposed rulemaking (ANPRM): CGD 8-82-09 Anchorage Regulations; Mississippi River below Baton Rouge, Louisiana, April 8, 1982.

Notices: CGD 82-035 Memorandum of Understanding between U.S. Coast Guard and American Bureau of Shipping Regarding Coast Guard Acceptance of Certificates of Admeasurement Issued by American Bureau of Shipping. April 1, 1982. CGD 82-041 Public Meeting; Chemical Transportation Advisory Committee (meeting to be held May 12, 1982), April 8, 1982. CGD 80-136 Maneuvering Performance Standards for U.S. Flag Vessels, Extension of Comment Period, April 8, 1982.

Questions concerning regulatory dockets should be directed to the Marine Safety Council (G-CMC), U.S. Coast Guard, Washington, DC 20593; (202) 426-1477.

* * *

Standards Proposed for Fixed Fire Extinguishing Systems on Uninspected Vessels (CGD 74-284)

The Coast Guard recently issued an NPRM regarding equipment standards and approval of fixed fire extinguishing systems intended for use on uninspected vessels.

At present, most fixed fire extinguishing systems on uninspected vessels are complex installations that meet the requirements for large passenger vessels and are not suited for use on uninspected vessels. The costs of these systems can be prohibitive for recreational boats.

The Coast Guard has approved small fixed fire extinguishing systems in the past but has not published approval requirements. Vessel manufacturers, dealers, extinguisher manufacturers, and members of the boating public have requested that standards for approval of affordable fixed systems be developed.

The proposed standards contain essential design and performance requirements, approval tests, and procedures for approving fixed fire extinguishing systems on uninspect-

ed vessels. For further information on this NPRM, published April 19, 1982, contact Mr. Klaus Wahle, U.S. Coast Guard (G-MMT-3/12), Washington, D.C. 20593; (202) 426-1444.

Updated Electrical Engineering Regulations Published (CGD 74-125A)

On April 8, 1982, the Coast Guard published its update of Subchapter J of Title 46 of the Code of Federal Regulations, the Electrical Engineering Regulations. This entirely new Subchapter J clarifies the regulations, brings them up to date, and deletes unnecessary requirements. Further, the revisions incorporate recommendations for electrical installations made by the International Maritime Organization (the newly renamed Inter-Governmental Maritime Consultative Organization) and the National Transportation Safety Board. Comments received from the public were considered in the final drafting of the regulations.

For further information concerning these final rules, contact LCDR Roger Mowery, U.S. Coast Guard (G-MMT-2/12), Washington, DC 20593; (202) 426-2206.

Accident Investigation Rule Withdrawn (CGD 77-018)

The Coast Guard has withdrawn CGD 77-018, which was published in the Federal Register on January 25, 1979. That notice sought to implement Coast Guard authority to investigate accidents outlined in the Ports and Waterways Safety Act (PWSA). The rulemaking would have covered any incident or accident involving any structure subject to the PWSA or which affected or might have affected the safety or environmental quality of the ports, harbors, or navigable waters of the U.S.

The majority of comments received were negative. Most of the people commenting questioned the granting of authority to conduct investigations and the unclear extent of jurisdiction. The Coast Guard thus reevaluated its position and withdrew the NPRM.

For further information, contact LCDR Gary Gregory, U.S. Coast Guard (G-WPE-3), Washington, DC 20593; (202) 426-1934.

Amendments on Tank Stop Valves Withdrawn (CGD 79-159)

The Coast Guard was considering amending its regulations on tank stop and other valves, as well as gates performing similar functions, on all inspected vessel except small passenger vessels. The purpose was to increase the safety of personnel and better protect the environment. An ANPRM was published in the Federal Register on April 16, 1981. All comments received were against the proposed amendments, and all commenters cited the economic impact of the proposed changes. The Coast Guard has decided that the improvement in personnel safety and environmental protection does not outweigh the anticipated costs. The rulemaking is thus being withdrawn.

For further information, contact LCDR Roger Mowery, U.S. Coast Guard (G-MMT-2/12), Washington, DC 20593; (202) 426-2206.

Rules on Certificates of Alternative Compliance Published (CGD 80-157, CGD 77-136)

If a ship cannot fully comply with the technical light and sound requirements of the 72 COLREGS or the new Inland Navigation Rules, that vessel can be issued a Certificate of Alternative Compliance. Certification can be made only if the vessel is complying with the applicable rules as closely as possible while still maintaining its special functions. The majority of Certificates of Alternative Compliance are issued to offshore supply vessels used in the gas and oil industry. A small number are issued to very specialized, unusual vessels.

On April 1, 1982, the Coast Guard published two final rules concerning Certificates of Alternative Compliance. CGD 80-157 spelled out the requirements and procedures for obtaining a Certificate of Alternative Compliance under the new Inland Navigation Rules. CGD 77-136 amends the application procedures for obtaining a Certificate under the 72 COLREGS and covers who may apply, what information is required on the application, and how records are to be maintained. It also changes procedures regarding the termination of a certificate. In addition, several editorial and procedural changes have been made. As a result, the application and administration procedures for Certificates of Alternative Compliance are now faster and more efficient.

For further information regarding these final rules, contact LCDR Kent Kirkpatrick, U.S. Coast Guard (G-NSR-3), Washington, DC 20593; (202) 245-0108.

Annex V to Inland Navigation Rules Published (CGD 80-158)

Annex V, the rules on special application of navigation lights drafted under the authority of the Inland Navigational Rules Act, was published on April 15, 1982. The rules are not new but have been rewritten to make them easier to understand. These rules concern lighting for law enforcement vessels, dredge pipelines, and barges at bank or at dock. Annex V became effective on May 14, 1982, on all inland waters of the U.S. except the Great Lakes, where it will go into effect on March 1, 1983.

For further information on these regulations, contact LCDR Kent Kirkpatrick at the address in the preceding Keynote.

Final Action Taken on Annex IV to Inland Rules (CGD 81-007)

On April 15, 1982, the Coast Guard published a final rule enacting into law Annex IV of the Inland Navigation Rules. This annex concerns Distress Signals. The list of designated signals is the same as that in the International Rules, except that a strobe light signal has been added. A high-intensity light which flashes 50 to 70 times per minute will be recognized as a distress signal on United States inland waters. The addition of the strobe light signal in U.S. regulations comes as a result of public requests for this signal and also because a strobe light is a very effective means of attracting attention.

The other signals, such as a gun fired at a one-minute interval or an orange smoke signal, remain as described in Annex IV to the 72 COLREGS.

The regulations went into effect on May 17, 1982, on all U.S. inland waters except the Great Lakes, where they will go into effect March 1, 1983.

For further information, contact LCDR Kent Kirkpatrick (same address as two preceding Keynotes).

PFD Revisions Proposed (CGD 81-023)

The Coast Guard has proposed that obsolete provisions of its regulations on Personal Flotation Devices (PFDs) on recreational boats be revoked and corresponding editorial changes made. The changes will also clarify PFD carriage requirements (including those for Type V PFDs). The pamphlet which PFD manufacturers currently are required to provide for each PFD that is offered for sale has been revised, and it no longer need be in pamphlet form. Manufacturers may use the current pamphlet until their supplies are exhausted.

For further information concerning this NPRM, published April 12, 1982, contact Mr. William Sobeck, U.S. Coast Guard (G-BEL-3/43), Washington, DC; (202) 426-4176.

Study Done on Electrical Hazard Protection (CGD 81-050)

When a vessel is moored to a pier, an electrical potential, primarily in the form of stray currents, may build up between the vessel and the pier. If they are bridged by a good electrical conductor, such as the cargo transfer lines, particularly when the hose is being connected or disconnected, sparks may result. If this should occur on a tank vessel, which frequently generates explosive atmospheres, a fire or explosion may result. This may have caused several tank vessel casualties.

One widely used method of reducing the hazard is to connect a bonding wire between the vessel and the pier in an attempt to short-circuit the voltage and reduce the danger of stray currents. Many authorities believe this strategy to be very ineffective. A second method gaining favor in the petroleum industry calls for totally insulating the vessel from the shore, providing no path for a stray current to pass.

The Coast Guard recognized the need for further study on this phenomenon and on August 8, 1981, announced in the Federal Register the completion of a preliminary study done by the Jet Propulsion Laboratory (JPL) in Pasadena, California. Industry comments and participation were invited. The response by industry to this request was good. The need to explore new methods of protection from stray currents is clear. One industry representative commented that he hoped the Coast Guard study would settle the argument over bonding cables.

Although further study is needed, the Coast Guard, because of budgeting priorities, cannot continue to fund research. On April 15, 1982, the Coast Guard published a notice in the Federal Register suggesting that the study could continue if industry would provide the funding. This type of arrangement has been used before in Coast Guard research and develop-

ment work. If the industry accepts this idea, the Coast Guard will remain project manager.

For further information, contact LT Robert Murray, U.S. Coast Guard (G-MVI-2/26), Washington DC 20593; (202) 426-2183.

