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Holding a boat drill is one way of ensuring that vessel passengers will know what to do if their vessel has to be abandoned. Panic and confusion will decrease in direct proportion to familiarity with emergency procedures. Three articles in this month's issue, "Vessel Emergencies--Are You Prepared?" (facing page), "Foresight," in the Lessons from Casualties section (page 114), and "Helicopter Evacuations" (page 117), deal with the subject of emergency preparedness.

Vessel Emergencies—

Are You Prepared?

Life-threatening situations often leave people paralyzed, with either fear or indecision. Thinking ahead and preparing for emergencies can make the difference between paralysis and a cool, effective response.

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No one is ever really "ready" for an emergency, since an emergency is by definition a serious situation which develops suddenly and unexpectedly. Some situations can be anticipated, however. The excellent safety record achieved by the commercial marine industry over the past few decades can be attributed at least in part to the industry's having anticipated emergency situations and developed means of forestalling them or responding in ways which minimize adverse consequences. Mariners, because they recognize the dangers of travel on water, are usually better prepared to react when something goes wrong than their counterparts on land, despite the added complications of the shipboard environment. Deaths and injuries continue to occur, however, and I believe we can do more to increase readiness for handling maritime emergencies.

You may be asking what type of emergency situations we are talking about. Some minor incidents labeled emergencies may not really be emergencies at all; on the other hand, some serious situations may be handled so well by the crew that they seem to be nothing more than routine problems. The definition of a marine emergency is really up to the individual. There are, however, certain casualty categories which are usually classified as marine emergency situations. Examples of these are collisions, explosions, fires, groundings, capsizings, flooding, and equipment or structural failures. This list is by no means exhaustive, but it does provide enough types of emergencies to allow a discussion. Though this article deals primarily with commercial vessels, much of the discussion could be applied to recreational or military vessels as well.

An analysis of casualty figures collected by the Coast Guard and the National Transportation Safety Board over the last decade or so shows that the highest number of deaths in

vessel casualties occurred when vessels were sinking (the categories foundering, capsizing, flooding, or groundings which resulted in hull damage). It is very difficult to "walk" away from a sinking vessel. The usual cause of death in these cases was hypothermia or drowning. The more time an individual spends in the water, the less likely he is to survive. The importance of decreasing immersion time will be discussed later in the article.

Another interesting point brought to light by the casualty statistics is the number of deaths and injuries resulting from relatively minor casualties, for instance, a grounding in which the hull is not damaged. Vessel damage is not a prerequisite for deaths or injuries to humans.

What can be done to prevent deaths and injuries? One answer is safety regulation. The Coast Guard has written a large number of marine safety-oriented regulations as part of its commercial vessel safety program. Life-saving equipment, for example, is covered in several sections of Title 46 of the Code of Federal Regulations. The regulations specify how much and what type of equipment is to be carried. Requirements vary according to many factors such as a vessel's type of service, route, and construction.

Regulations cannot take into account every combination of circumstances, however. Also, in today's rapidly changing world, technology may outstrip regulations, and situations may arise in which the existing regulations can do no more than serve as a guide. What can be done?

It is an old football adage that the best defense is a good offense. This holds true in the maritime community as well, and the maritime industry has in many cases seized the initiative in efforts to hold down the number of casualties. The industry is to be credited with making great strides in building safer vessels, putting a strong emphasis on safe operation, taking advantage of the latest marine technology, and trying to provide the least hazardous working environments possible. We must be realistic, however. Human beings make mistakes, and some forces are beyond the control of human beings. Some casualties are going to happen.

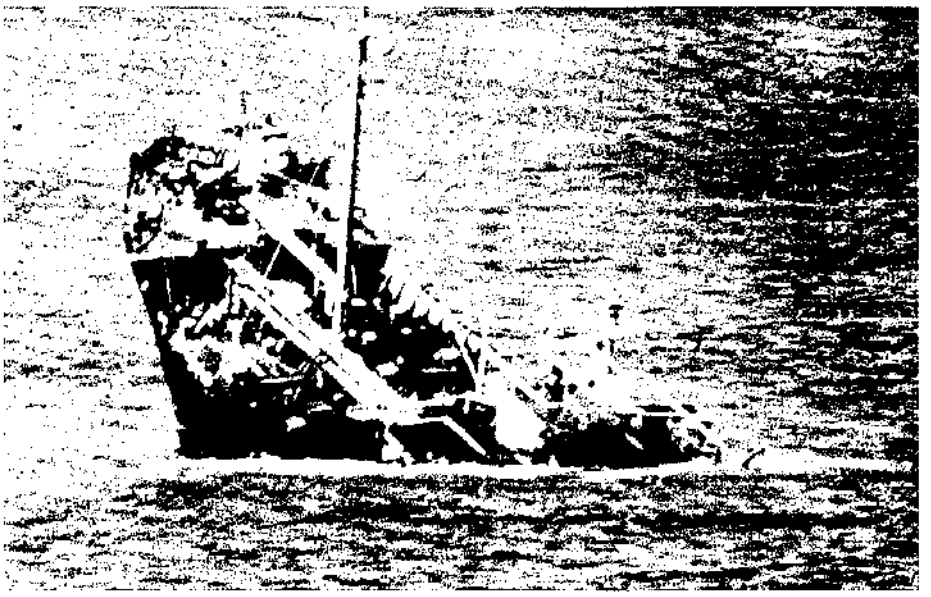
Assuming, then, that casualties will occur, despite safety regulations and the best efforts of the maritime community, what can be done to keep the number of deaths and injuries to a minimum? Some have suggested that the Coast Guard improve its response time. At the risk of sounding somewhat biased, I would like to say that, given today's resources, I do not believe that the Coast Guard could improve its response time significantly. I know from experience that when a search-and-rescue call comes in, it is responded to as fast as possible.

If the rescuers are doing everything they can, then we must look to the people being rescued for further help. If the people involved in a casualty are prepared for possible emergency situations, they stand a better chance of survival. The secret to successful response is to have anticipated an emergency, in other words, to avoid being caught off guard by emergencies.

There are many ways to prepare for disaster, but central to all of them is one element: planning. I will illustrate the need for better planning by recounting several marine casualties and analyzing them for weaknesses in emergency preparedness plans.

While the definition of "emergency" varies from individual to individual, some occurrences should be a clear-cut cause for concern. Do these employees realize the gravity of the situation?

Chain of Command



"It is very difficult to 'walk' away from a sinking vessel . . ."

No one would dispute that leadership is necessary on a vessel. What may not be so obvious, however, is the idea that leadership must extend beyond the most senior person on the vessel. The master cannot be everywhere at one time. Vessels need a well organized chain of command.

