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Proper watchkeeping is essential if collisions and groundings are to be avoided. Regulations and resolutions regarding watchkeeping duties are a major part of the International Maritime Organization's International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978. A four-part series on the STCW's guidelines begins on page 263. Photo courtesy of the International Organization of Masters, Mates and Pilots and its Maritime Institute of Technology and Graduate Studies

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Watchkeeping

Investigations into casualties involving collisions and groundings frequently reveal that the main contributory factor has been the failure to maintain an adequate navigational watch. Regulations and resolutions agreed upon by representatives to the International Maritime Organization are intended to ensure that seafarers will carry out their watchkeeping duties properly.

Photos courtesy of the International Organization of Masters, Mates and Pilots and its Maritime Institute of Technology and Graduate Studies

This is the first in a four-part series on the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW). This month's article focuses on basic principles and operational guidelines for officers in charge of a navigational watch. While some of these principles apply only to large, seagoing vessels, much of the text can apply to vessels of any size and in any type of service, and the concise, informative way in which the procedures are outlined should make them of use to ship owners, operators, masters, and watchkeeping personnel.

The articles to follow will address watchkeeping as it applies to deck officers in port and to engineer officers underway and in port.

The four articles are based on excerpts from the STCW Convention, which will go into effect for signatory nations in April 1984. Since the United States has not yet ratified the Convention, the principles elaborated in the articles are only recommendations at this time and cannot take the form of regulations or policy. However, U.S. mariners who enter ports of signatory nations will be required to comply with the Convention's provisions, and all licensed mariners should familiarize themselves with the guidelines and the STCW Convention.

The regulatory proposal for a new U.S. licensing structure (described in detail in the February issue of the *Proceedings*) was developed with an eye to harmonizing its provisions with those of the STCW wherever possible. That proposal was published in the Federal Register August 8, 1983, and the public comment period extends until December 6, 1983.

STCW
Regulation II/1

Basic Principles to be Observed in Keeping a Navigational Watch

1. Parties shall direct the attention of ship owners, ship operators, masters, and watchkeeping personnel to the following principles, which shall be observed to ensure that a safe navigational watch is maintained at all times.

2. The master of every ship is bound to ensure that watchkeeping arrangements are adequate for maintaining a safe navigational watch. Under the master's general direction, the officers of the watch are responsible for navigating the ship safely during their periods of duty, when they will be particularly concerned with avoiding collision and stranding.

3. The basic principles, including, but not limited to, the following, shall be taken into account on all ships.

4. Watch arrangements

(a) The composition of the watch shall at all times be adequate and appropriate to the prevailing circumstances and conditions and shall take into account the need for maintaining a proper lookout.

(b) When deciding the composition of the watch on the bridge, which may include appro-

priate deck ratings, the following factors, inter alia, shall be taken into account:

(i) the need to see that the bridge is at no time left unattended;

(ii) weather conditions, visibility, and whether there is daylight or darkness;

(iii) proximity of navigational hazards which may make it necessary for the officer in charge of the watch to carry out additional navigational duties;

(iv) use and operational condition of navigational aids such as radar or electronic position-indicating devices and any other equipment affecting the safe navigation of the ship;

(v) whether the ship is fitted with automatic steering;

(vi) any unusual demands on the navigational watch that may arise as a result of special operational circumstances.

5. Fitness for duty

The watch system shall be such that the efficiency of watchkeeping officers and watchkeeping ratings is not impaired by fatigue. Duties shall be so organized that the first watch at the commencement of a voyage and the subsequent relieving watches are sufficiently rested and otherwise fit for duty.

6. Navigation

(a) The intended voyage shall be planned in advance, taking into consideration all pertinent information, and any course laid down shall be checked before the voyage commences.

(b) During the watch the course steered, position, and speed shall be checked at sufficiently frequent intervals, using any available navigational aids necessary to ensure that the ship follows the planned course.

(c) The watchkeeping officer shall have full knowledge of the location and operation of all safety and navigational equipment on board the ship and shall be aware and take account of the operating limitations of such equipment.

(d) The officer in charge of a navigational watch shall not be assigned or undertake any duties which would interfere with the safe navigation of the ship.

7. Navigational equipment

(a) The officer of the watch shall make the most effective use of all navigational equipment at his disposal.

(b) When using radar the officer of the watch shall bear in mind the necessity to comply at all times with the provisions on the use of radar contained in the applicable regulations for preventing collisions at sea.

(c) In cases of need the officer of the watch shall not hesitate to use the helm, engines, and sound-signaling apparatus.

8. Navigational duties and responsibilities

(a) The officer in charge of the watch shall:

(i) keep his watch on the bridge, which he shall in no circumstances leave until properly relieved;

(ii) continue to be responsible for the safe navigation of the ship despite the presence of the master on the bridge until the master informs him specifically that he has assumed that responsibility and this is mutually understood;

(iii) notify the master when in any doubt as to what action to take in the interest of safety;

(iv) not hand over the watch to the relieving officer if he has reason to believe that the latter is obviously not capable of carrying out his duties effectively, in which case he shall notify the master accordingly.

(b) On taking over the watch the relieving officer shall satisfy himself as to the ship's estimated or true position and confirm its intended track, course, and speed and shall note any dangers to navigation expected to be encountered during his watch.

(c) A proper record shall be kept of the movements and activities during the watch relating to the navigation of the ship.

9. Lookout

In addition to maintaining a proper lookout for the purpose of fully appraising the situation and the risk of collision, stranding, and other dangers to navigation, the duties of the lookout shall include the detection of ships or aircraft in distress, shipwrecked persons, wrecks, and debris. In maintaining a lookout the following shall be observed:

(a) the lookout must be able to give full attention to the keeping of a proper lookout, and no other duties shall be undertaken or assigned which could interfere with that task;

(b) the duties of the lookout and helmsman are separate and the helmsman shall not be considered the lookout while steering, except in small ships where an unobstructed all-round view is provided at the steering position and there is no impairment of night vision or other impediment to the keeping of a proper lookout. The officer in charge of the watch may be the sole lookout in daylight, provided that on each such occasion:

(i) the situation has been carefully assessed and it has been established without doubt that such an arrangement is safe;

(ii) full account has been taken of all relevant factors including, but not limited to:

- state of weather
- visibility
- traffic density
- proximity of danger to navigation
- the attention necessary when navigating in or near traffic separation schemes;

(iii) assistance is immediately available to be summoned to the bridge when any change in the situation so requires.

10. Navigation with pilot embarked

Despite the duties and obligations of a pilot, his presence on board does not relieve the master and officer in charge of the watch from their duties and obligations for the safety of the ship. The master and the pilot shall exchange information regarding navigation procedures, local conditions, and the ship's characteristics. The master and officer of the watch shall cooperate closely with the pilot and maintain an accurate check of the ship's position and movement.

11. Protection of the marine environment

The master and officer in charge of the watch shall be aware of the serious effects of operational or accidental pollution of the marine environment and shall take all possible precautions to prevent such pollution, particularly within the framework of relevant international and port regulations.

STCW
Resolution 1

Recommendation on Operational Guidance for Officers in Charge of a Navigational Watch

Introduction

1. This Recommendation contains operational guidance of general application for officers in charge of a navigational watch which masters are expected to supplement as appropriate. It is essential that officers of the watch appreciate that the efficient performance of their duties is necessary in the interests of safety of life and property at sea and the prevention of pollution of the marine environment.