Boundaries of COTP and MIO Zones Realigned (CGD 82-019)

On April 1, 1982, the Coast Guard published a final rule modifying several Captain of the Port (COTP) and Marine Inspection zones in the Third, Ninth, Twelfth, and Fourteenth Coast Guard Districts. These are organizational changes only and will not substantively alter the existing requirements and responsibilities of the public or the Coast Guard. The changes should result in a cost savings and more efficient use of available resources. An amendment document concerning the Albany and Guam Marine Inspection Offices (MIOs) was published April 26, 1982.

For further information, contact LCDR Bennet C. Osborne, U.S. Coast Guard (G-WPE), Washington, DC 20593; (202) 426-1450 or LT Wayne R. Hamilton, U.S. Coast Guard (G-MP), Washington, DC 20593; (202) 426-1483.

Effective Date for Inland Rules on Great Lakes Changed (CGD 82-037)

The new Inland Navigation Rules were enacted on December 24, 1980, and went into effect one year later on all U.S. inland waters except the Great Lakes. The effective date for the Great Lakes was delayed to allow the Canadian government time to establish parallel navigation rules. The Canadian and U.S. Coast Guards originally planned to have the new rules go into effect on the Great Lakes on April 1, 1982. Unexpected delays pushed the date back to July 1, 1982 (*see the Keynotes section of the April 1982 issue of the* Proceedings). Mariners on the Great Lakes have since then expressed their concern over changing the rules in the middle of the navigation season. The Canadian and U.S. Coast Guards have therefore agreed that the Inland Navigation Rules will not go into effect on the Great Lakes until March 1, 1983.

For further information, contact LCDR Kent Kirkpatrick, U.S. Coast Guard (G-NSR-3), Washington, DC 20593; (202) 245-0108.

Actions of the Marine Safety Council

April Meeting

The Council discussed two items of general interest at the April meeting.

CGD 82-030 Rewrite of 33 CFR 157 (Work Plan)

The regulations in Part 157 of Title 33 of the Code of Federal Regulations (33 CFR 157) were first issued in 1975 to implement the tanker standards in the International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL 73). Since then, there have been several revisions and additions to 33 CFR 157, including those initiated to incorporate the requirements written into the 1978 MARPOL Protocol which modified and incorporated MARPOL 73. (The composite Convention is known as MARPOL 73/78.) Most of the regulatory changes were undertaken within a short period of time and had rigid completion dates. In addition, many interpretations of internationally agreed upon standards were completed after the final regulations implementing these standards had been issued, resulting in the need for interpretive documents. These factors have produced a set of regulations that are complex, difficult to understand, ambiguous, inconsistent with international agreements, and, in some instances, in error. This rewrite is needed to provide a more clear, concise, and correct set of regulations and see that 33 CFR 157 is consistent with the latest international requirements and interpretations.

No changes in existing policy are involved. An NPRM is expected late this fall.

CGD 82-034 Amendments to 46 CFR 157 (Work Plan)

The thrust of this project is to revise joint regulations of the U.S. Coast Guard and the National Transportation Safety Board. The NTSB will have an increased role in investigating accidents involving Coast Guard vessels or in which Coast Guard safety functions are directly involved. This will minimize any appearance of conflict of interest that might otherwise arise from accidents in which the Coast Guard would be investigating itself.

A rule is expected late this summer.

National Safe Boating Week
June 6-12, 1982

Wear Your PFD (Your "Friend for Life")

The boating season is a time when all of the organizations concerned with your well-being bombard you with safety advice. Unfortunately, because you get so many messages, you might not remember any single piece of advice very long. It's sort of a "can't see the forest for the trees," or vice versa, situation.

Boaters may realize that they should be careful while refueling, or that there are accepted procedures they should follow to pass another boat, or even that every boat is required to carry certain safety equipment. But what are the specifics? There's just so much information to remember.

The National Safe Boating Council, Inc. (NSBC), a group of private and public organizations concerned with improving safety on the water, and the U.S. Coast Guard recognize the frustration boaters may experience in trying to remember all of the safety advice bombarding them. The two groups studied boating accident statistics and found that there was one, simple, easy-to-remember safety message that, if heeded, would do more to save lives than all of the other pieces of advice put together. The message is:

"Wear your Personal Flotation Device."

"With this message, we have the potential to significantly reduce boating accident fatalities," says LCDR William Ladd of the Coast Guard's Boating Education Branch in Washington.

Ladd explains that boating data compiled by the Coast Guard show that 85 percent of all people who die in boating accidents drown. Most of them are not wearing a Personal Flotation Device (PFD).

"The logic is simple," says Ladd. "Get boaters to wear their life jackets whenever they boat, and you reduce the number of accidental drownings."

While the logic may be simple, Ladd concedes that convincing boaters of the need to

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always wear PFDs is a challenge.

"Granted, most people view PFDs as confining, uncomfortable, unglamorous. They interfere with a person's getting a tan. They're not 'macho.' It will be an uphill climb, but we are taking a step up just by letting people know about our '85 percent' statistic."

Ladd likens promoting the wearing of PFDs to safety campaigns geared to getting people to wear motorcycle helmets or seatbelts.

"What we have to do is make people aware of the dangers they face by not wearing a PFD. Then they will be able to weigh the benefits of wearing a PFD against the alleged inconvenience.

"And it is an 'alleged' inconvenience. With the number of styles, shapes, colors, and weights of PFDs available today, there's no reason why a person can't find one he would be comfortable wearing during a day on the water."

The Coast Guard and the NSBC will kick off the promotion of the "wear your PFD" theme during National Safe Boating Week 1982, to be observed June 6 -12.

"Our slogan is 'Wear your PFD, your Friend for Life,'" says George Rounds, Chairman of NSBC. "We will be promoting this slogan through posters, radio and television advertising, news releases, and any other means we can think of."

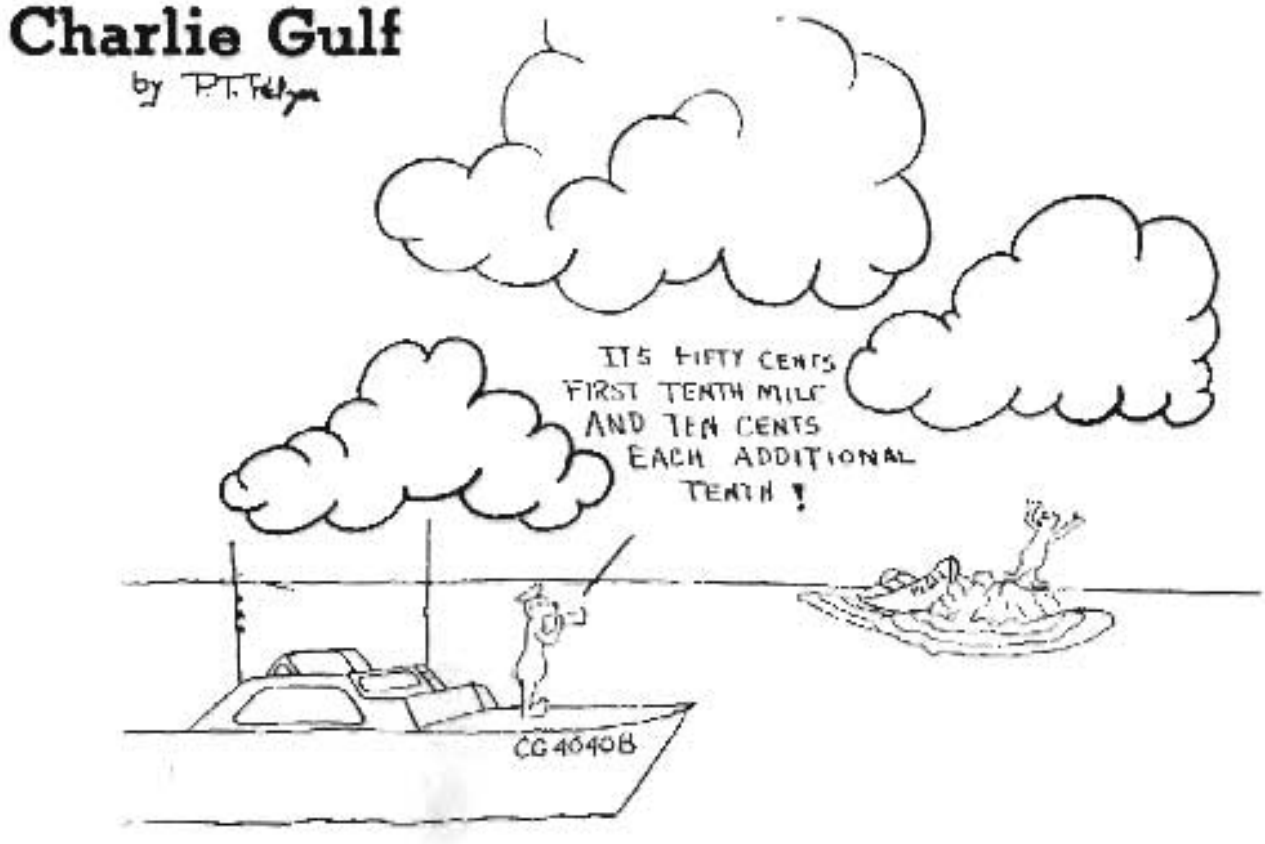
Rounds says NSBC relies on local boating groups to promote its National Safe Boating Week theme. These groups include yacht clubs, marina associations, flotillas of the Coast Guard Auxiliary and U.S. Power Squadron, local Coast Guard units, owners of marine equipment stores, and state boating law administrations.