A 1979 Coast Guard study on training in the use and maintenance of survival equipment indicated that chain-of-command problems are particularly evident on mobile offshore drilling units (MODUs) and other types of drill rigs. On April 15, 1976, for example, the self-elevating drilling unit OCEAN EXPRESS capsized and sank in the Gulf of Mexico. Thirteen of the 34 people on the rig drowned. Those 13 were in a survival capsule which, after having been successfully launched, capsized. An identical capsule containing 14 people was also successfully launched; its passengers were rescued. The difference in outcomes may be attributable to a lack of effective leadership in the first capsule. According to some of the passengers who survived the capsizing, confusion reigned in the capsule, even though three of the four most senior-ranking people on the rig were on board. Apparently there had been a difference of opinion among the senior people on the rig as to the severity of the situation prior to abandonment of the rig. The bargemover was technically in command of the rig at the time of the emergency; however, it was the toolpusher, driller, and drilling superintendent who ordered the rig to be abandoned. This set up a very bad situation. Because a bargemover is normally on a rig for only a very short period of time, the crew looks to the other senior people on board for direction. The result in this case was that the person technically in command did not have effective control.

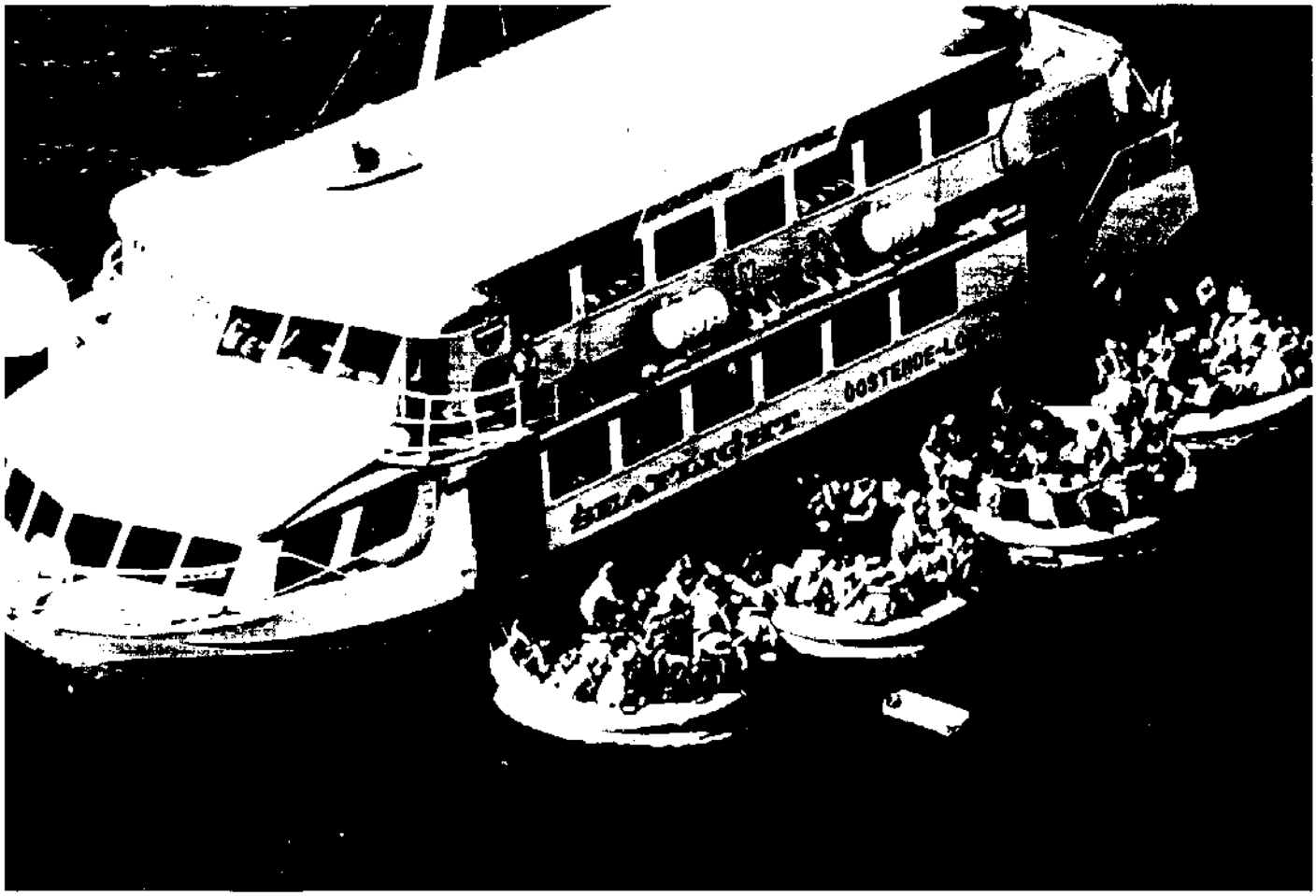
An effective chain of command is an integral part of any emergency preparedness plan. This chain of command must take into account the various situations which are likely to be encountered by personnel on a vessel or drill rig. As evidenced by the case of the OCEAN EXPRESS, it needs to provide for alternate persons to command in the absence of the master or person in charge. It also must be clear who will command any survival craft launched from a parent vessel.

Station Bills

An effective chain of command should enable vessel personnel to cope with almost any problem which arises. The chain of command must be made known to everyone, however, and that is the function of the station bill. Who is responsible for doing what and anything else the crew may need to know in an emergency should be spelled out in the station bill. Station bills are often either nonexistent or are overlooked when changes are made to a vessel or its crew. The importance of posting an up-to-date station bill where all people on the vessel have access to it cannot be overemphasized, as is illustrated by the following account.

On October 20, 1976, the ferry M/V GEORGE PRINCE and the SS FROSTA collided on the Mississippi River. The M/V GEORGE PRINCE capsized, and 77 people on the vessel lost their lives.* The collision and capsizing took place very rapidly, and the passengers were given little or no warning. According to the National Transportation Safety Board report, "Some of the passengers grabbed life

* For the purposes of this article, figures cited for deaths will include the figures for persons officially listed as missing and presumed dead.



Passengers will need help and guidance if it is necessary to take to the lifeboats. The station bill should spell out who is assigned to command any survival craft launched.

jackets, but the record does not indicate whether any were able to properly don them; most simply held them for flotation." More disturbing is the sentence "The *regular* commuters were aware of the location of the life jacket boxes." *(emphasis added)* While there was a station bill posted for the crew, there were no instructions posted for the passengers, either on the vessel or at the terminals.