General

2. The officer of the watch is the master's representative, and his primary responsibility at all times is the safe navigation of the ship. He should at all times comply with the applicable regulations for preventing collisions at sea (see also paragraphs 22 and 23).

3. It is of special importance that at all times the officer of the watch ensure that an efficient lookout is maintained. In a ship with a separate chart room the officer of the watch may visit the chart room, when essential, for a short period for the necessary performance of his navigational duties, but he should previously satisfy himself that it is safe to do so and ensure that an efficient lookout is maintained.

4. The officer of the watch should bear in mind that the engines are at his disposal and he should not hesitate to use them in case of need. However, timely notice of intended variations of engine speed should be given where possible. He should also know the handling characteristics of his ship, including its stopping distance, and should appreciate that other ships may have different handling characteristics.

5. The officer of the watch should also bear in mind that the sound-signaling apparatus is at his disposal and he should not hesitate to use it in accordance with the applicable regulations for preventing collisions at sea.

Taking over the navigational watch

6. The relieving officer of the watch should ensure that members of his watch are fully capable of performing their duties, particularly ensuring that their eyes have adjusted to night vision.

7. The relieving officer should not take over the watch until his vision is fully adjusted to the light conditions and he has personally satisfied himself regarding:

(a) standing orders and other special instructions of the master relating to navigation of the ship;

(b) position, course, speed, and draft of the ship;

(c) prevailing and predicted tides, currents, weather, visibility, and the

effect of these factors upon course and speed;

(d) navigational situation, including, but not limited to, the following:

(i) operational condition of all navigational and safety equipment being used or likely to be used during the watch;

(ii) errors of gyro and magnetic compass;

(iii) presence and movement of ships in sight or known to be in the vicinity;

(iv) conditions and hazards likely to be encountered during his watch;

(v) possible effects of heel, trim, water density, and squat* on underkeel clearance.

8. If at the time the officer of the watch is to be relieved a maneuver or other action to avoid any hazard is taking place, the relief of the officer should be deferred until such action has been completed.

Periodic checks of navigational equipment

9. Operational tests of shipboard navigational equipment should be carried out at sea as frequently as practicable and as circumstances permit and in particular when hazardous conditions affecting navigation are expected; where appropriate these tests should be recorded.

10. The officer of the watch should make regular checks to ensure that:

(a) the helmsman or the automatic pilot is steering the correct course;

(b) the standard compass error is determined at least once a watch and when possible after any major alteration of course; the standard and gyro compasses are frequently compared and repeaters are synchronized with their master compass;

(c) the automatic pilot is tested manually at least once a watch;

(d) the navigation and signal lights and other navigational equipment are functioning properly.

Automatic pilot

11. The officer of the watch should bear in mind the necessity to comply at all times with the requirments of Regulation 19, Chapter V, of the International Convention for the Safety of Life at Sea, 1974. He should take into account the need to station the helmsman and to put the steering into manual control in good time to allow any potentially hazardous situation to be dealt with in a safe manner. With a ship under automatic steering it is highly dangerous to allow a situation to develop to the point where the officer of the watch is without assistance and has to break the continuity of the lookout in order to take emergency action. The changeover from automatic to manual steering and vice versa should be made by, or under the supervision of, a responsible officer.

Electronic navigational aids

12. The officer of the watch should be thoroughly familiar with the use of electronic navigational aids carried, including their capabilities and limitations.

13. The echo sounder is a valuable navigational aid and should be used whenever appropriate.

Radar

14. The officer of the watch should use the radar when appropriate and whenever restricted visibility is encountered or expected and at all times in congested waters, having due regard to its limitations.

15. Whenever radar is in use, the officer of the watch should select an appropriate range scale, observe the display carefully, and plot effectively.

16. The officer of the watch should ensure that

* Squat: The decrease in clearance beneath the ship which occurs when the ship moves through the water and is caused both by bodily sinkage and by change of trim. The effect is accentuated in shallow water and is reduced with a reduction in ship's speed.

range scales employed are changed at sufficiently frequent intervals so that echoes are detected as early as possible.

17. It should be borne in mind that small or poor echoes may escape detection.

18. The officer of the watch should ensure that plotting or systematic analysis is commenced in ample time.

19. In clear weather, whenever possible, the officer of the watch should carry out radar practice.

Navigation in coastal waters

20. The largest-scale chart on board suitable for the area and corrected with the latest available information should be used. Fixes should be taken at frequent intervals; whenever circumstances allow, fixing should be carried out by more than one method.

21. The officer of the watch should positively identify all relevant navigation marks.

Clear weather

22. The officer of the watch should take frequent and accurate compass bearings of approaching ships as a means of early detection of risk of collision; such risk may sometimes exist even when an appreciable bearing change is evident, particularly when a vessel is approaching a very large ship or a tow or approaching a ship at close range. He should also take early and positive action in compliance with the applicable regulations for preventing collisions at sea and subsequently check that such action is having the desired effect.

Restricted visibility

23. When restricted visibility is encountered or expected, the first responsibility of the officer of the watch is to comply with the relevant rules of the applicable regulations for preventing collisions at sea, with particular regard to the sounding of fog signals, proceeding at a safe speed, and having the engines ready for immediate maneuvers. In addition, he should:

(a) inform the master (see paragraph 24);

(b) post a proper lookout and helmsman and, in congested waters, revert to hand steering immediately;

(c) exhibit navigation lights;

(d) operate and use the radar.

It is important that the officer of the watch should know the handling characteristics of his ship, including its stopping distance, and should appreciate that other ships may have different handling characteristics.

Calling the master

24. The officer of the watch should notify the master immediately in the following circumstances:

(a) if restricted visibility is encountered or expected;

(b) if the traffic conditions or the movements of other ships are causing concern;

(c) if difficulty is experienced in maintaining course;

(d) on failure to sight land or a navigation mark or to obtain soundings by the expected time;

(e) if, unexpectedly, land or a navigation mark is sighted or change in soundings occurs;

(f) on the breakdown of the engines, steering gear, or any essential navigational equipment;

(g) in heavy weather if in any doubt about the possibility of weather damage;

(h) if the ship meets any hazard to navigation, such as ice or derelicts;

(i) in any other emergency or situation in which he is in any doubt.

Despite the requirement to notify the master immediately in the foregoing circumstances, the officer of the watch should in addition not hesitate to take immediate action for the safety of the ship, where circumstances require.

Navigation with pilot embarked

25. If the officer of the watch is in any doubt as to the pilot's actions or intentions, he should seek clarification from the pilot; if doubt still exists, he should notify the master immediately and take whatever action is necessary before the master arrives.

The watchkeeping personnel

26. The officer of the watch should give watchkeeping personnel all appropriate instructions and information which will ensure the keeping of a safe watch, including an appropriate lookout.