"NSBC provides these groups with posters and 'how-to' manuals for promoting safety afloat," says Rounds. "From then on, it's up to them to get the message out to the boaters."

And apparently it works. The number of boaters who die each year per 100,000 boats (the boating death rate) is declining even as the number of recreational boats on the water continues to grow.

Rounds feels that promoting the wearing of PFDs will cause the rate to decrease even further.

"Ideally, we would like to see the wearing of a PFD become second nature to all boaters. You go aboard your boat, the first thing you do is put on your life jacket. People do it with seatbelts in cars. We hope we can condition boaters to do it with PFDs."



Ten Little Boaters

by Peggy Tjarks
U.S. Coast Guard Auxiliary
Second District

10 Little Boaters, Skimming o'er the Brine . . .
One Boat was Overloaded, and then there were 9.
(Seats do not indicate capacity . . . total weight, not numbers, is your only safety guide)
9 Little Boaters, Fishing until Late . . .
One Ignored the Weather, and then there were 8.
(In rough water, keep low in the boat and head it into the waves)
8 Little Boaters, Motors really "Revvin" . . .
One had too much Power, and then there were 7.
(Overpowered boats lead to disaster. Match the boat to the motor)
7 Little Boaters, Seeking Aqua Kicks . . .
One Brought a Bottle, and then there were 6.
(Boating and alcohol are a deadly mixture. Don't drink while boating)

6 Little Boaters, Dunked—But still Alive . . .
One Tried to Swim to Shore, and then there were 5.
(Capsized boats rarely sink. Stay with the boat until help arrives)
5 Little Boaters, Zooming Toward the Shore . . .
One "Buzzed" the Dock, and then there were 4.
(For safety's sake, give docks, swimmers, and other boats a wide berth, then reduce speed when approaching shore or congested waters)
4 Little Boaters, Towing Board and Ski . . .
One Steered Alone, and then there were 3.
(Water skiing and surfboarding are safe only when an alert observer accompanies the operator)
3 Little Boaters, Well Equipped it's True . . .
But One Forgot his Life Jacket, then there were 2.
(Provide PFDs for all occupants of a boat)

2 Little Boaters, Out for Fishing Fun . . .
One Stood to Land his Catch, and then there was 1.
(If you must move in a small boat, or change seats, keep low and in the center with both hands on the gunwales)
1 Little Boater, Who is Still Afloat Today . . .
By Following Sound Safety Rules, He Hopes to Stay that Way.
(Your life and the lives of others depend on your skill, care, and judgment in handling a boat)
REMEMBER—NO SAFETY DEVICE CAN REPLACE COURTESY, CAUTION, AND COMMON SENSE

New Device Makes Towing Safer and Easier

Two Coast Guardsmen in the Second District, Seaman Rodney Bupp and Petty Officer First Class John Treece, have put the finishing touches on an invention that has been under development at Station Marblehead, Ohio, for two boating seasons. Station members claim it has helped reduce accidents and makes towing operations easier.

Since station personnel are transferred every so often, ideas sometimes just don't get off the ground. Luckily, this one was passed on to successors.

The device that has evolved over the past two summers is a hook-up device worked on to the bitter end of a towline. This eliminates the need to have the disabled boater tie the towline to the bow. In fact, with this device all the disabled boater has to do is keep the boat in line with the Coast Guard boat.

Petty Officer First Class Bill Pickett, stationed at Marblehead two years ago, came up with the original idea. Pickett fitted a piece of metal piping over the end of a towline with a J-hook attached to the bitter end. Since the pipe weighed too much, he switched to PVC piping. The end was heated and flared to fit perfectly around the J-hook while at the same time opening the safety clip. The pipe offers a clear reach from the stern of the towing vessel to the bow of the disabled craft. The boat crewman can then reach out and hook the bow. When he pulls back on the piping, the safety clip is released with the hook securely in place.

Last summer, Bupp and Treece added a float to keep the line from sinking. A piece of leather was sewn into place behind the pipe to keep the pipe from riding up and down during the actual tow.

After seeing the device in operation for two full summers, Treece said it had proved its worth in preventing accidents and has taken a lot of danger away from the towing operation itself. The supplies to make the device can be acquired at a local hardware store at a minimal cost.

Seaman Rodney Bupp demonstrates the hook-up device. Photo by Michael Hilley, Ninth Coast Guard District

How Hazardous is Harvesting the Sea?

A Report on Fishing Fatalities

by Rick Gleason

Fishermen have long been aware that they were engaged in a risky occupation. Few, however, have realized just how risky.

The following case histories, taken from the *Alaska Fishermen's Journal* (AFJ), provide only three examples of what is too often the fate of fishermen. Virtually all commercial fishing fatalities can be attributed to one of three causes: vessel sinkings (85 percent), falls overboard (10 percent), or accidents on board vessels (5 percent).

Vessel sinkings

A 95-foot fishing vessel went aground after taking on water during a storm in Bristol Bay, a large estuary north of the Aleutian Island chain, on August 20. Two crewmen died after abandoning the listing vessel. Five other crewmen survived. (AFJ - October 1981)

Falls overboard

A 34-year-old man was lost at sea May 8 when he reportedly fell overboard about three miles south of Tongue Point in Bristol Bay. A Coast Guard C-130 joined many vessels in the area to search for him without success. The man's brother had fallen overboard at the same time but had been rescued. (AFJ - June 1981)

Accidents on board vessels

A 49-year-old man died May 8 after being struck on the head by a crane boom on a crab vessel. The blow from the crane reportedly knocked him overboard near Summit Island, Alaska. (AFJ - June 1981)

Vessel sinkings can result from a boat's icing up, groundings, collisions, overloading, flooding, improper storage, faulty navigation equipment, storms, marine fires, open lazarette, unattended autopilot, or someone's falling asleep at the wheel.

Fifty percent of the **falls overboard** studied

Rick Gleason is an industrial hygienist presently employed by the State of Washington in its Department of Labor and Industries (Division of Industrial Safety and Health). He previously spent three and a half years working as a safety and health inspector for the Occupational Safety and Health Administration. Mr. Gleason has also worked as a commercial fisherman in Washington and Alaska.

Icing is one cause of vessels sinkings, which account for 85 percent of commercial fishing fatalities. Coast Guard photo by Norm Holm

by the author (using Coast Guard records in the North Pacific) occurred when someone was urinating over the side of the boat and was unexpectedly swept over the railing. Falls overboard can also result from a railing that is not of sufficient height or strength, bad weather, carelessness, slippery decks, or horseplay, or while people are climbing to the flying bridge in heavy weather, loading and unloading from a dock higher or lower than the vessel, transferring from one vessel to another, attempting to dislodge items from the propeller, or operating the gear in a position that requires them to lean overboard.

The results of falls overboard are often serious. Life vests are rarely worn. The engine noise will drown out any shouts for help by the person in the water. Other crewmembers assume the absent deckhand is in the bathroom (engine room, hold, galley, etc.). Rubber boots may fill with water and drag the person down. Also, hypothermia can be deadly if a person is in the water for more than 30 minutes.

Accidents on board vessels can be traced to a number of hazards, such as unguarded machinery, open hatchways, the need to work at heights (on the mast or flying bridge), crewmembers' lack of training in the proper use of equipment, burns, fires, inadequate lighting, work stress or fatigue, the need to work in bad weather or at night, someone's rush to get a job done, inexperience on the part of some crewmembers, or improper maintenance of equipment.

In the United States, few statistics can be found on commercial fishing accident and death rates. Other countries, most notably Great Britain, have done some work in this area. In 1966, an article by a British doctor, R. S. F. Schilling, appeared in the *Proceedings of the Royal Society of Medicine*. Dr. Schilling wrote in his article, "Trawler Fishing, an Extreme Occupation," that the mortality rate of British trawl fishermen was reportedly twice that of miners and twenty times that of those employed in the manufacturing industry.

"How hazardous is commercial fishing compared to other occupations?"

Marine Safety Officer Dave Illuminati helped me answer that question by searching through Coast Guard records from 1978 through 1981 at the Seventeenth Coast Guard District Office in Ketchikan, Alaska. He reviewed all fatalities involving commercial fishermen in the state of Alaska. As separate files are not kept for fishermen, all files first had to be reviewed to determine whether the incident in question was commercial fishing-related. Fatalities involving crewmembers of sport fishing boats, recreational boats, sailboats, charter boats, tugboats, ferries, and barges were excluded.