Had station bills and other emergency instructions showing exit routes, life jacket locations, and life jacket donning instructions been posted, perhaps the loss of life would not have been so great. The station bills which were posted for the crew did assign personnel to assist the passengers in the event of an emergency and did provide for the sounding of an emergency alarm to notify the passengers of danger. Unfortunately, neither of these provisions was carried out. We can only assume that the crew members assigned to these tasks either did not know of their responsibilities or forgot them in the excitement of the emergency. Well organized and readily available station bills might have helped. We will never know for sure, since all five of the crew members were killed.

Another case lends itself to similar speculation. On May 10, 1979, the MODU RANGER I collapsed and sank in the Gulf of Mexico. There were 30 people on board the rig at the time of the emergency. Eight were killed. Though there was a station bill prepared for the rig, it was not posted at the time of the casualty. There were some new people on board who had not had much of a chance to familiarize themselves with the rig. Perhaps some of these people might have survived, had a station bill and emergency instructions showing possible escape routes been posted.

The survival equipment training and maintenance study mentioned earlier pointed to deficiencies in several types of station bills currently being used. The most common complaint

about the currently used station bills is that they failed to spell out a well-defined chain of command. Also mentioned was the failure to designate first-aid personnel, personnel to launch the survival craft, and backup personnel.

In 1982 the Coast Guard issued a Navigation and Vessel Inspection Circular (NVIC 7-82) which included a sample format for a vessel station bill. It is shown on page 109.

Though the sample station bill was drawn up with a specific type of vessel in mind, it could be modified for any type of vessel or facility. It would *have* to be modified, in fact, since there is no such thing as a universal or master station bill. The sample is intended to illustrate most of the items which should appear on station bills. The use of pictorial representations is encouraged, so that crew members who do not speak English, are illiterate or semi-literate, or are simply unfamiliar with the vessel will be able to understand the station bill.

Though station bills are required only on certain inspected vessels, their use on almost all vessels can be strongly recommended. Anyone can forget something, particularly in an emergency situation, and a good station bill can serve as a reliable reminder of the steps to be taken in an emergency. An accurate and up-to-date station bill is a vital part of a good emergency preparedness plan. Also to be recommended are emergency instructions showing escape routes, life jacket locations, and life jacket donning instructions. This is particularly true when passengers are involved or there is a high rate of crew turnover.

Training and Drills

Training and drills are another indispensable element of any emergency preparedness plan. On January 10, 1977, the M/V CHESTER A. POLING, a 281-foot coastal tanker, broke in two during a heavy storm while off the coast of Massachusetts. During the rescue attempt, a rescue basket was lowered from a Coast Guard helicopter. One of the crewmen, trying to get into it, leaned over the rail to grab the basket and fell into the water. The man was not wearing any type of personal flotation device (PFD) at the time. Though attempts were made to retrieve him with the rescue basket, the man died. During the same rescue operation, five other crew members were forced into the water. All five were wearing PFDs, and all five survived. None of these six crew members had been trained in how to tend, handle, or enter a rescue basket. Training of this nature is not required; however, as the casualty illustrates, in this instance, it could have saved a life.

There is no such thing as too much training. Unfortunately, in many cases training is conducted infrequently or not at all. Lack of crew training has been cited as a contributing factor to loss of life or injury in many casualties. The recommendations included in casualty investigations testify to the need for additional training. Here are three from Coast Guard casualty reports:

". . . that the masters of vessels emphasize knowledge of the operation of firefighting, lifesaving, and all other emergency equipment during drills." (Stranding of the SS TRANSHURON, September 26, 1974)

". . . that the owners and operators of Great Lakes vessels, in cooperation with the maritime unions and training schools, undertake a program to improve the level of crew training in the use of lifesaving equipment installed on board the vessels and in other emergency procedures. This program should specifically include training in the use of inflatable life rafts and afford crews of vessels the opportunity to see a raft inflated." (Sinking of the SS EDMUND FITZGERALD, November 10, 1975)

". . . that improved safety indoctrination be provided to all personnel on board a drilling unit. Its objectives should be that each individual know how to escape from the unit, that he be able to locate personal safety equipment, and that he be able to use it." (Sinking of the RANGER I, May 10, 1979)

The National Transportation Safety Board, in two of its casualty reports, made the following recommendations:

"Expedite the promulgation of regulations for personnel qualifications and manning standards for self-elevating mobile offshore drilling units and require that industrial personnel who perform seafaring duties obtain appropriate training and licenses." (Capsizing of the OCEAN EXPRESS, April 15, 1976)

"Expedite completion of [the Maritime Administration] firefighting training curriculum and program, which should include basic firefighting training at shoreside facilities and follow-on training 'on board' using shipboard systems and equipment, for merchant marine officers and seamen." (Collision between the SS EDGAR M QUEENY and the S/T CORINTHOS, January 31, 1975)

The last casualty mentioned, the collision between the SS EDGAR M QUEENY and the

S/T CORINTHOS, shows what a difference training can make. Both vessels were carrying flammable bulk cargoes. When they collided, explosions erupted and fires broke out almost immediately. Twenty-six of the 49 people on the two vessels were killed. The casualty rate could have been much higher, however. The following comment is taken from the analysis section of the investigation report:

"The response of some of the crew in fighting the fire on the QUEENY indicated that they had good knowledge of the equipment and had the confidence necessary to fight such a fire. The response was indicative of the value of the training program they had completed during the voyage preceding the accident, which was conducted with the equipment aboard the QUEENY. Such shipboard programs are very productive in developing an effective firefighting capability which is especially important where bulk flammable cargoes are involved."

The capsizing of the mobile offshore drilling unit OCEAN RANGER in the Atlantic Ocean on February 15, 1982, also points to the importance of training and drills. The toolpusher, as the designated "Person in Charge," was responsible for such things as conducting fire and boat drills and ensuring that the required lifeboatmen were on board and assigned to lifeboats. According to the report of the Coast Guard Marine Board of Investigation, there was no indication that the toolpushers were familiar with the Coast Guard regulations under which these duties fell to them or that they were trained in the marine aspects of the rig. The effects were apparent during rescue operations. The capsizing of the No. 2 lifeboat, for example, was caused by something so elementary as the passengers moving en masse to the port side of the boat as they prepared to leave the boat for a rescue boat.