Ship at anchor

27. If the master considers it necessary, a continuous navigational watch should be maintained at anchor. In all circumstances, while at anchor, however, the officer of the watch should:

(a) determine and plot the ship's position on the appropriate chart as soon as practicable; when circumstances permit, check at sufficiently frequent intervals whether the ship is remaining securely at anchor by taking bearings of fixed navigational marks or readily identifiable shore objects;

(b) ensure that an efficient lookout is maintained;

(c) ensure that inspection rounds of the ship are made periodically;

(d) observe meteorological and tidal conditions and the state of the sea;

(e) notify the master and undertake all necessary measures if the ship drags anchor;

(f) ensure that the state of readiness of the main engines and other machinery is in accordance with the master's instructions;

(g) if visibility deteriorates, notify the master and comply with the applicable regulations for preventing collisions at sea;

(h) ensure that the ship exhibits the appropriate lights and shapes and that appropriate sound signals are made at all times, as required;

(i) take measures to protect the environment from pollution by the ship and comply with applicable pollution regulations.

Questions and comments regarding the STCW should be directed to LCDR George N. Naccara, U.S. Coast Guard (G-MVP-3), Washington, DC 20593; tel. (202) 426-2240. ‡

Oil and Sources of Ignition Don't Mix

Pump leakage can provide one of three things necessary for a fire—the fuel. All that's needed then are oxygen and a source of ignition.

by CDR F. H. Halvorsen
Executive Officer
Marine Safety Office, Port Arthur, Texas

This is the third in a series of three accounts of tank vessel casualties occurring in the Southeast Texas Gulf Coast area.

The M/V OSWEGO HOPE Incident

On December 4, 1981, the Coast Guard Marine Safety Office in Port Arthur was notified that an explosion had occurred in the pumproom and engine room of a 31,000-gross-ton Liberian-flag tank vessel moored at a terminal in Port Neches on the Neches River. One man had been injured. It appeared the fire was out. The vessel had had an operational inert gas system in use and had been discharging cargo and crude-oil washing at the time of the explosion. There is little doubt that the inert gas system prevented the explosion from spreading to the cargo tanks.

Damage was confined to the pumproom, where the damage survey turned up evidence of an internal explosion in the exhaust vent ducting. Other portions of the exhaust vent system also showed evidence of internal overpressure (the heavy cloth motion dampers between the exhaust fan and the vent system were blown out). In addition, the top of the exhaust vent tower on the main deck had been blown off and the flame screens ripped out. The pumproom itself showed signs of internal overpressure, primarily the damaged doors on the main deck, which had been blown open. The only personnel casualty was a man passing in front of the pumproom doors on the main deck when the explosion occurred. He had been blown across the deck and had suffered a broken arm and leg. Equipment stored at the main-deck level of the pumproom had also been blown out on deck. This included an air cylinder for a self-contained breathing apparatus. The neck valve on the cylinder had been sheared off and the bottle propelled like a rocket up the starboard side of the vessel. There was little evidence of fire in the pumproom, either in the bilges or elsewhere, although a partially melted flashlight, a piece of charred paper, and a partially charred cloth were found. Immediately following the explosion, cargo transfer was secured and the pumproom accesses were closed. All pumps, the exhaust fan, and electrical circuits in the pumproom were also secured.

Coast Guard inspectors found signs of unusual cargo leakage around two of the five cargo pumps. Oil spray was especially evident around the No. 4 pump, the pump in use at the time of the casualty. Oil was noted on bulkheads, strength members, and the platform on which the pumps were situated. A relatively large amount of oil was present in the bilges of the pumproom. This situation was apparently well known to vessel personnel, since gasket material was hung around two pumps to restrict the spray of the pumps. Further investigation showed the source of the spray to be the shaft

This series of articles was adapted from a paper presented by the author at last year's session of the annual Marine Chemists' Seminar, held in San Francisco July 12 - 14, 1982.

seals. When the pump in use was later disassembled for repair, a brass bushing, the shaft itself, and a carbon seal were found to be badly worn. This apparently allowed an excessive amount of oil to escape past the shaft.

It was readily apparent that the fuel for the explosion was provided by the unusual pump leakage. In a normal pumproom the powered exhaust ventilation should be sufficient to remove any buildup of vapors. Pumproom ventilation system designs are based on the fact that cargo vapors are denser than both air and extracts from the bottom of the pumproom. Air enters at the top of the pumproom to create an air flow moving from top to bottom and "sweeping" along the cargo vapors. This incident demonstrated that severe cargo leakage can overwhelm the ability of a ventilation system to remove vapors.

Analysis

Once the leakage had been noted, the investigation centered on finding the ignition source within the pumproom. The Coast Guard, the American Bureau of Shipping, the Liberian Maritime Administration, the owner's representatives, and the crew of the vessel all joined in the search for this source. All electrical fittings were inspected and found to be in good condition. The ventilation exhaust fan, a traditional source of ignition in past accidents of this type, was checked, disassembled, and found to be in good condition. There were no sources of spontaneous combustion, and, with the exception of the cargo leakage, the pumps were operating normally. Binding of the pump shaft and subsequent overheating were considered a potential autoignition source, but this theory was rejected; investigators reasoned that the leakage would have kept the shaft even cooler than normal because of the flow of oil past the suspected binding area. In addition, when the pump was disassembled, the worn parts showed no signs of overheating, such as bluing of the stainless steel shaft or bonding of brass to steel. Even if the pump had lost suction, which was not likely, since there was a flooded suction of approximately 30 feet of oil, an internal arrangement of vacuum valves would have opened, and recirculated oil would have passed through the pump.

The pump and fan shaft seals from the engine room were checked and found to be in good condition. There was no one in the pumproom at the time of the casualty; thus, such sources of ignition as cigarettes could be ruled out as unlikely. One proposed theory was that flammable vapors discharged from the exhaust ventilation were ignited, allowing a flame front to progress back into the vent, where an environment of more propitious vapor concentration, temperature, and/or pressure allowed an explosion to take place. This theory was rejected because of the 15-knot winds from abeam the vessel, which would have provided good dissipation of the vapors.

In short, all conventional sources of ignition were considered and ruled out. The owner was clamoring to finish offloading his vessel. No ignition source had been found, so it had to be assumed that the ignition source was still present. The safest route was thus to eliminate the fuel portion of the fuel/ignition source/oxygen triangle. The Coast Guard accordingly required the owner to

- clean up the pumproom,
- repair the pump shaft seals,
- repair the vent ducting and make the ventilation system operational, and
- have a Marine Chemist test the pumproom to see that it met the requirements for a gas-free certificate prior to offloading.

As it turned out, the pump which was in operation when the explosion occurred could not be repaired without a major overhaul and could not be used until permanent repairs were made.

This incident has caused some consternation among Coast Guard officers, especially in view of the number of past incidents involving tank vessel explosions in the area. The Coast Guard now boards each vessel and checks the condition of the pumproom. Pump leakage and pumproom cleanliness are two items thoroughly checked on vessels entering this particular marine safety zone.