The study encompassed fatal accidents only and did not include injuries to fishermen or their illnesses, as most of these do not get reported to the Coast Guard. (Likewise, fishermen are not covered by State Workers' Compensation Insurance and are not included in state statistics on injuries or illnesses. Injuries may be recorded if the fisherman is treated under the Alaska Fishermen's Fund Program.) We were able to determine the total number of commercial fishermen from Alaska records, since Alaska requires each commercial fisher-

A crewmember could easily fall through the ice covering an open hatchway.

Table I Commercial Fishing Fatality Rates for Alaska

Year	Number of Commercial Fishermen	Total Number of Deaths	Annual Death Rate per 10,000 Fishermen
1978	35,140	42	12.0
1979	40,800	31	7.5
1980	43,285	39	8.8
1981	42,966	34	8.0

man in the state to be licensed.

Table I shows the death rate for commercial fishermen in Alaska for the 4-year period.

The figures show the 4-year average for commercial fishermen in the state of Alaska to be approximately 9.0 deaths a year for every 10,000 workers. In order to put these statistics into perspective, it is necessary to compare these rates to those for other occupations in Alaska and across the country. The statistics shown in Table II for the United States were taken from the 1978 National Safety Council *Accident Facts*. Also included are rates taken from the *1978 Occupational Injury and Illness Statistics* published by the Alaska Department of Workers' Compensation.

Table II Industrial Fatality Rates in the U.S. and Alaska, 1978

Industry	Total Number of Workers	Total Number of Deaths	Annual Death Rate per 10,000 Workers
Firefighters (U.S.)	60,000	68	6.8
Mining (U.S.)	800,000	500	6.3
Manufacturing (Alaska)	11,450	7	6.1
Construction (Alaska)	12,240	7	5.7
Construction (U.S.)	4,600,000	2,600	5.7
Logging (Alaska)	1,840	1	5.4
Agriculture (U.S.)	3,500,000	1,500	5.4
All Industry (except fishing) (Alaska)	114,990	47	4.1
All Industry (except fishing) (U.S.)	94,800,000	13,000	1.4
Manufacturing (U.S.)	20,300,000	1,800	0.9

Up until now, it had been reported that firemen had the highest death rate of any occupational group in the United States. In 1978, however, Alaska commercial fishermen had a death rate 88 percent higher than that of firemen (12.0 compared to 6.8). *The 1978 fishing fatality rate is almost twice that of miners and 13 times that of people employed in the manufacturing industry.*

Commercial fishing in Alaska employed 35,140 people in 1978, while all of the state's other industries combined employed 114,990. *Even though fishing employed only 23 percent of the state's people, it accounted for 47 percent of the total occupational deaths* (42 commercial fishing deaths vs. 47 from all other industries combined). This rate is all the more startling in view of the fact that fishermen do not work year-round. Most have other jobs and work as fishermen during the summer salmon season or the winter king crab season.

Recommendations

In the author's opinion, it is the responsibility of the **U.S. Coast Guard** and **Congress** to help reduce this loss of life at sea by promulgating and enforcing safety and health standards which apply to fishing vessels. The standards should encompass certification and inspection of lifeboats, life rafts, and survival suits. The Coast Guard could adopt many standards now enforced by the Occupational Safety and Health Administration, such as those pertaining to machine guarding, working at heights, fire protection, noise, illumination, line and rope maintenance, ladder construction, welding, personal protective equipment, entry into confined spaces, commercial diving, and proper railing heights.

Pulling shrimp traps through the ice can be extremely dangerous. Safe work practices are a must.

It is the responsibility of the **skipper** of the fishing vessel to adequately train his workers in the following areas:

- Location of fire extinguishers and how to use them
- Location and use of survival suits and life jackets and periodic drills on donning them
- Location of and inflation procedure for the life raft and yearly maintenance by a Coast Guard-certified inspector
- Location of emergency flashlights and Emergency Position Indicating Radio Beacon (EPIRB) and proper upkeep of the batteries
- Proper gear operation and maintenance, stressing safety
- Proper personal protective equipment: gloves, headgear, safety glasses, non-slip footwear, and raingear that is not bulky and will not catch in machinery
- Location and contents of the first aid kit
- Location and operation of bilge pumps and manual emergency pumps and knowledge of how to contact the Coast Guard on the radio
- Proper operation of the stove and heater
- Location of hatch covers and cargo doors and awareness of the need to keep them closed when not using them.

It is also the skipper's responsibility to know the limitations of the crew and not push crewmembers beyond their ability. Fatigue can lead to an accident.

Finally, it is the responsibility of the **deckhand** to work safely at all times, possess a valid first aid card and have cardiopulmonary training, read and familiarize himself with the proper operation of the equipment, watch out for the safety of the other members of the crew, follow instructions, and use the bathroom instead of the railing!

SS Poet: Lost at Sea

A Case Study in Vessel Casualty Analysis

by LCDR Robert W. Henry
Ship Design Branch
Marine Technical and
Hazardous Materials Division

In October 1980 the U.S.-flag cargo vessel SS POET disappeared while en route to Port Said, Egypt, with a cargo of bulk corn. Its 34 crew members are missing and presumed dead. The following article does not intend to solve the mystery of the vessel's disappearance but rather to highlight some of the technical services used in analyzing the casualty. These services were provided by the Coast Guard's Merchant Marine Technical Division (now the Marine Technical and Hazardous Materials Division).

INTRODUCTION

The vessel involved in this casualty began its existence as the GENERAL OMAR BUNDY, a troopship constructed by Kaiser Shipbuilding Corporation in Richmond, California, in 1944. It was later converted for service as a cargo vessel and underwent several name changes before becoming the SS POET. Its last voyage, involving the carriage of 13,500 long tons of #2 yellow corn, was intended to be similar to its previous trips. The SS POET departed the Port of Philadelphia in the early morning of October 24, 1980, after receiving cargo, fuel, and fresh water. The vessel was declared overdue on November 3, and an extensive search followed. No trace of the vessel or its 34-man crew was found. On November 17 the Commandant of the Coast Guard established a Marine Board of Investigation to inquire into the disappearance.

Early testimony presented to the Marine Board did little to clarify the probable cause of the vessel's disappearance. However, the Board was able to construct a hypothetical chain of events based on, among other things, the results of analyses performed by the Coast Guard's Merchant Marine Technical Division.

HISTORY

The Merchant Marine Technical Division got its start back in the late 1930s in the old Bureau of Marine Inspection and Navigation (BMIN). The formation of a technical group within the Bureau was mandated by Congress after the loss of 124 lives in the MORRO CASTLE fire. During World War II the functions of the BMIN were transferred to the U.S. Coast Guard. After the War, the Office of Merchant Marine Safety was formed in the Coast Guard, and the technical expertise gained from the Bureau became the basis for the new Merchant Marine Technical Division (MMT). (The division was recently reorganized and became part of the Marine Technical and Hazardous Materials Division). Over the last 30 years, MMT assumed the following functions:

- Assessment of the safety of novel marine concepts

- Review of plans and specifications
- Stability approval
- Lifesaving equipment approval
- Firefighting and fire protection evaluation
- Marine safety regulation development
- Loadline and admeasurement review
- Technical support and assistance
- Technical guidance at IMO (formerly IMCO)
- Pollution prevention

One of MMT's traditional tasks was to assist in Coast Guard Marine Boards of Investigation. The following partial list covers recent major casualties where MMT lent its technical assistance:

CV SEAWITCH - June 2, 1973

MMT investigated the vessel to determine the extent of damage and to assess the performance of the installed safety features.

SS SILVER DOVE - April 2, 1973

MMT provided analysis and testimony on the vessel's loss of stability as a result of the flooding of a major cargo hold.

SS EDMUND FITZGERALD - November 10, 1975

MMT provided technical assistance concerning the vessel's lifesaving features, loadline, and stability.

Drilling Rig OCEAN EXPRESS - April 15, 1976

MMT conducted an analysis to evaluate the unit's stability while under tow and in transit. MMT also provided expert testimony on the design, testing, and approval of the lifesaving appliances.

MV CHESTER A. POLING - January 10, 1977

MMT conducted an analysis to evaluate the condition of the vessel's hull structure, its loading, and the prevailing weather and sea conditions. MMT monitored testing of the hull steel and hull welding.

MV ANGELINA LAURO - March 30, 1979

MMT did an on-site examination of the fire damage to the vessel and presented technical information on the ship's fire protection systems.

TECHNICAL ANALYSIS

The loss of the SS POET was not typical of most casualties previously analyzed by MMT in that no survivors or vessel debris was recovered to aid in the casualty analysis. On the basis of testimony, a review of the vessel's plan file, and information gathered from the crew of the SS PENNY, sistership of the SS POET, the Marine Board of Investigation provided specific instructions to MMT requesting that the strength of the vessel, intact and damage stability, and seakeeping characteristics be evaluated. Reconstruction of vessel loading conditions was the first task.

Vessel Loading

The "departure condition" of the SS POET was synthesized from the National Cargo Bureau, Inc. (NCB) grain stability calculations for the last cargo load, sample conditions from the vessel's Trim and Stability Booklet, and the last observed drafts. The intact condition of the SS POET at any time during its voyage could then be calculated on the basis of the estimated departure condition by making assumptions about expenditure of consumables (fuel and water) and vessel trim.