In addition to illustrating the need for training in the use of survival equipment, the OCEAN RANGER casualty shows how important it is for crew members to learn to handle regular shipboard items during emergencies. According to the Marine Board report, the lack of detailed instructions regarding the use of and training in the operation of the OCEAN RANGER's ballast system contributed significantly to the rig's capsizing. The crew members' understanding of the ballast system was deemed inadequate for extraordinary situations or

Thanks to the firefighting training they had undergone on their vessel's previous voyage, crew members of the EDGAR M QUEENY were able to save much of the vessel when its cargo, a bulk flammable liquid, exploded following a collision.

U.S. Department of Transportation
United States Coast Guard

Station Bill

Enclosure (1) to NVC 7-82

Sample Format Only

General Instructions

1. EACH person shall familiarize themselves with their assigned location in the event of an emergency immediately upon boarding the vessel.

2. All crew members shall be thoroughly familiar with the duties they are assigned to perform in the event of an emergency.

3. Each person shall participate in emergency drills and shall be properly dressed including a properly donned life preserver or exposure suit.

4. In all vessels carrying passengers, the STEWARD'S DEPARTMENT shall be responsible for warning passengers, seeing that passengers are properly dressed and have correctly donned their life preservers or exposure suits, assembling and directing passengers to their appointed stations, keeping order in passageways and stairways, controlling passenger movements and ensuring a supply of blankets is taken to the lifeboats.

5. The proper chain of command is indicated by the sequential numbers assigned to each department. Should a key person become disabled, the next senior member of that department shall take the disabled person's place.

6. The Chief Mate shall be responsible for the maintenance and readiness of all lifesaving and firefighting appliances and equipment above the main deck. The First Assistant Engineer shall be responsible for the maintenance and readiness of all lifesaving and firefighting appliances and equipment on the main deck and below.

MASTER'S SIGNATURE

Fire and Emergency

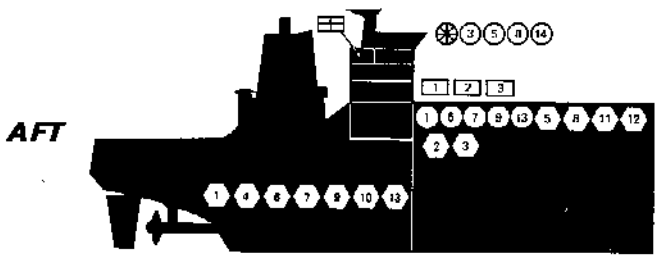
Instructions

1. ANY person discovering a fire shall notify the bridge by sounding the nearest available alarm and then take all other actions as appropriate.

2. Upon hearing the fire and emergency signal all airports, watertight doors, fire doors, scuppers, and designated discharges shall be closed and all fans, blowers and ventilating systems shall be stopped. All safety equipment will be prepared for immediate service. OMED's Numbers 9 and 10 shall check to ensure this item is completed after they report to their station.

3. Upon seeing a "MAN OVERBOARD", immediately throw a life preserver (with a light attached if at night) and notify the bridge by reporting "MAN OVERBOARD PORT (STARBOARD) SIDE". In all cases keep the man in sight.

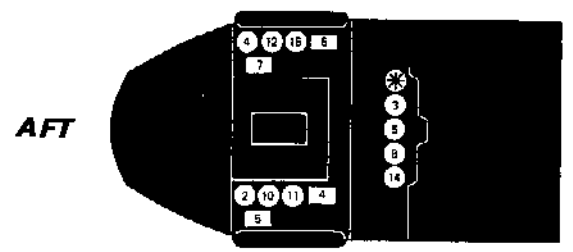
4. Any extra persons shall report to the Hospital Treatment Room.



Signals

Fire and Emergency Signal (———)
The fire and emergency signal shall be a continuous blast of the whistle for a period not less than 10 seconds followed by a continuous ringing of the general alarm for not less than 10 seconds.

Man Overboard Signal (— — —)
The man overboard signal shall be the letter "O" sounded several (at least 4) times on the ship's whistle followed by the same signal on the general alarm.

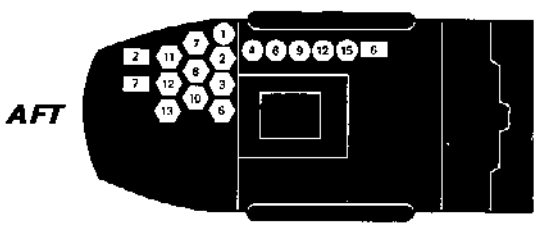


Abandon Ship

Instructions

1. All persons indicated in the diagram on the left should use lifeboat #2. All persons indicated in the diagram on the right should use lifeboat #1.

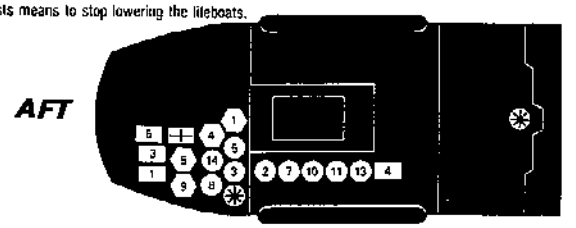
2. Any extra persons should muster at lifeboat #1.



Signals

Abandon Ship Signal (. . . . . ———)
The abandon ship signal shall be at least 7 short blasts followed by one long blast on the ship's whistle followed by the same signal sounded on the general alarm.

Boat Handling Signals
All boat handling signals shall be sounded on the ship's whistle and shall mean the following:
(-) One short blast means to lower the lifeboats.
(- -) Two short blasts means to stop lowering the lifeboats.



Personnel and Duties

Deck Department Functions

Symbol	Position	Fire & Emergency	Abandon Ship	Symbol	Position	Fire & Emergency	Abandon Ship
⊛	MASTER	In Command	In Command Lifeboat No. 1	8	Quartermaster	Helmsman	Assist as Directed
1	Chief Mate	In Charge * Emerg. Squad	In Command Lifeboat No. 2	9	Quartermaster	Emerg. Squad	Man Forepart Lines No. 2
5	Second Mate	In Charge STBD Boatdeck	In Charge Lowering No. 1	10	Able Seaman	Boat Detail STBD Boatdeck	Man Forepart Lines No. 1
3	Third Mate	Assist Master	Provide Nav. Equip.	11	Able Seaman	Boat Detail STBD Boatdeck	Man Forepart Lines No. 1
4	Third Mate	In Charge Port Boatdeck	In Charge Lowering No. 2	12	Able Seaman	Boat Detail Port Boatdeck	Man Forepart Lines No. 2
6	Deck Cadet	Assist as Directed	Assist as Directed	3	Ordinary Seaman	Emerg. Squad	Lower Ladder Tend Sea Pntr.
6	Boatswain	Emerg. Squad	Operate Winch No. 2	4	Ordinary Seaman	Messenger	Launch Lifeboat No. 1
7	Quartermaster	Emerg. Squad	Operate Winch No. 1	5	Ordinary Seaman	Boat Detail Port Boatdeck	Lower Ladder Tend Sea Pntr.