Conclusion

There is no doubt that tank vessel accidents will continue. Everyone concerned must be aware of the constant possibility of exposure to toxic substances (as in the first incident in this series) and, especially, the existence of conditions which will permit an explosion (as in incidents 2 and 3). Marine Chemists as well as Coast Guard personnel must always bear in mind the extreme hazards presented by these products and must also make a concerted effort to make the maritime industry aware of the hazards of petroleum products. ↓

Keynotes

The Coast Guard published the following items of general interest in the Federal Register between September 16, 1983, and October 11, 1983:

Final rules:

CGD 78-079b	St. Marys River Vessel Traffic Service, correction (published September 16, 1983)
CGD3-83-46	Regatta: Chrysler Laser Classic 200, New York Harbor, New York (September 22)
CCGD9 83-04	Drawbridge Operation Regulations: Manitowoc River, Wisconsin (September 22)
CGD 82-023a	Casualty Reporting Requirements (September 22)
CGD 82-023	Casualty Reporting Requirements (September 23)
CGD11 11-92-83	Establishment of Special Local Regulations for the "Lake Havasu City Triathlon" (September 29)
CGD11 11-94-83	Establishment of Special Local Regulations for the "London Bridge Days Water Ski Show" (September 29)
CGD11 11-96-83	Establishment of Special Local Regulations for the "Windsurfer Points Regatta" (September 29)
CGD 82-055	Chart and Publication Requirements (September 29)
COTP Miami, FL Reg. 83-09	Safety Zone Regulations: Government Cut, Miami, Florida (September 29)
CGD 82-063b	Revision of (Coast Guard) Staff Codes and Addresses, correction to final rule (October 3)
CGD3-83-44	Special Local Regulations; Head of the Connecticut River, Middleton, Connecticut (October 4)
CGD3-82-010	Drawbridge Operation Regulations; Beaver Dam Creek, New Jersey (October 4)
CGD 75-124a	Pollution Prevention; Implementation of Outstanding MARPOL 73/78 Provisions (October 6)
CGD 76-088b	Tank Vessels Carrying Oil in Bulk; Cargo Monitors (October 6)
CGD 76-088c	Engineering Equipment; Design and Approval Requirements for Oil Pollution Prevention Equipment (October 6)
CGD 83-039	Vessel Financial Responsibility for Pollution Liability (October 11)

Notices of proposed rulemaking (NPRMs):

CCGD8-83-01	Anchorage Regulations; Lower Mississippi River, withdrawal of NPRM published April 11, 1983 (September 22)

CGD7 83-08	Drawbridge Operation Regulations; Wilmington River, Atlantic Intracoastal Waterway, Georgia (September 29)
CGD 82-002	Actions Against Seamen's Licenses, Certificates, or Documents (September 30)
CGD 79-032	Pilot Boarding Equipment (October 5)
CGD 81-058	Boundary Lines, corrections to supplemental NPRM published September 15, 1983 (October 6)

Notices:

CGD 83-053	Lower Mississippi River Waterway Safety Advisory Committee, notice of meeting (September 29)
CGD 78-151	Inland Waterways Navigation Regulations; Connecting Waters from Lake Huron to Lake Erie, notice of hearing and extension of comment period for NPRM published June 6 (October 6)
CGD 83-052	Towing Safety Advisory Committee, notice of meeting (October 6)

Requests for copies of NPRMs should be directed to the Marine Safety Council at the following address:

Commandant (G-CMC)
U.S. Coast Guard
Washington, DC 20593
Tel.: (202) 426-1477

The Marine Safety Council office, Room 4402 at Coast Guard Headquarters, 2100 Second Street, SW, Washington, DC, is open between the hours of 9:00 a.m. and 4:00 p.m. Monday through Friday. Comments are available for inspection or copying during those hours.

* * *

Final rules:

Casualty Reporting Requirements (CGD 82-023a, 82-023)

These two final rules were published on September 22 and 23, 1983, respectively. They adopt interim final rules issued on August 16, 1982, providing for the use of a single casualty reporting form, a new CG-2692. The old CG-2692 and CG-924E forms are being phased out. The effect of the change will be to reduce the paperwork burden on the public and improve the Coast Guard's ability to analyze casualties.

CGD 82-023a relates to outer continental shelf (OCS) facilities as well as vessels and other units engaged in OCS activities. CGD 82-023 pertains to other marine casualties, injuries, and loss of life. Both rules became effective on the date they were published.

Chart and Publication Requirements (CGD 82-055)

This rule, published September 29, 1983, modifies the requirements for carriage of nautical charts and publications by removing certain ambiguities from the Navigation Safety Regulations (Part 164 of Title 33 of the Code of Federal Regulations). These regulations are applicable to self-propelled vessels of 1600 gross register tons or more operating on navigable waters of the United States other than the St. Lawrence Seaway.

Experience with the original regulations indicated that the requirement that a vessel have on board the most recent edition of a chart or publication placed an undue burden on the persons operating the vessel. In most instances, a chart or publication that has been corrected to show changes and additions subsequent to publication is just as suitable for safe navigation as the most recent edition of that chart or publication.

The final rule, which went into effect October 28, 1983, requires that operators have marine charts of large enough scale and with sufficient detail to make safe navigation of an area possible. Charts and publications must be corrected

and updated with corrections contained in all Notices to Mariners reasonably available to a vessel. They need no longer be the latest editions, provided the editions on board are so corrected. Foreign charts and publications are acceptable but, like their U.S. counterparts, must provide for the safe navigation of a vessel in the area to be transited. The required Tide and Tidal Current Tables must be of the current edition.

Pollution Prevention Regulations

Published together on October 6, 1983, were three final rules implementing various provisions of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78). The Act to Prevent Pollution from Ships, 1980 (P.L. 96-478) requires the Secretary of Transportation to promulgate regulations to implement these provisions of MARPOL 73/78. The three final rules are

Pollution Prevention; Implementation of Outstanding MARPOL 73/78 Provisions (CGD 75-124a),

Tank Vessels Carrying Oil in Bulk; Cargo Monitors (CGD 76-088b), and

Engineering Equipment; Design and Approval Requirements for Oil Pollution Prevention Equipment (CGD 76-088c).

All of these final rules became effective the date they were published.

Vessel Financial Responsibility for Pollution Liability (CGD 83-039)

This action results from the recent transfer of the vessel financial responsibility certification program from the Federal Maritime Commission (FMC) to the Coast Guard. The effect of the action is to locate the program-governing regulations in the appropriate Coast Guard chapter of the Code of Federal Regulations.

The final rule, published on October 11, 1983, redesignates the FMC regulations governing vessel financial responsibility for pollution liability (Parts 542, 543, and 544 of Title 46 of the CFR) as new Parts 130, 131, and 132 of Title 33 of the CFR.

This amendment involves organizational and administrative changes brought about because of the shift of a Federal program from one agency to another. It does not substantively revise current governing regulations. Therefore, it is excepted from the usual notice and public-procedure requirements and is effective immediately.

Notices of proposed rulemaking (NPRMs):

Actions Against Seamen's Licenses, Certificates, or Documents (CGD 82-002)

This proposal, published on September 30, 1983, would revise the regulations pertaining to suspension and revocation proceedings against a seaman's license, certificate, and/or document. It would bring the existing regulations up to date with statutory and case law by incorporating changes which have occurred since the last revision. This proposal would eliminate excessive or redundant regulatory material and would improve the organization of the existing regulations. As a result, it would make the regulations and the procedures involved easier for the affected public to understand.

Pilot Boarding Equipment (CGD 79-032)

In this NPRM, published October 5, 1983, the Coast Guard is proposing to revise its installation, equipment, and operating standards for the embarking and disembarking of pilots on vessels underway or at anchor. This proposal combines existing requirements with international standards contained in Regulation 17, Chapter V, of the Convention for Safety of Life at Sea, 1974, and adds new provisions concerning the replacement of steps. These proposed regulations would apply to all U.S. vessels and certain foreign vessels that normally employ pilots when calling at U.S. ports. The purpose of the regulations would be to minimize the potential for hazardous situations when pilots are boarded.