Computer Application

Taking the SS POET's assumed loading condition at the time of its disappearance as a starting point, MMT used its extensive computer analysis capability to further define the hydrostatic and hydrodynamic characteristics of the vessel. These computer resources were developed wholly or in part with Coast Guard funding to provide the means to answer tech-

nical questions related to maritime safety. Similar analytical tools exist elsewhere in the marine community, but the following programs have been tailored to suit particular Coast Guard needs:

SHCP (Ship Hull Characteristics Program) - Provides data for still water and wave-induced bending moments and intact and damage stability information such as displacement, draft, trim, centers of buoyancy, gravity and flotation, and the location of the metacenter.

CGSCORES (Coast Guard Ship Computer Response) - Provides hydrostatic and hydrodynamic information concerning still water and wave-induced bending moments and shear forces, deck wetness, and slamming.

CAPSIZE (Capsize) - Provides stability and synchronous rolling data for a ship in following seas.

GIFTS (Graphics-oriented Interactive Finite Element Time-sharing System) - Performs detailed structural analysis.

FLEXSM (Flexible Section Modulus) - Provides strength analysis of a vessel's hull girder, taking into account buckling of plating.

Intact and Damage Stability

An NCB Grain Stability Calculation form was completed using the previously computed cargo and liquid loading calculations. Assumed shifts of grain were calculated according to SOLAS 1974, Chapter VI, to determine the list and dynamic stability of the SS POET in its departure condition at Philadelphia on October 24, 1980. The static angle of heel was determined to be 10.6°, and the available residual dynamic stability (righting energy) was 36.6 ft-deg up to an angle of heel of 40°. These values complied with SOLAS 1974 requirements.

The SS POET's intact stability was calculated using a long form loading sheet and the vessel's Trim and Stability Booklet. The SS POET's metacentric height, a measure of initial stability relating to the ability of a vessel to resist heel from the upright position, was found to be within Coast Guard standards.

The SS POET was also evaluated for damage stability. Both Hold No. 1 and the after machinery space were alternately "flooded" and evaluated under various conditions using the computer program SHCP. The resulting stability characteristics showed the vessel to have positive stability after damage.

Longitudinal Strength

FLEXSM was used to evaluate the longitudinal and collapse (buckling) strength of the SS POET on the basis of its hull girder. CGSCORES was run to provide shear forces, bending moments, and stresses for specific loading conditions. The computed longitudinal strength of the vessel was found to be acceptable when compared to Coast Guard structural standards.

Seakeeping

CGSCORES was also run to evaluate the seakeeping characteristics of the SS POET. CGSCORES, using the vessel's hull geometry and weight distribution, computes the motions of a vessel and the loads on it caused by wave action. The deck wetness analysis indicated that at speeds of 5 and 8 knots in 22.5-foot seas, water on deck would occur more often in stern quartering seas than in bow seas. In the even keel condition, water on deck would occur from about 20 times per hour for head seas to about 50 times per hour for stern quartering seas. The No. 1 hatch coaming was 5 feet above the deck. This location would become immersed less than once per hour in bow seas and more than 10 times per hour in stern quartering seas.

The computer program CAPSIZE was run to evaluate the rolling response of the SS POET to following seas under various conditions. In the computer program, a "capsize" is arbitrarily defined as a roll in excess of 115°. The CAPSIZE simulations did not indicate capsizing for any of the assumed conditions. CAPSIZE results do not take into account any shifting of cargo. The program also does not take into account actions that a prudent seaman might take in response to severe vessel motions. A small helm change could produce a markedly different vessel response.

The studies described above summarize the

services provided by the Merchant Marine Technical Division. MMT's objective was not to draw conclusions but to assist the Marine Board in its efforts to find the most probable cause for the loss of the SS POET. The questions involving stability, seakeeping, and strength required full use of Coast Guard analytical capabilities. The report to the Board will be published as technical report CG-M-4-81. Copies may be obtained by contacting Commandant (G-MTH-4/13) at Coast Guard Headquarters ((202) 426-2197) or through the National Technical Information Service (NTIS), Springfield, VA 22161.

Marine Casualty Report Released

SS POET: DISAPPEARANCE
Report No. USCG 16732/11486

Signed by the Commandant
of the U.S. Coast Guard on April 12, 1982

This report on the SS POET contains the U.S. Coast Guard Marine Board of Investigation report, action taken by the Commandant to determine the proximate cause of the casualty, and recommendations to prevent recurrence.

The Commandant has concurred with the Marine Board that the proximate cause of the casualty cannot be determined. Although the Board found that a credible case could be made for a number of possible causes, the Commandant considers it more probable that some loss of hull integrity occurred. If a loss of hull integrity occurred, the ingress of water could have gone undetected by the crew long enough to lead to the sudden loss of the ship by plunging, capsizing, or foundering.

This document is available to the public through the National Technical Information Service, Springfield, VA 22161, or from Commandant (G-MMI-1/74), U.S. Coast Guard, Washington, DC 20593; (202) 426-1455.

The Rhyme and Reason of Coast Guard Mailing Addresses

Readers who write to the Coast Guard are familiar with such symbols as G-CMC, G-WER, and G-MMI.

If you've been wondering what these letters stand for, this article is for you.

The "G-" that you see in front of these staff symbols is a requirement of the Office of the Secretary of Transportation. Each administration has a letter prefix for its staff symbols, and the Coast Guard uses "G."

The first letter after the hyphen designates an Office. The Coast Guard is divided into 16 of these. The older offices have letters that are the first letter of their title. For example, P is Personnel, O is Operations, M is Merchant Marine Safety. As duplicate first letters began to crop up, the Coast Guard had to look for alternatives. Comptroller, for instance, couldn't use C because the Office of the Commandant used it. So the Comptroller uses F (for the Financial work it does). Marine Environment and Systems couldn't use M (already taken by Merchant Marine Safety, so it took W (for Waterways Management). And so on.

The 16 Offices of the Coast Guard and their functions are as follows:

G-C **The Office of the Commandant** is charged with administering the Coast Guard, advising the Secretary of Transportation on matters regarding the Coast Guard, and maintaining liaison with public and private agencies.

G-CCS **The Office of the Chief of Staff** (the exception to the rule that an Office is designated by a single letter) is charged with developing and coordinating the Coast Guard's policies and programs, with special emphasis on general administration and management.

G-B **The Office of Boating, Public, and Consumer Affairs** is charged with

a. overseeing the program for prevention of recreational boat casualties. This includes enforcement of Federal laws and regulations, supervision of Coast Guard Auxiliary operations, establishment of pleasure craft safety standards, administration of public education and training programs, and maintenance of liaison with other authorities and organizations concerned with boating safety.

b. providing for a public relations and consumer affairs program aimed at keeping the private sector abreast of Coast Guard developments and events of general interest

G-D **The Office of Research and Development** is charged with administering a program of research and development tailored to the needs of the Coast Guard for new or improved systems, equipment, methods, and procedures.

G-E **The Office of Engineering** is charged with providing support in areas having to do with engineering, such as design, construction, maintenance, outfitting and alteration of vessels, aircraft, aids to navigation, shore establishments, machinery, and utilities.

G-F **The Office of Comptroller** is charged with such things as maintaining accounts, disbursing funds, and overseeing financial management.

G-H **The Office of Civil Rights** is charged with ensuring compliance with civil rights and equal opportunity policies, both within the Coast Guard itself and in its dealings with the public.

G-K **The Office of Health Services** is charged with developing and implementing the overall health services program of the Coast Guard.

G-L **The Office of the Chief Counsel** is charged with ensuring that the operations and activities of the Coast Guard are legally consistent with the requirements of the law and the rulings of higher authority.

G-M **The Office of Merchant Marine Safety** is charged with overseeing the program for prevention of marine casualties, including the inspection of merchant vessels to ensure compliance with established standards, approval of vessel plans and equipment, and the development and application of standards for merchant marine personnel.

G-N **The Office of Navigation** is charged with developing plans and providing resources for such Coast Guard operations as short range aids to navigation, radionavigation aids, and bridge administration.

G-O **The Office of Operations** is charged with developing plans and providing resources for Coast Guard operations involving search and rescue, enforcement of laws and treaties, polar and domestic icebreaking operations, operational and military readiness, marine science, ocean operations, and intelligence and security.

G-P **The Office of Personnel** is charged with such matters as hiring/recruiting, training, and assignment of personnel.

G-R **The Office of Reserve** is charged with training and assigning Reserve personnel and directing the Coast Guard Reserve Forces Program.

G-T The relatively new **Office of Command, Control, and Communications** (it was formed in May 1981) is charged with developing, overseeing, and acquiring the equipment for Coast Guard telecommunications and information systems.

G-W **The Office of Marine Environment and Systems** is charged with establishing and maintaining the Coast Guard's environmental program and a comprehensive ports and waterways system encompassing all aspects of marine transportation except vessel safety, aids to navigation, and bridge administration.