* The Chief Mate is in charge of the Emergency Squad if the Emergency is outside the engine spaces.

** The First Assistant Engineer is in charge of the Emergency Squad if the Emergency is in the engine spaces.

NOTE The distress signal from all Emergency Stations shall be 3 short blasts of the ship's whistle (. . .)

Engineering Department Functions

Symbol	Position	Fire & Emergency	Abandon Ship	Symbol	Position	Fire & Emergency	Abandon Ship
1	Chief Engineer	In Charge Engineroom	Boat Engineer No. 1	8	OMED	Emergency Squad	Launch Liferaft No. 2
2	First Assist Engineer	In Charge ** Emerg. Squad	Boat Engineer No. 2	9	OMED	Engineroom Asist	Launch Liferaft No. 1
3	Second Assist Engineer	Emergency Squad	Assist Boat Engineer No. 2	10	OMED	Engineroom Assist	Assist as Directed
5	Third Assist Engineer	Engineroom Assist	Assist Boat Engineer No. 1	6	OMED	Emergency Squad	Assist as Directed
5	Third Assist Engineer	Emergency Squad	Assist as Directed	6	Wiper	Emergency Squad	Launch Liferaft No. 2
5	Third Assist Engineer	Engineroom Assist	Assist as Directed	6	Wiper	Engineroom Assist	Assist as Directed
7	Engine Cadet	Engineroom Assist	Assist as Directed				

Steward's Department Functions

☎	Radio Officer	At Radio Station	Provide Emerg. Radio	4	General Steward Util.	Boat Detail STBD Boatdeck	Assist as Directed
1	Chief Steward	In Charge Hosp. Treat. Rm.	Assist Extra Pers. Boat No. 1	5	General Steward Util.	Boat Detail STBD Boatdeck	Assist as Directed
2	Chief Cook	Assist in Hosp. Treat. Rm.	Assist Extra Pers. Boat No. 2	6	General Steward Util.	Boat Detail Port Boatdeck	Assist as Directed
3	General Steward Util.	Assist in Hosp. Treat. Rm.	Provide Blankets & First Aid Kit	7	General Steward Util.	Boat Detail Port Boatdeck	Provide Blankets & First Aid Kit

emergencies.

Training in such topics as rules of the road, operational safety, cargo loading, stability, use and maintenance of auxiliary equipment, seamanship, communications, navigation, use of lifesaving and firefighting equipment, and first aid is readily available to maritime personnel. Many local organizations provide courses and programs in these subjects quite frequently and often free of charge. Equipment manufacturers are also a good source of training. Observing the servicing of inflatable life rafts, for example, offers a very valuable lesson in their operation. There are also technical schools throughout the country that provide much training in all of the subjects mentioned above. Though training may not be required in all of these subjects, a working knowledge of them on the part of all crew members would go far toward making the working environment as safe as possible. Drills should be attended by the entire crew and should be meaningful, like the hands-on vessel training undergone by the crew of the SS EDGAR M QUEENY.

New Videotapes Show How to Deal with Hypothermia

Hypothermia is a significant factor in many outdoor injuries, including drownings. This condition, a dangerous lowering of the body core temperature, is often misdiagnosed and remains untreated.

Two videotape programs recently produced in connection with the Sea Grant Marine Advisory Program at the University of Maine examine the problem of hypothermia.

One program, "Hypothermia: Think Survival, Not Rescue," focuses on ways to survive sudden immersion in cold water. Key elements in the presentation are the victim's attitude and proper use of lifesaving gear such as survival suits, rafts, and distress signals.

The other program, "Hypothermia: The Chill That Not Need Kill," is designed primarily for those responding to accidents where hypothermia may be part of the picture. Emergency medical personnel, sheriff's patrols, firemen, ski patrols, and others who need to recognize and treat this condition might find this videotape a useful training tool.

Additional information about the cost and availability of the videotapes can be obtained from the Sea Grant College Program, Communications Office, 30 Coburn Hall, University of Maine, Orono, Maine 04469; tel.: (207) 581-1440.

Survival Equipment

While the subject of survival equipment has come up repeatedly in my discussion of the chain of command, station bills, and training and drills, I believe further discussion is necessary of the equipment itself and its accessibility.

The need for items such as exposure suits and emergency position-indicating radio beacons (EPIRBs) is well documented. Investigation reports for several cases, particularly those involving small fishing vessels, include the suggestion that these items be carried. Since EPIRBs are not required survival equipment on small fishing vessels, that suggestion must remain nothing more than a recommendation. EPIRBs are extremely valuable in locating a vessel in distress. Emergencies often arise very rapidly, so rapidly that there may not be time for a distress call. Without an EPIRB, survivors could be in the water for hours or even days before anyone knew something was wrong. This exposure time could be critical.

On December 14, 1980, the F/V ATLANTIC PRINCESS capsized and sank in the North Atlantic. There were six men on board the vessel when it sank. Two survived. The two survivors had managed to board an inflatable life raft after the capsizing. They did not have an EPIRB, and, even though there was another fishing vessel less than three miles from the capsizing, the men were in the raft for over eight hours. Had these survivors been in the water, they could not have survived that long without protection against hypothermia. The crew of the other fishing vessel found the raft after having come across another empty raft which had floated free of the ATLANTIC PRINCESS. The investigators concluded that the inflatable life raft saved the two survivors and that an EPIRB might have speeded their rescue.