Actions of the Marine Safety Council

The Marine Safety Council did not meet during the month of October. ‡

Maritime Sidelights

Coast Guard Begins New Radio Service for Mariners

On October 17 the Coast Guard began a new broadcasting service from its station at Sandwich, Massachusetts. The new service, called the Navtex system, has the potential to provide an improved standard of navigational information to the mariner with less work on the part of the ship's staff. It provides navigational and weather information using a new radio format taking advantage of a low-cost microcomputer. While already extensively used in Northern Europe, it has never before been used west of the Atlantic.

Broadcasting starts at 0500 UTC (1 a.m. Eastern Daylight Time) and is repeated every six hours thereafter. Broadcasts include several navigational notices to mariners, weather forecasts, weather warnings, and search and rescue information. A "smart" radio receiver installed in the pilothouse of a ship checks each message to see whether it has been received during an earlier transmission or is of a category of no interest to the ship's master. If it is a new and wanted message, it is printed on a roll of adding machine-size paper.

Previously, a radio operator wanting to obtain this information had to be at the radio at the right time to listen to a voice broadcast or decode a Morse-coded broadcast. With the Navtex system, he can walk over to the radio at any time and read only the messages of interest to him.

Ships within 200 to 300 nautical miles of the Sandwich transmitter will be able to receive Navtex broadcasts (this includes the whole New England Coast, as well as the Georges Bank fishing area). A new ship coming into the area will receive previously broadcast messages for the first time; ships already in the area which have already received a message will not receive it again.

At least three manufacturers already offer Navtex receivers, which cost anywhere from $1,000 to slightly over $2,000.

The Navtex system has been so successful in Europe that the International Maritime Organization is considering requiring Navtex receivers to be installed on all medium-sized and large vessels traversing the ocean in the 1990s.

Work Boat Show Scheduled

The 1984 International Work Boat Show will be held January 19 - 22 at the Louisiana Superdome in New Orleans.

Among the exhibitors at the show will be some 400 marine companies, including, among others, boatbuilders and operators, manufacturers and suppliers, and service companies. Industry seminars are scheduled on such topics as the future of the marine industry, the growing computerization of the work boat industry, advanced navigational systems, and commercial fishing.

Requests for further information should be sent to the attention of Rick Martin at The Work Boat Show, P.O. Box 2400, Covington, Louisiana 70434; tel.: (504) 893-2930.

Use of Satellites in Search and Rescue to be Discussed in France

An international symposium on satellite-aided search and rescue will be held April 9 -13, 1984, in Toulouse, France.

The symposium will cover all topics related to the development, implementation, and use of satellite systems in the field of maritime and aeronautical search and rescue. The two main subject headings will be the results obtained from experiments in this field in the last few years and the operational prospects for using satellite techniques in Search and Rescue activities. Sessions will focus on the international organization of search and rescue efforts, national or regional requirements, applications of polar and geostationary satellite systems, systems demonstration results, and future systems and requirements.

Further details and registration forms are available from Tom McGunigal, Code EC4, NASA Headquarters, Washington, DC 20546.

The symposium is being sponsored by the French space agency Centre National d'Etudes Spatiales. Among its cosponsors from the United States are the Coast Guard and NASA.

Competence

What degree of professionalism is it reasonable to expect from mariners? Two casualties, attributable to lack of familiarity with the navigational rules and inability to use radar effectively, illustrate the importance of professional competence.

The Rules Change with the Weather

by LT Jack Hardin
Senior Investigating Officer
Marine Safety Office, Port Arthur, Texas

"No matter how gross the fault of one, a collision at sea could hardly occur without the concurring carelessness of the other," wrote New York District Court Judge J. Coxe in *Livingstone* (1898).

Years of investigating marine casualties have convinced me that the Coast Guard does not look for or expect extraordinary skill or diligence from a master but only that degree of skill and care which is ordinarily found in a competent and prudent seaman. As a minimum, he should be expected to observe the rules of navigation. After all, the risk of a collision arises the very second a vessel begins to operate outside the rules established by law.

One particular marine casualty is especially pertinent in this respect. It took place in the Gulf of Mexico in mid-February 1982. A large U.S. LASH freighter and a smaller foreign freighter were both proceeding full speed ahead during the four-to-eight watch. They were closing at an angle of 43 degrees, and if there had been unlimited visibility, the foreign vessel would have been the "stand on" vessel and the U.S. vessel the "give way" vessel. However, both vessels were navigating in the fog.

Neither vessel was able to visually sight the other until seconds before the collision, and neither vessel made any effective change in course or speed before the collision.

Operators on each vessel detected the presence of the other with radar at least ten minutes before the collision, and each watched the other proceed to a point where it was in extremis and subsequently could not avoid a collision.

The mate on watch on the foreign vessel realized a collision situation existed early on, but he was convinced that the other vessel would have to avoid him because he thought he had the "right of way." As the minutes and miles passed, he began to worry. Nevertheless, he stood on with his assumed right of way—right into an unnecessary collision. He later testified that he was unaware that the navigation rules change for vessels navigating in or near restricted visibility.

Personnel on the U.S. vessel apparently did not consider the rules of navigation at all; they just continued on their way. However, they were at least sounding fog signals. Whether those signals would have been heard early enough to allow audible tracking of the ap-

Operators on each vessel detected the presence of the other with radar at least ten minutes before the collision, and each watched the other proceed to a point where it was in extremis and subsequently could not avoid a collision.

proaching vessel before both ships were in extremis is doubtful, however, since they were making approximately 22 knots.

The master of the U.S. vessel asked his mate about the approaching vessel detected on radar, and the mate explained that it would pass clear to starboard, even though he had not accurately plotted its course, speed, and closest point of approach. The master then walked over to the mate's radar and saw a grease-pencil line drawn on the plastic overlay of the Plan Position Indicator (PPI) scope. The pencil line showed that the vessel would pass safely. The only problem was that the grease-pencil line had been placed on the PPI scope hours earlier, while the vessel was meeting another vessel, and had not been erased.

Both the master and the mate on the LASH freighter became increasingly concerned as the bearing remained constant on the rapidly closing ship. A constant bearing with a closing range is a sure danger signal in itself which should place every mariner on alert. Although concerned, they made no decrease in speed or change in course, nor did they attempt any radiotelephone communications.

Only when the foreign ship appeared out of the fog and on an obvious collision course, just 400 feet away, was any sort of action taken. By then, it was too late.

Miraculously, no one was killed, although there were several injuries. The two ships—designed, built, and crewed to avoid collisions—were badly damaged. One was declared a total constructive loss and later scrapped.

Obviously, negligence and multiple violations of the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS) could be attributed to the crews of both vessels. When two well-equipped vessels such as these collide at sea while the operators of each vessel are aware of the presence of the other, it is prima facie evidence that the conning officers failed to exercise the expected degree of skill and care.

It is in all mariners' best interest to observe the rules of navigation. In order for a vessel to shape its course in relation to that of others, conning personnel must make certain assumptions about what other vessels will do and be prepared to maneuver their vessels in such a manner as to avoid a close-quarters situation and a possible collision. Until there is evidence to the contrary, a conning officer should be able to take it for granted that others will obey the rules of navigation and practice good seamanship. The rules will be worthless if navigating officers do not follow them.