The last two letters of a staff symbol are, where possible, the initial letters of the first two substantive words in a division's name (exceptions are made where this would result in duplicates or a combination of letters with unpleasant connotations). G-MMI, for example, stands for the Marine Investigation Division of the Office of Merchant Marine Safety. Some division symbols are followed by numbers. These indicate a branch. G-MMI-1, for instance, is the Casualty Review Branch; G-MMI-2 is the Personnel Action Branch; etc. Planning and policy staffs, since they are not divisions, have just a single letter after the Office designation: G-MP is the Planning and Special Projects Staff in the Office of Merchant Marine Safety.

The following is a sampling of some of the other symbols you may have had occasion to use:

G-CMC - Marine Safety Council (Office of the Commandant)

G-CMA - Management Analysis Division (Office of the Chief of Staff)

G-BPA - Public Affairs Division (Office of Boating, Public, and Consumer Affairs)

G-LRA - Regulations and Administrative Law Division (Office of the Chief Counsel)

G-LMI - Maritime and International Law Division (Office of the Chief Counsel)

G-MVI - Merchant Vessel Inspection Division (Office of Merchant Marine Safety)

G-MVP - Merchant Vessel Personnel Division (Office of Merchant Marine Safety)

G-MVD - Merchant Vessel Documentation Division (Office of Merchant Marine Safety)

G-NSR - Short Range Aids to Navigation Division (Office of Navigation)

G-OSR - Search and Rescue Division (Office of Operations)

G-WER - Environmental Response Division (Office of Marine Environment and Systems)

G-WWM - Waterways Management Division (Office of Marine Environment and Systems)

Some of the divisions of the Office of Merchant Marine Safety have recently been reorganized. The Merchant Marine Technical Division (G-MMT) and the Cargo and Hazardous Materials Division (G-MHM) no longer exist in their old form. The functions of G-MMT that related to vessel inspections were transferred to G-MVI. Those functions related to the work done by G-MHM were transferred to that division, and the name was changed to the Marine Technical and Hazardous Materials Division, G-MTH. (G-MMT was not used, since that might have led to confusion with the former Merchant Marine Technical Division.) ‡

CIMARRON: Guardian of the River

by Tom Gillespie, Photojournalist
U.S. Coast Guard Headquarters

As the early morning sun rose slowly through the Tennessee pines at Paris Landing, only the sounds of crickets and frogs competed with Senior Chief Petty Officer Donald Steerman's commands to cast off lines. Another week of buoy work on the Tennessee and Cumberland Rivers was about to begin for the Coast Guard Cutter CIMARRON.

"Our job on this river is to maintain the aids to navigation. We're the first line of defense for these towboaters," said Petty Officer First Class Will Taylor. "We keep the commerce traveling on the rivers."

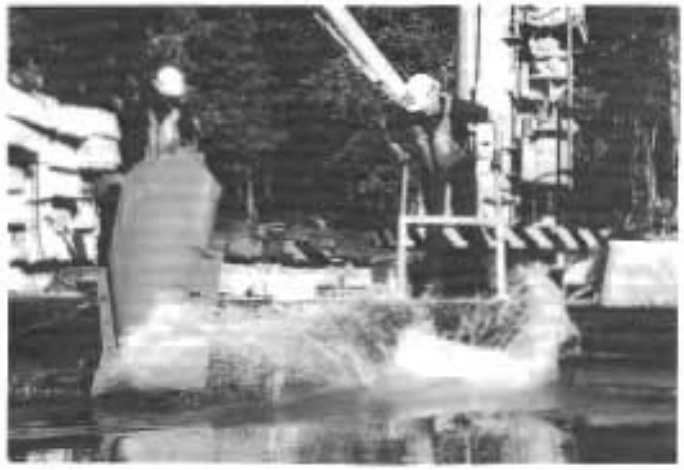
The CIMARRON has done a good job of keeping goods moving on the rivers--so good, in fact, that it won the National Defense Transportation Award as the Coast Guard's outstanding unit in 1980. It was an award earned though many long, hard hours on the river. In addition, the CIMARRON won its fourth consecutive excellence award from Coast Guard District inspectors.

"The CIMARRON keeps the river open and keeps it safe," added Group Tennessee River commander Harry Sites. "On this river, industry is big business, so it becomes imperative to keep the towboats moving. We want to make sure we have the best and the safest channel marked. That's our main concern."

Along with its sister ship, the OUACHITA, the CIMARRON services more than 1,200 miles of rivers with more than 1,500 buoys, shore structures, and safety landing markers.

Warrant Officer Sites explained the important job done by the CIMARRON: "Working navigational aids is not a glamorous job. It's a job that doesn't allow you to see the end result, but we try to instill pride in this work and the

The officer in charge of the CIMARRON, Donald Steerman, gives the word to the men on the buoy barge to drop the buoy on his signal.



As Senior Chief Steerman gives the word, the crewmembers drop the buoys overboard to remark the channel in the river.

feeling that if it's worth doing, it's worth doing right."

Keeping the navigational aids in place on the rivers is a never-ending struggle against the natural elements and errant commercial traffic on the river. Often the crew of the CIMARRON replaces as many as 60 percent of the buoys on one trip down the river.

The job is hard and often dangerous. "The buoys we use weigh 300 to 400 pounds, and the sinkers that hold them down weigh 1,500 to 2,000 pounds," said Petty Officer Third Class Fred Parsons. "When that much weight is swinging around on the buoy deck, you have to keep your eyes on the load and make sure you don't hit anybody. Everybody has to pay attention to what's goin' on on the buoy deck."

In addition to setting buoys, the crew must frequently reconstruct navigational lights along the river which have been knocked down by high water, bank erosion, and stray barge traffic. Twenty-foot towers must be constructed, guy wires strung, and reflective plywood "day markers" hoisted up the tower. Finally, 50 pounds of batteries must be hoisted up to power the lights.

Navigational light construction is a time-consuming, tedious job, but for the crew of the CIMARRON, it's all in a day's work.

Although navigational aids work is its prime concern, the crew of the CIMARRON must also respond to chemical and oil spills and numerous search-and-rescue cases—often on very short notice.

Retired tugboat captain Bill Harmon summed up the feelings of the river pilots for the job done by the CIMARRON and its hard-working crew: "I've been on the river 46 years, and I've seen a big change in it. There's a much better marked channel now.

"It's just better navigation now than before," Harmon continued. "Eight barges used to be a load. Now we're taking 35 or 40 barges down the river.

"If the Coast Guard weren't taking care of the navigational aids on the river, it would be unnavigable. We couldn't navigate with the loads we're taking down the river today," Harmon concluded.

Work on the inland rivers can often be a thankless job, but because of men and women like those on the CIMARRON, safe navigation is assured and goods can continue to move on the nation's rivers. ⚓

One job of the crew is to maintain the navigational lights and markers along the riverbank. High water and bank erosion make the job even more difficult than it would normally be.

A Reader Replies to "The Wake of the TITANIC"

*Captain Gunnar Olsborg is an Ocean Master Mariner and a long-time Puget Sound pilot. He is also a member of the Titanic Historical Society and has read extensively on the subject of the TITANIC's sinking. The following is taken from a letter Captain Olsborg wrote in response to the article "The Wake of the TITANIC" by PA3 Jeffrey D. Moore (*Proceedings, *January 1982):*

"I first became interested in accident prevention when, as a young ordinary and able-bodied seaman standing a wheel watch, I was privileged to hear captains, mates, and pilots describe how ships or docks were rammed or groundings occurred because of improper engine maneuvers or other causes.

"I believe [the TITANIC] could have been saved along with all hands if proper action had been taken.

"I have reviewed the accident periodically for 30 years and have expounded on my theory when discussing or giving talks on this subject. I have yet to have a seafarer dispute me.

"I trust you will excuse the lengthy buildup on the way to explaining what I believe went wrong on the third night out, just hours before what must have been the most newsworthy event of 1912.

"Needless to say, had Captain Edward J. Smith taken heed of the several ice reports delivered by Marconi wireless, the accident would perhaps not have happened.

"However, the commodore of the White Star Line was perhaps all fired up like the other officials and passengers . . . After all, the TITANIC was an 'unsinkable ship' and not in need of sufficient lifeboats and rafts to accommodate all passengers and crew. Needless to say, such lifesaving standards were immediately revised.

"The TITANIC, a floating palace with some 2,200 on board, had been running in thick, patchy fog conditions during the early evening when even the stars overhead were sometimes visible.

"The lookout man in the crow's nest sighted the iceberg about 23 minutes before midnight and reported same immediately to the bridge, whereupon Chief Officer Murdoch must have taken a few seconds with the binoculars to determine that the oncoming apparition was indeed close ahead . . . [he then] gave the order 'hard astarboard,' a throwback to the days of sail when the helm or tiller was placed to starboard in order to swing the bow to port, followed by a full astern backup on both engines. Strange as it might seem, this method of helm orders prevailed until 1936.