A good example of the importance of carrying hypothermia-protection devices is the sinking of the F/V OCEAN CAPE in the Gulf of Alaska on January 1, 1979. The four crew members of the OCEAN CAPE spent four days in an inflatable life raft. All four were wearing survival suits. One of the conclusions reached

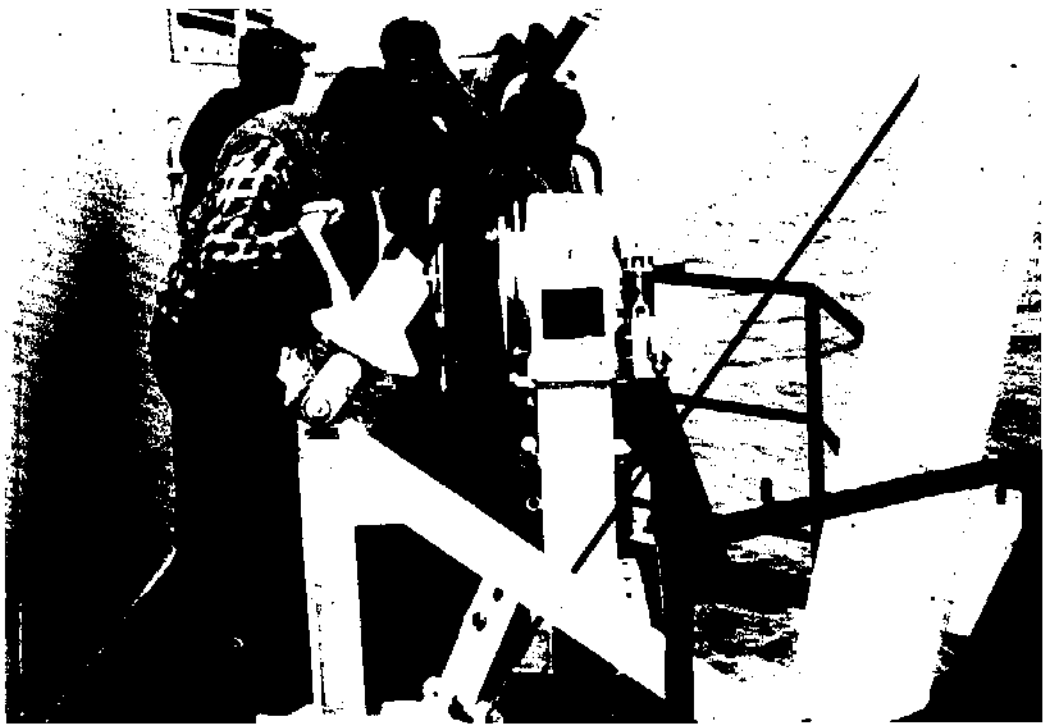
in the investigation was that "the availability and use by the crew of the . . . survival suits and the inflatable life raft are responsible for the survival of the four crewmen during the four days after the vessel sank until they were rescued." "Without these two items, they would have surely perished." I could go on citing examples where this equipment either saved lives or could have if it had been on board.

Many advances have been made in survival equipment technology. Usually, survival suits, EPIRBs, portable fire extinguishers, and other types of survival equipment do not take up much room, and they can make the difference between life and death. Even though it is not always required, carriage of these articles of survival gear is always a good idea. It is also important to realize the limitations of the survival equipment. For example, totally enclosed lifeboats and life rafts can still capsize. Some life rafts are now being made more stable by the addition of ballasting bags, and most totally enclosed lifeboats are self-righting, provided the passengers are in their seats and the craft is not flooded. There is evidence that in the OCEAN EXPRESS casualty cited earlier, passengers of the capsule which capsized were not buckled into their seats as they should have been and that the capsule was flooded.

There is one piece of survival equipment that is required but is often not used. Personal flotation devices are required on every vessel, regardless of vessel type. They are not always worn, however. Countless fatalities have occurred when someone has fallen or been knocked overboard and drowned because he or she was not wearing a PFD. You should wear a PFD whenever there is any possibility that you will end up in the water. When is there a possibility that you will end up in the water? The answer to that question is any time you are near the water. It may be unrealistic to expect people to wear PFDs that often. However, a PFD should, at the very least, be worn by persons who are working fishing gear, transferring from one vessel to another, working near or over the side of the vessel, or walking down a weather deck where there is no railing (such as on a barge). If you think this is a bit extreme, consider the fact that there were 208 deaths reported during 1978 and 1979 from "falls from vessels into water, not involving a vessel casualty."

The reason usually given for not wearing PFDs is that they are too uncomfortable. There are several types of PFDs which are Coast Guard-approved and are as comfortable to wear as any normal vest or jacket. There are also many types of unapproved devices, such as inflatables, that consist of only a belt or pouch. These devices, if properly maintained, can provide the same flotation characteristics as currently approved PFDs. So, in most situations, there is really no excuse for not wearing a PFD.

PFDs are often taken for granted. They are thrown in the bottom of a locker, with gear on top of them, and forgotten until they are needed. PFDs can become damaged or wear out after use, and it is extremely important to maintain them in good condition and inspect them on a frequent basis. PFDs also have



Boat drills should be held frequently, and crew members should get as much hands-on training with their vessel's own equipment as possible.

limitations. For example, a Type III PFD will not provide the same flotation characteristics as a Type I. There are four types of wearable PFDs approved by the Coast Guard. These range from the Type I (a rather bulky vest-type of device) to a Type V work vest (three flotation pads connected by webbing). (Type IVs are throwable devices.) Each is designed for a different function.

Accessibility of Survival Equipment

Vessel owners and operators must often make difficult decisions when outfitting their vessels with survival equipment. The purpose of operating a commercial vessel is to make money. Space is at a premium. Any space on the vessel which is not used in the money-making function of the vessel is detracting from the vessel's profit capability. We all know that safety regulations require some types of survival gear to be carried. In some instances they even specify where on the vessel the gear is to be carried. More often, however, the regulations simply state that the equipment must be on board. Equipment location can be a very real problem.

One of the conclusions reached in the investigation of the collision between the M/V GEORGE PRINCE and the SS FROSTA was that "the design and location of the life jacket stowage boxes did not provide easy passenger accessibility to life jackets . . . some life jackets remained stuck in the boxes when the ferry capsized."

In another example, the F/V DIXIE LEE II capsized in the Chesapeake Bay on June 6, 1977. There were 27 people on board when the vessel capsized; 13 drowned. The life preservers were stowed in a rack under the overhead. According to their statements, only a few of the passengers knew where the life jackets were prior to the casualty. Investigators concluded that the storage area should be relocated or redesigned. Some of the points they mentioned were that the storage area should be designed so that it could not possibly injure anyone when it was opened and that the life preservers should be in such a position as to be readily available to all passengers, regardless of their physical capabilities. In any case, life preservers should not be stored so that they go down with a vessel.

It should also be realized that lifeboats and life rafts that are tied down will not launch themselves. Provision should be made for float-free stowage or hydrostatic release. The best survival equipment may be useless unless its limitations are realized and it is properly operated.

The location of the survival equipment is very important. Consider the collision between

Casualties such as this one demonstrate the advisability of having survival equipment stored at both ends of a vessel.

the M/V CAPE BEAVER and the F/V MARGARET JANE. The MARGARET JANE was struck amidships and began to sink by the stern, and the crew could not get any PFDs from the after deckhouse. Some of the crew then went forward to get PFDs from the fo'c's'le. The vessel sank within 40 seconds, and at least two of the crew members were trapped under the overhang of the fo'c's'le. If the PFDs had been stored elsewhere, perhaps these two men would have survived.