In this casualty, the mate on the foreign vessel indicated that he thought Rule 15 of the COLREGS applied, as he was in a crossing situation and off the starboard bow of the other vessel. However, Rule 15 did not apply, since the vessels were operating in conditions of restricted visibility and were not in sight of each other. Therefore, Rule 19, concerning the conduct of vessels in restricted visibility, was the governing rule in this case.

Rule 19(d) states, in part, "a vessel which detects by radar alone the presence of another vessel shall determine if a close-quarters situation is developing and/or risk of collision exists. If so, she shall take avoiding action in ample time . . ." Since both vessels were traveling in fog and could not visually sight one another, neither vessel was privileged; in fact, both were as burdened as they could possibly be. The supreme burden of both vessels was to keep from colliding by avoiding a close-quarters situation.

. . . the mate explained that it would pass clear to starboard, even though he had not accurately plotted its course, speed, and closest point of approach.

Even though bridge personnel should be able to assume that other vessels will adhere to the rules of navigation, they should be ready at all times to execute evasive maneuvers when necessary. This brings up another factor which must be considered a definite, but sometimes overlooked, contributing cause of casualties—fatigue.

The master of the U.S. vessel had not slept for some 23 hours prior to the collision. In addition, he actually had had the conn of the vessel and had been staring into his radar for well over six hours prior to the collision. This lengthy watch was due to his company's policy requirement that the master be in control of navigation of the vessel whenever restricted visibility was encountered.

It is certainly not unreasonable for the owners, the shippers, and especially the crew of a vessel to expect the master to navigate with caution and to bring his ship, its cargo, and its crew safely to port. His license states that he is capable of doing that; it also requires his

compliance with applicable COLREGS. To err is considered human, but if a master is going to err, it should be on the side of safety. There is absolutely nothing wrong with being overcautious when life, property, and the environment are at stake. Whatever can be done to avoid a collision must be done in ample time.

Professional mariners must realize their grave responsibility for the safety of their vessels and crews. They must be held accountable for knowing, understanding, and navigating within the rules. Unfortunately, sometimes they must also compensate for other mariners' failure to heed the rules.

Cut in half on a rainy night

by John A. Crawford
Analyst, Marine Investigative Division

Visibility in the Gulf of Mexico the night of January 7, 1978, was poor because of heavy rain. The men on board the 95-foot aluminum U.S. crew boat CANDY BAR barely saw the 565-foot, 21,150-deadweight-ton Liberian tankship STOLT VIKING before it struck in way of the passsenger compartment, splitting the CANDY BAR in two. Fortunately, although the CANDY BAR was certificated to carry 55 persons, there were no passengers on board that night. Two of the four crewmen on board the CANDY BAR disappeared, however, and are presumed dead.

Survivors reconstructed the event as follows: the CANDY BAR was returning to Freshwater Bayou, Louisiana, on course 031 degrees T at 14 knots with two operators on board when it received a request to pick up an injured person on a nearby rig. The first operator went down to the galley to use a table to plot a course. He fixed the position of the vessel using Loran A and water depth and called the course up to the bridge. The second operator began a port turn to come about to 250 degrees T. The first operator put away the navigation equipment, returned to the bridge, and took the wheel. He noticed several blips on the radar at a range of about 2,000 yards on the port side, and the second operator tuned the radar for a better picture. About a minute after the first operator took the wheel the rig called and cancelled the request. Immediately, the first

To err is considered human, but if a master is going to err, it should be on the side of safety.

operator swung the boat to starboard to return to the original course of 031 degrees T. About a half minute after that, the rig called again and said that transportation was needed after all for the injured man. The first operator kept the CANDY BAR in the starboard turn to come around to 250 degrees T. Shortly thereafter, the CANDY BAR detected the STOLT VIKING at a distance of about 40 yards. The second operator thought they were colliding with a drilling rig; he did not even know there was a ship in the area.

On the STOLT VIKING, the watch at the time of the collision consisted of the officer on watch, a helmsman, and a lookout. The master, chief mate, and second mate were also on the bridge. Vessel speed was 12 knots. In spite of the extra manning on the bridge, the mate was having trouble tracking targets with radar in the heavy rain, and the ship's track did not stay within the safety fairway. The CANDY BAR was not detected until it was about 80 yards from the bow.

Both vessels had ample personnel on the bridge and all the equipment they needed. In spite of the fact that crewmen on each vessel intermittently observed contacts visually and on radar, no one on either vessel took visual bearings or plotted the contacts. It is likely that they did observe each other prior to the collision. Neither of the officers on watch used lookouts or radar effectively, and neither positively identified the presence of another vessel until there was no time to avoid the collision.

The lookout on the tankship was on the bridge, 170 yards aft of the bow. The crew boat's lookout was inside the pilot house. Neither vessel was sounding fog signals. The missing operator of the CANDY BAR did not have a valid license; the surviving operator had a license but no formal training in the use of radar. The officers of the STOLT VIKING were all properly licensed and qualified under Liberian law.

Poor watchkeeping and navigation practice on both vessels contributed to this casualty. In addition to moving at excessive speed, the crews were deficient in three areas essential to safe operation:

Knowing one's location - the CANDY BAR plotted its position incorrectly about five minutes before the collision, and the STOLT VIKING was outside of the safety fairway at the time of the collision.

Making one's presence known to others - neither vessel was sounding fog signals.

Knowing the location of other traffic and obstacles - neither vessel was aware of the presence of the other.

The effective use of radar could have helped in the first and the third respects. In this case, there were two obstacles to the effective use of radar. First, heavy rain periodically obscured the radar. Second, the track line of the CANDY BAR in its convoluted maneuver would have been challenging to follow even in good weather. Similarly, the CANDY BAR faced the formidable challenge of trying to use its radar while making the turn. Note that both vessels should have identified each other on radar before the CANDY BAR began the hard turn.

Clearly, this casualty was the result of several types of poor seamanship, and one of the shortcomings it highlights is the need for solid radar skills.

If a crew boat has radar on board, the Coast Guard encourages its licensed operators to have competent radar skills. This means more than knowing where the on/off switch is located. Relative motion, rapid radar plotting, closest point of approach, contact avoidance--it does not seem unreasonable to expect operators to have all the knowledge of a competent professional trained in radar.