"The accident occurred in less than three

A number of readers have called or written to ask about the drawing on the cover of the January 1982 issue. This picture of the TITANIC appeared in the May 1912 issue of Scientific American. (Artist unknown)

minutes while the engineers, unprepared for the emergency, were frantically trying to stop and reverse the propellers. No one knows for certain if the backup maneuver had actually started to any appreciable extent when the underwater hull sideswiped and tore a hole in the ship described as being roughly 8 inches in height over a distance of 300 feet, flooding at least 4 compartments. Most ships of this size are generally designed to allow for the flooding of any 2 compartments without serious loss of stability. Naturally, the ship was doomed.

"One can hardly fault the chief officer for the attempted escape action that was undertaken [during the initial excitement].

"Perhaps in those days, unlike today, accidents were not visualized in advance for near automatic response in order to escape or at least minimize the disaster.

"Based on what we now know, the best avoidance action would have been to try and steer away from the hazard with a possible full backup on only the port engine. Unfortunately, this was not done.

"... the next mistake was the failure of Captain Smith to recover from his shock ... [he paid more attention to] a technical investigative report as to how much longer the ship would remain afloat [than the need] to take immediate and decisive action.

"This is when, as the fog immediately cleared after the accident, revealing several nearby large icebergs including the one just hit, the captain should have steered square on to one of the nearby large icebergs at a speed of four to six knots or more for the purpose of stabilizing and holding the bow in a rather rigid position with the engines running ahead ... [this would have certainly been] possible because of the flat, calm sea conditions prevailing at the time.

"Had this been done, Captain Arthur Rostron on the CARPATHIA [might] well have effected a full rescue.

"The ship might even have been saved by the use of canvas, dunnage, mattresses, etc. to stanch the flow of water commensurate with the ability of the pumps to maintain stability. Had this been done, it is possible that the ship could have been brought into the nearest port for beaching and repair.

"Despite the misfortune of the accident, Captain Edward J. Smith could have faced retirement as a hero, the same as the master of the CARPATHIA.

"Captain Smith must not have been unmindful of the passenger steamer ARIZONA, which in 1879 accidentally ran at full speed into an iceberg, crushing her bow and then backing all the way to Newfoundland for repairs.

"While the speed of the ARIZONA is not known, it could hardly have been less than 15 knots, inasmuch as passenger steamers in the mid-1880s were already doing nearly 20 knots, or about 22½ miles per hour.

"In 1922 the passenger vessel MONTROSE, [moving] at perhaps 20 knots, inadvertently encountered an iceberg in roughly the same sideswiping manner as the TITANIC and deliberately threw the steering wheel over to meet the berg head-on and at nearly full speed.

"Naturally much damage to the bow ensued, but only the forward hold was flooded, and the vessel was able to make Liverpool with all her passengers and nearly all the cargo intact.

"Likewise in 1923, the fastest passenger ship in the world (27 knots), while on a run from San Francisco to Seattle at a speed of 22 knots in thick fog, ran into a steep, nearly vertical rock on the northwestern Washington coast.

"The bow collapsed for some 30 or 40 feet, and the ship steamed astern for 150 miles into Seattle, again without loss of life.

"In view of the fact that we are soon observing the 70th anniversary of one of history's most outstanding maritime peacetime disasters,* may I compliment [Mr. Moore] for a most timely review."

Very sincerely,

Gunnar Olsborg

* *Editor's note: Captain Olsborg's letter was dated February 24, 1982.*

*This is the first in a series of four articles discussing derivatives of the chemical benzene.**

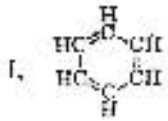
Toluene: $C_6H_5CH_3$

Synonyms:	Toluol Methyl benzene
Physical Properties	
boiling point:	111°C (231°F)
freezing point:	-95°C (-139°F)
vapor pressure at	
20°C (68°F):	22 mm Hg
25°C (77°F):	28 mm Hg (approx.)
Threshold Limit Values (TLV)	
time weighted average:	100 ppm; 375 mg/m³
short term exposure limit:	150 ppm; 560 mg/m³
Flammability Limits in Air	
lower flammability limit:	1.2% vol.
upper flammability limit:	7.1% vol.
Combustion Properties	
flash point (c.c.):	4°C (40°F)
autoignition temperature:	480°C (896°F)
Densities	
liquid (water = 1.0):	0.9
vapor (air = 1.0):	3.1
Identifiers	
U.N. Number:	1294
CHRIS Code:	TOL
Cargo Compatibility Group	32 (Aromatic Hydrocarbons)

Toluene (TOL-yoo-een) is perhaps most familiar to non-chemists as the second "T" in "TNT"—formally known as trinitrotoluene. It was discovered in a much less violent context in 1838 by two organic chemists working in Paris, P. Joseph Pelletier and Philippe Walter, a Polish-born emigre. The two scientists were doing research on the products obtained by heating a type of balsam used in medicines and perfumes. This balsam, a natural resin, came from the Tolue tree of northern South America—hence, the name of the chemical.

Chemists think of toluene as a member of a family of chemicals called *aromatic hydrocarbons*. The structure of the organic chemicals which make up this family is based on the ring structure of the benzene molecule (see diagram below). The family name was derived from the generally pleasant odor of the first few family members identified.

Benzene, C_6H_6, the parent compound, is illustrated by chemists in the following way:

I.  II.  III. 

To a chemist, these are simply three different ways of indicating the same structure. For simplicity's sake, we will use the third illustration throughout this series.

Toluene, $C_6H_5CH_3$, is the second member of the aromatic hydrocarbon family. It is a benzene ring in which one of the hydrogen atoms, H, has been replaced by a methyl group, $-CH_3$. Toluene can be drawn the following way:

About half the toluene produced in the U.S. today is used to make benzene. The process involved is called "dealkylation" and consists of removing the methyl group. Some toluene is used along with other materials to improve the octane quality of gasoline. Toluene is also an excellent solvent for many oils, fats, waxes, paints and lacquers, and rubber. It is a prime starting material for a host of other chemicals, including benzoic acid (which, in turn, is used to produce phenol), caprolactam, and various chlorotoluenes. Toluene is also a starting material for the artificial sweetener saccharine.

In 1980, the latest year for which figures on chemical production in the U.S. are available, toluene ranked 15th in volume (benzene was 16th).

* *For a discussion of benzene, see CG-482, "Benzene, Safe Handling Practices," available from Commandant (G-CMA-3), U.S. Coast Guard, Washington, DC 20593.*

Production methods have come a long way from the days of heating balsam. Toward the end of the 19th century toluene was being recovered as an important by-product of the process used to make coke from coal for the steel industry. This is still a source of toluene, although limited. Currently, about 95 percent of the toluene produced in the U.S. comes from several petroleum and petrochemical processes. This type of production first became economically viable during World War I, when the need for TNT increased. The process was refined and production costs thus cut in the years preceding World War II, when research was being conducted on methods to produce high-octane aromatic concentrates from petroleum for premium gasolines. Because the need for TNT again increased, these methods were converted to ultimately produce high-purity toluene. This was the beginning of the commercially important, and very large, petroleum aromatics industry in the U.S. While toluene was the principal product made during the war, these processes are used today to produce primarily what are called "BTX fractions," consisting of various percentages of benzene, toluene, and another benzene derivative, xylenes. These BTX fractions can then be separated into the different components.

There are several different grades of toluene. Two very pure grades are known as reagent grade, used principally by chemists, and nitration grade, used for making dyes, TNT, and toluene diisocyanate *(see the May 1982 issue of the* Proceedings). There are also three less pure industrial grades.

The primary hazard of toluene is its flammability. Its flash point, the temperature at which its vapor will ignite if exposed to a source of ignition, is a mere $4^{\circ}C$ ($40^{\circ}F$), and concentrations with as little as 1.2% toluene by volume in air are flammable. Since toluene vapor is heavier than air, it may travel along the ground or deck and, if ignited, flash back to its origin. Carbon dioxide, dry chemical, or foam are used to fight fires involving toluene.

Short-term overexposure to toluene may cause irritation of the eyes, skin, and respiratory tract. Inhalation of toluene vapors produces narcotic effects such as feelings of fatigue, muscular weakness, dizziness, drowsiness, confusion, and headaches. Cases of extreme overexposure have caused severe but reversible liver and kidney damage. Liquid toluene splashed in the eyes can result in irritation and temporary, reversible damage. Long-term exposure to toluene causes the skin to dry and crack because its solvent action, which makes it so valuable industrially, breaks down the body's oils. This is temporary but in cases of extreme exposure can be rather painful.

To protect themselves from exposure to the liquid, personnel should wear impervious clothing, gloves, and face shields/splash-proof safety goggles. Contaminated clothing should be removed and thoroughly washed before being reworn (note: keep it away from sources of ignition). Affected skin areas should be washed with soap and water and the eyes flushed with plenty of water. In cases of ingestion (swallowing), vomiting should not be induced because of the danger of aspiration: if the toluene gets into the lungs, it can cause chemical pneumonia. Inhalation overexposure is treated by removal of the victim to fresh air.