Sometimes, different types of survival equipment are needed in more than one location on a vessel. In the CHESTER A. POLING casualty, for example, the majority of the crew members were on the stern section of the vessel, but the master and a seaman were on the forward part. These two were cut off from access to a life raft or lifeboat. Fortunately, they had PFDs, and Coast Guard rescue forces were on scene. The master and the crewman survived.

Conclusions

Vessel emergencies do occur. As we have seen, some crews are not as prepared to handle these emergency situations as they may have thought they were. The number of casualties can be decreased to some extent through improved vessel design, safety regulations, and other preventive measures. Because we are human and make mistakes, however, and because we are subject to forces beyond our control, there is a limit to how far we can go in reducing the number of casualties. We must, therefore, be ready to handle emergencies at sea when they occur in a way that minimizes the number of deaths and injuries.

In order to respond successfully to emergencies, we must begin to deal with situations before they arise. Planning is the key to good emergency preparedness. We must plan for all possible situations likely to occur. Without adequate planning, the emergency response will be at best ineffective and may even add to the problem.

Every vessel should have an emergency preparedness plan. This plan should describe the emergency scenarios which the vessel could encounter and prescribe the steps to be taken. A good emergency preparedness plan should include at least the following items:

- A clear delineation of the chain of command showing who is to do what during times of emergency and assigning responsibility for command of survival craft and response teams. Provision should be made for backup personnel to assume responsibility for key positions when necessary;

- A complete and adequate station bill which is posted in several conspicuous locations. The format should follow that of the sample shown on page 109;

- Emergency instructions showing escape routes, life jacket locations, and how life jackets are to be donned. These should be posted in several conspicuous locations, particularly in passenger spaces;

- Crew training, including training in the use of all emergency equipment carried on board the vessel. The training program should involve all crew members and should include refresher courses. As much hands-on training on the vessel as possible should be conducted;

- Carriage of modern survival equipment such as inflatable life rafts, totally enclosed lifeboats and survival capsules, installed and portable fire-extinguishing systems, EPIRBs, survival suits, and PFDs. The emergency equipment should be readily accessible. Vessel owners and operators should remember that Coast Guard regulations are based on the *minimum* equipment requirements.

Where vessel casualties are concerned, we must learn from our mistakes. Even though the commercial marine industry has a good safety record, still more can be done to improve the handling of emergencies. Some of the deaths and injuries in the casualties discussed in this article could not have been avoided. Many could have been avoided, however, had the vessels' or rigs' crews been prepared to handle the emergency situations. In my opinion, any death or injury which could have been prevented is an inexcusable one.

This article was adapted from a paper presented by LTjg Girton at the 70th Annual National Safety Congress and Exposition, October 20, 1982, in Chicago. It was judged "Best Paper" of those presented to the Marine Section of the National Safety Congress and won for its author the General Chairman's Award. ⚓

Foresight

Only five minutes elapsed between the appearance of the first signs of flooding and the sinking of the motor yacht GEORGINA. All of the crew members had been told in advance what their duties would be in the event the vessel had to be abandoned. Thanks to this prudent measure, abandonment went smoothly.

The following account was related by the captain of GEORGINA, Thomas R. Jacobs of Spokane, Washington. GEORGINA went down off the coast of California on June 27, 1983. The cause of the sinking was massive structural failure with resulting rapid flooding. The specific cause of this failure is unknown. In addition to the captain/narrator, the crew consisted of the three owners, Michael House, Sr., Bette House, and Michael House, Jr., the deckhand, Jay Vavra, and the first mate, Ellen Gilliam.

GEORGINA was a Bertram 46.6-foot motor yacht equipped with twin Detroit turbocharged diesels, Loran C, and radar. She was a fine boat, generally well equipped and in good condition and repair.

Sea conditions on the day of the sinking were moderate, with an 8-foot swell and 20 knots of true wind. Our course was 315 magnetic, speed 7 - 8 knots, and rpm 1,000. We were eight miles offshore to avoid wave profile and current interference from the shore.

At 0650 hours on June 27 I was off watch, asleep on the floor of the salon. Michael, Sr., and his wife were asleep in the aft cabin. The first mate, Ellen Gilliam, had the watch. The other crew members were sleeping on the salon floor.

The first indication we had of trouble was the appearance of water in the forward head. The deckhand passed the word to the first mate, who awoke me. For this flooding to have occurred undetected, two indicators had to have malfunctioned simultaneously. First, the automatic bilge alarm, although tested and energized, had to have failed to react. Second, the bilge pumps had to have failed to energize. The bilge pumps had been tested and were set on automatic. The indicator lights that show the pumps are actually operating are distinctive on the instrument panel and are grounds for a visual inspection. When I checked, I found the switches on automatic and the lights off. When I switched the system to manual, the lights came on.

It is my opinion that these systems failed because of immediate immersion, which shorted them out before they could alert the watch. A routine visual inspection of the bilge was scheduled for 0700, and one had also been completed during the last watch. At that time I had found no water.

When awakened, I immediately saw water rising above the deck of the forepeak and opened the engine room hatch amidships. There was some water there, but it was well below the engines, and the compartment was not flooded.

I went to the steering station, where I

turned the bilge pumps on manually and reduced throttle to take water pressure off the bow, where I felt the damage must be. As the speed came off, the boat nosed down. In my opinion, it was about to sink immediately. I resumed power, approximately 1600 rpm, which maintained the best trim under these conditions.

Time elapsed: less than one minute since I had been awakened.

I returned below and observed water filling the salon. Judging from the speed and volume of the water, the flooding must have started in the minute or so before I was awakened. The rate of flooding was incredible—hundreds of gallons per minute. It would have been hazardous at this time to try to reach the bow to check the damage. It would also have been a waste of time. There was no doubt GEORGINA was going down in a hurry.

I ordered the crew to institute abandon ship procedures. Each person knew what his assigned tasks were. These tasks were as follows:

Tom:	transporting all of the crew from the boat to safety, radioing GEORGINA's position, and carrying the EPIRB to the life raft;
Ellen:	transferring all PFDs from the flybridge locker to the aft deck;
Mike, Sr.:	deploying the life raft and, if time permitted, cutting the dinghy loose from the foredeck;
Jay:	helping launch the life raft and transporting the sleeping bags from the salon to the aft deck;
Mike, Jr.:	transporting five gallons of drinking water from the steering station to the aft deck and transporting all PFDs from the steering station to the aft deck;
Bette:	transporting the first aid kit from the aft cabin to the aft deck.