The Coast Guard has made several determinations regarding the definition of competence in the use of radar and the applicability of rules requiring it. Another one is on the horizon:

Licensing of Officers and Operators and Registration of Staff Officers (CGD 81-059)

As a result of the STOLT VIKING-CANDY BAR collision, the National Transportation Safety Board recommended that the Coast Guard require the operator of every radar-equipped vessel carrying more than six passengers for hire and engaged in the offshore oil industry to be qualified as a "radar observer." The Coast Guard did not concur with this recommendation because radar is not required on such vessels. Still, the Coast Guard is concerned about incidents such as this, where there is ample evidence of improper use of radar preceding a casualty. In a proposed revision to the licensing rules in Part 10 of Title 46 of the Code of Federal Regulations is a section that will require licensed operators to be skilled in the use of installed navigation equipment, including radar. The pertinent part of the amendment reads as follows:

46 CFR 10.01-1 Purpose of Regulations

* * *

(b) . . . it is incumbent upon every licensed individual to become familiar with all unique characteristics of each vessel served upon as soon as possible after reporting aboard for duty. As appropriate for a deck or engineer license, this includes but is not limited to: maneuvering characteristics of

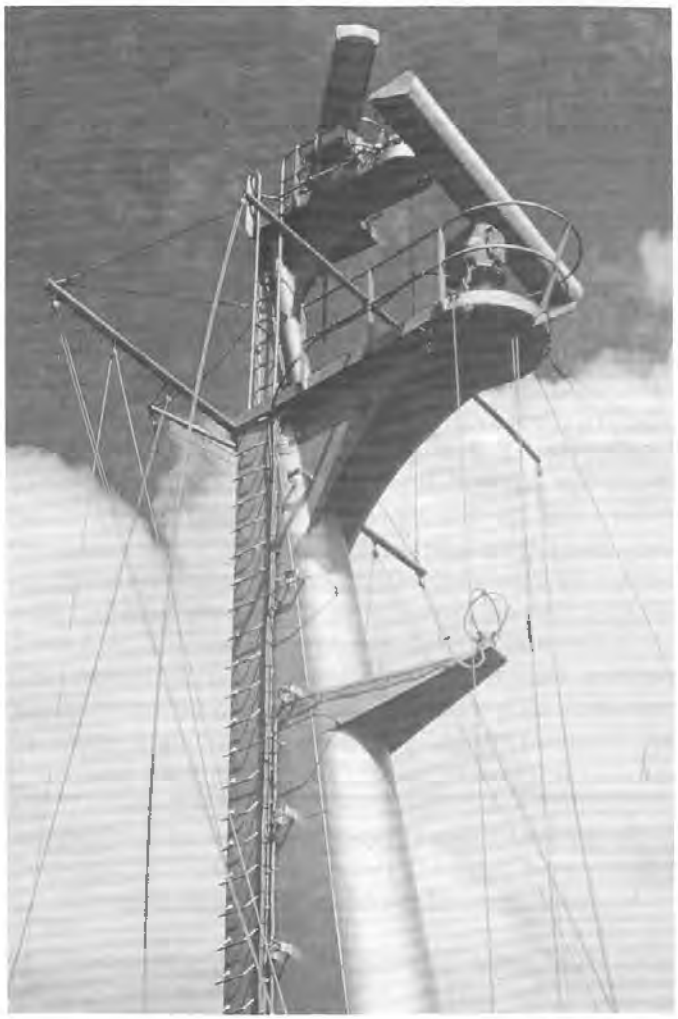

Photo courtesy of the International Organization of Masters, Mates and Pilots and its Maritime Institute of Technology and Graduate Studies

the vessel; proper operation of the installed navigation equipment *(emphasis added)*; firefighting and lifesaving equipment; stability and loading characteristics; and main propulsion and auxiliary machinery.

The notice of proposed rulemaking (NPRM) which includes these revisions to the licensing regulations was published in the Federal Register on August 8, 1983.

This policy on competence of personnel is not limited to radar equipment or to ocean operators. For a long time, licensed engineering officers have been held responsible to some degree for the correct maintenance and operation of engineering equipment. Most of this equipment is not required to be on board by the Coast Guard, even though the operation of the vessel depends on it. Similarly, the Coast Guard has minimum standards for navigation equipment. These standards are not meant to suggest that additional equipment is of no value; vessel owners are encouraged to take advantage of every available technology which may assist in the safe navigation of their vessels, taking into account the individual needs of the vessel and the route(s) traveled. It hardly seems unreasonable for the Coast Guard to expect a licensed deck officer or licensed operator to have the skills needed to effectively operate a vessel's navigation equipment. It would be interesting to know why the vessel owner would not expect the same thing.

In a sense, this proposed regulation is redundant with respect to radar. There is already a clear requirement for radar competence implied in both the Inland and the International Navigation Rules. In both sets of rules, Rule 6 (Safe Speed) and Rule 7 (Risk of Collision) make reference to the "proper" use of radar. The only real question in all of this is how competence in licensed operators should be ensured. What type of training is necessary? When can an individual (or his employer) be confident that he has the needed skills? The regulation will not explicitly require school. However, looking at it practically, the only reasonable way for most people to develop adequate skills in a reasonable period of time is to go to school.

Most, if not all, vessels in offshore work are equipped with radar and use it routinely. It is difficult to see how anyone could defend the idea that radar skill is some sort of an option in the offshore business. Had the operators of the STOLT VIKING and the CANDY BAR known how to make effective use of radar, the CANDY BAR might still be plying the waters of the Gulf of Mexico.

. . . it is more likely that the most fundamental error in radar use was the problem. The radar was probably not watched carefully.

Postscript to the NTSB's recommendation

Some of the people here at Coast Guard Headquarters who have studied the STOLT VIKING-CANDY BAR case question whether the NTSB is correct to suggest that better radar skills are the solution to this kind of casualty. There is an abundance of faulty navigation of all sorts demonstrated in this case. Nevertheless, it is also clear that the radar skills demonstrated were anything but shining examples. The NTSB does have a basis for making this recommendation, and it may also have been told of other casualties in which shortcomings in radar use played a prominent role. One of the investigating officers in New Orleans was asked if the STOLT VIKING-CANDY BAR casualty was unique from the perspective of radar incompetence. "Far from it," was the response. There are many such cases. When asked for an example, the officer cited the following case:

Vessel A was outbound from Venice, Louisiana, through Bayou Baptiste Collette. Upon leaving the jetties into the Gulf of Mexico, the master broadcast his course and destination over channel 16. He received no answer and was not aware of vessel B, even though his radar was operating.

Vessel B was returning to Venice when an approaching vessel was observed on the radar at a range of about 3 miles in Main Pass Block 46. The approaching boat appeared to be "a little to the starboard," and vessel B's pilot steered 5 degrees to port. The other boat still looked as though it were coming at vessel B, so the pilot continued to steer to port. When the approaching boat was at a range of about 3/4 mile, vessel B slowed to an idle. The approaching boat still seemed to be coming right at vessel B—perhaps because it was. When the approaching vessel became visible, the master of vessel B opened his throttle to full power, but there was not enough time to get out of the way. Vessel B was hit on the starboard quarter.

The fog must have been rather thick at the

time of the casualty. After the collision, crew boat A reported visibility of 20 feet, and crew boat B reported 100 feet. According to the investigating officer, vessel A was going too fast. By the time crew members of vessel A observed vessel B visually, it was too late to avoid hitting it.

All of the key elements of this collision involve radar. The report does not say why vessel A's radar operator did not see vessel B on radar. It couldn't have been the weather because vessel B's radar did pick up vessel A. Vessel A's radar might have been broken, but it is more likely that the most fundamental error in radar use was the problem. The radar was probably not watched carefully.

This was a radar-assisted collision. Vessel B's radar operator should have plotted the course of the oncoming vessel, solved the relative motion problem, and chosen a course that would have provided a safe minimum distance at closest point of approach (CPA). Instead, he simply watched the radar and made a turn to port. Turning to port is generally considered a poor choice for someone who is in doubt about which way to go. The operator also did it in the worst possible way, making a turn of only 5 degrees, which is hard to detect by the operator of an approaching vessel. Rule 8 of the Steering and Sailing Rules (both International and Inland) recommends against small course changes, if they can be avoided, for this very reason--they are difficult to detect.