Because of toluene's close structural relationship to benzene, it had been feared that it would cause similar toxicity problems for the blood and blood-forming organs (leukemia). This has not proved to be the case, however. Pure toluene does not seem to have these toxic effects. Toxicity is a problem only with the industrial grades, and that is because of the varying amounts of benzene (up to 25 percent) they contain. Results of human and animal tests indicate that alkylation of the benzene ring (in the case of toluene, the addition of a methyl group) results in a loss of the myelotoxic activity (destruction of bone marrow) exhibited by benzene. The major toxicity problem of toluene is its narcotic effects, which are readily reversible and easily avoided by simple precaution.

Toluene is regulated by the U.S. Coast Guard as a Subchapter D commodity (this reflects the fact that its primary hazard is flammability). Regulations governing those grades of toluene containing 10 percent or more benzene are found in Subchapter O, Part 151, of the Code of Federal Regulations—for tank barges—and—for tank ships—in Chapter VI of the Chemical Code of the International Maritime Organization (formerly the Inter-Governmental Maritime Consultative Organization). The U.S. Department of Transportation classifies toluene as a flammable liquid. Both the Environmental Protection Agency and IMO consider it a Class C pollutant.

Hazard Evaluation Branch
Marine Technical and
Hazardous Materials Division

Next month: xylene

Editor's note - The following article was submitted by Professor Louis S. Hathaway of the Maine Maritime Academy. He received it from Bob Wallace, a graduate of the Academy who is now working for Federal Commerce and Navigation Ltd. of St. John, New Brunswick.

I assume it was written tongue-in-cheek but will stand corrected if the incident sounds familiar to any of our readers.

The author, who appears to be British, is unknown, and we are thus unable to give him credit.

It is with regret and haste that I write this letter to you, regret that such a small misunderstanding could lead to the following circumstances, and haste in order that you will get this report before you form your own preconceived opinions from reports in the world press, for I am sure that they will tend to overdramatise the affair.

We had just picked up the pilot, and the apprentice had returned from changing the "G" flag for the "H" and, it being his first trip, was having difficulty in rolling the "G" flag up. I therefore proceeded to show him how. Coming to the last part, I told him to "let go." The lad, although willing, is not too bright, necessitating my having to repeat the order in a sharper tone.

At this moment the Chief Officer appeared from the Chart room, having been plotting the vessel's progress, and, thinking that it was the anchors that were being referred to, repeated the "let go" to the Third Officer on the forecastle. The port anchor, having been cleared away but not walked out, was promptly let go. The effect of letting the anchor drop from the "pipe" while the vessel was proceeding at full harbor speed proved too much for the windlass brake, and the entire length of the port cable was pulled out "by the roots." I fear that the damage to the chain locker may be extensive. The braking effect of the port anchor naturally caused the vessel to sheer in that direction, right towards the swing bridge that spans a tributary to the river up which we were proceeding.

The swing bridge operator showed great presence of mind by opening the bridge for my vessel. Unfortunately, he did not think to stop the vehicular traffic, the result being that the bridge partly opened and deposited a Volkswagen, two cyclists, and a cattle truck on the foredeck. My ship's company are at present rounding up the contents of the latter, which from the noise I would say were pigs. In his efforts to stop the progress of the vessel, the Third Officer dropped the starboard anchor, too late to be of practical use, for it fell on the swing bridge operator's control cabin.

After the port anchor was let go and the vessel started to sheer, I gave a double ring Full Astern on the Engine Room Telegraph and personally rang the Engine Room to order maximum astern revolutions. I was informed that the sea temperature was 53° and asked if there was a film tonight; my reply would not add constructively to this report.

Up to now I have confined my report to the activities at the forward end of the vessel. Down aft they were having their own problems. At the moment the port anchor was let go, the Second Officer was supervising the making fast of the after tug and was lowering the ship's towing spring down onto the tug.

The sudden braking effect on the port anchor caused the tug to "run in under" the stern of my vessel, just at the moment when the propeller was answering my double ring Full Astern. The prompt action of the Second Officer in securing the inboard end of the towing spring delayed the sinking of the tug by some minutes, thereby allowing the safe abandoning of that vessel.

It is strange, but at the very same moment of letting go the port anchor there was a power cut ashore. The fact that we were passing over a "cable area" at that time might suggest that we may have touched something on the river bed. It is perhaps lucky that the high-tension cables brought down by the foremast were not live, possibly being replaced by the underwater cable, but owing to the shore blackout it is impossible to say where the pylon fell.

It never fails to amaze me, the actions and behaviour of foreigners during moments of minor crisis. The pilot, for instance, is at this moment huddled in the corner of my day cabin, alternately crooning to himself and crying after having consumed a bottle of gin in a time that is worthy of inclusion in the Guinness Book of Records. The tug captain, on the other hand, reacted violently and had to forcibly be restrained by the Steward, who has him handcuffed in the ship's hospital, where he is telling me to do impossible things with my ship and my

person.

I enclose the names and addresses of the drivers and insurance companies of the vehicles on my foredeck, which the Third Officer collected after his somewhat hurried evacuation of the forecastle. These particulars will enable you to claim for the damage that they did to the railings of the No. 1 hold.

I am closing this preliminary report, for I am finding it difficult to concentrate with the sound of police sirens and their flashing lights.

It is sad to think that had the apprentice realized that there is no need to fly pilot flags after dark, none of this would have happened.

For weekly Accountability Report I will assign the following Casualty Numbers: T/750101 to T/750199 inclusive.

Yours truly,

MASTER

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.

DECK

1. At the commencement of a foreign or intercoastal voyage, a legible copy of the shipping articles (Forecastle Card) must be posted at a place accessible to the crew. The responsibility for this is that of the

A. shipping company.
B. master.
C. U.S. Coast Guard
D. U.S. Customs Service

REFERENCE: 46 CFR 14.05-2

2. One of the causes of ocean currents is density differences in the water. This is true because

A. the water surface is lower in an area of high density than in an area of low density.
B. surface water flows from an area of high density to one of low density.
C. the lesser the density gradient, the freer the water is to move.
D. it is the density differences that cause the currents to stay in the troughs.

REFERENCE: Bowditch

3. When using the international flags and pennants, if the receiving station can distinguish the flag signal of the transmitting station but cannot understand the meaning of it, it can hoist the flag signal

A. ZP.
B. ZQ.
C. ZR.
D. ZK.

REFERENCE: H.O. 102

4. On most merchant ships the vessel will heel inwards if

A. the vessel has very little draft.
B. GM is below the center of lateral resistance.
C. GM is above the center of lateral resistance.
D. the vessel is deeply laden.

REFERENCE: *Modern Ships*, LaDage

5. Which statement(s) is (are) true concerning a dehumidification system which employs silica gel?

I. All air going into the dehumidifier is filtered.
II. The silica gel never has to be replaced if it is kept clean.

A. I only
B. II only
C. Both I and II
D. Neither I nor II

REFERENCE: *Marine Cargo Operations*

ENGINEER

1. What is the speed of the camshaft in a two-stroke-cycle diesel engine when the crankshaft is turning 625 rpm?

A. 312
B. 425
C. 625
D. 1,250

REFERENCE: Maleev

2. Injection lag in a diesel engine may be caused by

A. the compressibility of fuel oil.
B. the high viscosity of diesel fuel.
C. mechanical rigidity in the fuel pump mechanism.
D. an increase in the fuel pump delivery pressure.

REFERENCE: Maleev

3. The most practical way of detecting an overload in one cylinder of an operating diesel engine is to

A. check the exhaust for black smoke.
B. listen for combustion knock in that cylinder.
C. isolate each cylinder and inspect the injector.
D. check the cylinder exhaust temperature frequently.

REFERENCE: Stinson

4. If lost motion is present in an individual type fuel injection pump, what will occur?

A. More fuel will be injected.
B. Fuel injection will remain unchanged.
C. Fuel injection will occur earlier.
D. Fuel injection will occur later.

REFERENCE: Maleev

5. The most common instrument used to measure exhaust pressure in a diesel engine is the

A. pyrometer.
B. Bourdon gauge.
C. pneumercator.
D. manometer.

REFERENCE: Stinson

ANSWERS

1.C;2.A;3.D;4.D;5.D
ENGINEER
1.B;2.A;3.B;4.B;5.C
DECK

Prove that Your EPIRB is Working

(Reprinted from Chevron Shipping Company's Safety Bulletin, December 1981)

For proof positive that your vessel's EPIRB will transmit a full-power signal if needed:

1. Collect the EPIRB, a small FM radio, a half-filled bucket of water, and a watch.
2. Check the EPIRB's battery by operating the test switch.
3. Turn on the FM radio and tune it to 99.5 MHz.
4. Check the time. The full-power test can be made only during the International Distress Frequency Test Period--from 00 to 05 minutes of any hour.
5. When the time is right, dunk the bottom of the EPIRB into the water, watch the indicator lamp, and listen to the radio.

If the EPIRB is working properly, the indicator lamp will light and you will hear the EPIRB signal—an oscillating tone—on the radio. Pull the EPIRB out of the water as soon as you hear the signal.

This full-power test transmission *must not* last longer than 1 second or 3 audio sweeps.

If you don't hear the signal on the radio, then your EPIRB is in need of service. Perform this test each month and enter the results in the radio log.

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