In this case, however, the crew of vessel A was not misled by the small course change, since it failed to detect vessel B at all.

NOTE: If you had any trouble understanding this discussion or if you couldn't have avoided the collisions by using radar properly, you need training. ‡

Missing Ships: Did the hydrates do it?

It is well-known lore in legend and in nautical and aviation history that sometimes, for no apparent reason, ships and low-flying aircraft fail and perish while traveling over ocean waters. Richard D. McIver, a Houston-based oil industry consultant, in the June (1982) *American Association of Petroleum Geologists Bulletin* identifies a possible culprit: gas hydrates. Hydrates--gassy ice--form, depending on seawater temperatures, at depths of 300 meters or 400 meters or more. As an ice-like substance, hydrates could form a fairly solid, dome-like seal that could trap pools of natural gas. If the seal were broken suddenly, the gas could escape rapidly, breaking into ever-smaller bubbles as it ascended to the surface. A vessel sailing through this gassy patch of water could lose buoyance and sink quickly, McIver says. Likewise, given a sufficient amount of gas, a plume of free gas could burst above the ocean surface, an event that could induce engine failure in a low-flying aircraft that encountered the concentrated gas. Intermittent gas blowouts, McIver writes, "might explain some of the many mysterious disappearances of ships and planes--particularly in areas where deep-sea sediments contain large amounts of gas in the form of hydrate."

The preceding is a "rational scenario," says Roland von Huene of the United States Geological Survey in Menlo Park, California. However, he says, his experience in drilling well into hydrate layers on Legs 67 and 84 of the Deep Sea Drilling Project has not convinced him that the hydrates form a solid layer, even though they show up on seismic profiles. "What we've encountered up to now is only a disseminated form of the hydrate and no large continuous layers." McIver's theoretical scenario, he says, would occur under conditions "that are quite different from what has been sampled to date."

Part of the significance of the hydrates other than the hazard they may pose for surface and low-flying vehicles is that a rapid shift of bottom sediments could endanger drilling vessels and oil-drilling platforms. The GLOMAR CHALLENGER, for instance, has never intentionally drilled completely through a hydrate layer because the drill lacks safety mechanisms needed to prevent blowouts. It is possible, says von Huene, that DSDP drills did penetrate through gas hydrate layers before their existence was known. A drop in pressure or increase in temperature might cause hydrates to decompose and revert to a fluid state. Such a change may be responsible for transporting huge quantitites of sediment, McIver writes, and may be related to such seafloor phenomena as mud volcanoes and mud flows.

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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. "Worming" a rope is

A. laying tarred small stuff between the strands.
B. putting in a long splice.
C. wrapping a layer of canvas strips around the line.
D. coiling it.

REFERENCE: American Merchant Seaman's Manual

2. The purpose of tilting an unconscious person's head back is to

A. allow blood to flow more easily to the brain.
B. prevent neck or upper spine injuries.
C. open the airway for easier breathing.
D. prevent the person from vomiting.

REFERENCE: Red Cross First Aid Manual, 1981

3. In ship construction, frame spacing is

A. uniform over the length of the vessel.
B. greater at the bow and stern.
C. reduced at the bow and stern.
D. uniform over the length of the vessel, with the exception of the machinery spaces, where it is reduced because of increased stress.

REFERENCE: Baker, Introduction to Steel Shipbuilding

4. Which of the following would be seen in a head-on situation on inland waters?

A. One red light of a vessel directly ahead
B. Two forward white towing lights in a vertical line on a towing vessel directly ahead
C. Both sidelights of a vessel directly off the starboard beam
D. Both sidelights of a vessel directly ahead

REFERENCE: COMDTINST M16672.2

5. Which of the following statements best describes the process by which fires are extinguished by dry chemical?

A. The stream of dry chemical powder cools the fire.
B. When heated, the dry chemical powder generates carbon dioxide.
C. The dry chemical powder forms a solid coating over the surface.
D. The fuel and the dry chemical combine chemically.

REFERENCE: MarAd firefighting manual

ENGINEER

1. A regenerative air heater should be bypassed at low load in order to

A. prevent chipping of the ceramic coating.
B. prevent condensation in the steam baffling.
C. maintain a positive seal on the replaceable basket.
D. avoid excessive cooling and condensation of the exhaust gases.

REFERENCE: Harrington, Marine Engineering

2. What material, when placed in a magnetic field, would have the highest permeability?

A. Glass
B. Soft iron
C. Bakelite
D. Aluminum

REFERENCE: NAVPERS, Basic Electricity

3. According to Coast Guard regulations, the capacity of a general-alarm-system feeder fuse shall be at least

A. 50 percent of the power source fuse capacity.
B. 150 percent of the system's rated current.
C. twice the capacity of the largest branch circuit fuse.
D. as near to 200 percent of supplied load as practicable.

REFERENCE: 46 CFR 113.25 - 16(b)

4. In an automation system, increasing or decreasing a loading pressure by a set amount is known as

A. positioning.
B. proportioning.
C. biasing.
D. controlling.

REFERENCE: Modern Marine Engineering, Vol. III

5. What advantage(s) can be gained by using a heat interchanger between the liquid and suction lines on an R-12 refrigeration system?

A. Sweating of the receiver discharge line is reduced.
B. The liquid enters the expansion valve at a higher temperature.
C. The possibility of liquid refrigerant's flooding back to the compressor is reduced.
D. All of the above

REFERENCE: Nelson, Commercial and Industrial Refrigeration

ANSWERS

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

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

A Note to Readers from the Staff of the Merchant Vessel Personnel Division

Because many of you have expressed a desire for up-to-date information regarding Coast Guard policy on licensing, certification, and training, we have decided to devote space in the *Proceedings* each month to a short article on these topics. In the next few months you can expect to see selected items applicable to all mariners on licensing and manning regulations, renewal procedures, examinations, and Coast Guard-approved marine training.

As we attempt to pass on current information in each topic area, new questions should surface regarding personnel qualifications and training. Please continue to correspond with the editor of the *Proceedings* so that we will know which topics generate the most interest.

Most of you already know that the new licensing regulations were published in the Federal Register on August 8, 1983. The Coast Guard printed additional copies of this important proposal, and we encourage each of you who has not received a copy to call (202) 426-2240 or write Commandant (G-MVP), U.S. Coast Guard, Washington, DC 20593 requesting a reprint. The Coast Guard is encouraging as many people as possible to make their opinions known before the comment period closes, as the proposed changes will affect nearly all license holders in some way. Each public comment the Coast Guard receives will be considered for the final rulemaking.

The Coast Guard has received many inquiries recently about proper procedures for the filing of merchant vessel logbooks, shipping articles, and seaman discharges. All shipping articles and seaman discharges are to be sent to Commandant (G-MVP-1/12), U.S. Coast Guard, Washington, DC 20593 at the time of discharge. Merchant vessel logbooks are to be turned in to the Marine Inspection Office or Marine Safety Office in the port of discharge.

We look forward to responding to any questions you may have regarding merchant vessel personnel. ⚓

US Department
of Transportation

**United States
Coast Guard**

2100 Second St., S.W.
Washington, D.C. 20593

DOT 514

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