I first cleared everyone from belowdecks, including the owner and his wife, who were just awakening. Bette hung back, wanting to get the first aid kit, which was in their cabin, but I ordered her away, as water was almost to the main cabin and would be flooding it in a fast current I feared she could not fight. We climbed the companionway onto the aft deck, and I grabbed the EPIRB on the way. On deck the crew was actively engaged in its assignments, and there was no panic.

Time elapsed: approximately one minute and 15 seconds since I had been awakened.

We were monitoring channel 16, as usual, on the VHF. Fearing the batteries would quickly short out, I fired off a quick Mayday, giving our position, the name of the vessel, and notice that we were rapidly sinking from flooding. I said that we had an EPIRB and asked for confirmation and assistance. The Coast Guard came back immediately, wanting to know how many people were on board, how our position had been fixed, whether we had a life raft, what color it was, whether we had flares, etc.

I repeated our position five or six times in the course of a short exchange. I turned and asked Mike, Sr., if the life raft had been deployed and inflated. He confirmed that it had. I told the Coast Guard we were taking fresh water, the dinghy, the sleeping bags, and the PFDs with us. I requested pumps, in case once we were in the raft the boat miraculously stabilized and could be saved.

Time elapsed: three minutes since I had been awakened. At this moment, the engines choked on seawater and died, emitting steam and destroying the trim.

The crew members who had completed their duties were waiting on the aft deck. Mike, Sr., was working on the lines that held down the dinghy, with water breaking up to him and over him at times.

With PFDs on every crew member, I led us out on deck, where Mike, Sr., joined us. The life raft had deployed upside down, and it took us several confused seconds to recognize this, although I had read the literature. Mike, Sr., Jay, and I righted it, and the canopy opening was in position for entry. I put Bette on board first, then Ellen, Jay, Mike, Jr., and Mike, Sr.

I passed down the EPIRB, the drinking water, and the sleeping bags and tied a line to the dinghy and passed it to the raft. At this time I observed that there were two lines from GEORGINA to the raft and ordered Mike, Sr., to cut the second one, which was tangled on the GEORGINA's bow, well underwater. I passed him my knife so he could do so. As it turned out, this tangled line was attached to the sea anchor. The raft drifted out from the boat, and I asked the crew member at the opening if part of the canopy was clear so I could jump on. He said it was, so I did, landing on Bette but not injuring her, fortunately. I crawled through the

canopy opening and asked Mike for the knife. With it I cut the lanyard connecting the raft to GEORGINA and took the line to the dinghy. The cabin top was awash, so we pulled on the line, but one dinghy tiedown was still in place, and the dinghy didn't float free. We quit pulling and drifted downwind to the end of the line. Within seconds the flying bridge went under, and, as the line led down, I released it.

The final tiedown broke underwater, and the dinghy popped to the surface near us. Mike and I paddled toward it, getting within three feet. He wanted to swim to it, but I refused permission. It wasn't important enough to put someone in the water, as I felt we would be in the raft a short time and the raft was in good shape, remarkably stable.

Time elapsed: less than five minutes since I had been awakened.

I activated the EPIRB, put it inside my PFD and shirts, where it would stay warmest, and extended the aerial out of the canopy for best propagation.

I checked the crew for injury and found everyone in good shape. I had cracked a rib a week previously but had no injuries related to the loss of GEORGINA.

There was water in the raft as a result of its inverted deployment, perhaps two or three inches. I had the provisions opened and the flares put in a dry location close at hand. The crew was briefed on helicopter rescue procedures, especially static discharge grounding. *(See following article)*

Two freighters were observed near our location, so I had Mike, Sr., fire off a parachute flare. It wasn't seen. As one of the vessels began to pass us, I had Mike fire the second flare high and across its bow. Although the mortar was pointed properly, the trajectory was 120 degrees off course, and the flare passed to the right of and behind the ship. The ship turned in our direction, and I began to have concerns of being run down. I lit a handheld flare, and the smoke from its ignition was spotted by a bow lookout, who ran aft. The ship was 150 yards away. I threw the flare away, fearing damage to the raft.

Time elapsed: approximately 30 minutes since I had been awakened.

The freighter's bow quit swinging toward us, and we began passing down her port side. Her crew put the engines astern to take way off, and turbulence spread forward from her stern. I advised my crew to stay with the raft if it capsized and either right it or climb on top, rather than trying for the ship. During this period the Jacob's ladder was lowered, but I waved the ship off, as I felt embarkation was too risky, given the turbulence. I shouted to the bridge personnel to stop the engines and pointed at the propellers. After the engines were stopped, the ladder seemed an acceptable risk, and Mike, Sr., and I paddled the raft over to the ladder. Bette was sent up first, followed by Ellen, Jay, Mike, Jr. and Mike, Sr. The first two members of my crew ascended without a tether, but the freighter crew sent down a safety line, which I tied to each remaining member before he or she left the raft. I tied a line from the ship to the raft and then left the raft myself. I shut off the EPIRB at this time and later, after the raft had been hoisted onto the freighter, verified that the EPIRB was still off.

The freighter that rescued us was the ANNIE JOHNSON (Göran Ringberg, Captain), homeported in Stockholm and on a passage from San Pedro to San Francisco. My first mate had observed the vessel on radar shortly before the sinking, and the captain later verified his distance from our 0650 position as 5 miles. The captain and crew did a wonderful job of locating us and taking us on board. They also extended unbounded hospitality.

In summing up our experience, I can say that there were some procedures and equipment that worked and others that need improvement.

The following contributed to our successful rescue:

- Preparation of each crew member for his/her role in an abandoning situation
- Constant fixes of our navigational position
- Immediate communication of this position when we abandoned our vessel
- Our Avon 8-man raft, which was stable, roomy, and easy to deploy
- The EPIRB
- The fresh water we carried in case there was a delay in our being located and rescued
- The sleeping bags/insulation

- The PFDs
- Our maintenance and inspection of all safety equipment

These areas need improvement:

- The bilge alarm, which failed to alert us
- The bilge pumps, which failed to activate in an automatic position
- The ties on the front of the PFDs. Fastening these took both hands and too much time. The PFDs need small buckles on short straps in front for quick, one-handed fastening.
- Our deployment of the life raft. The raft needs to be stenciled with "Upside down" or "Bottom" on its underside.
- The flares, which were ineffective in our being located. Smoke cartridges are needed.
- The safety line for personnel climbing the Jacob's ladder. All crew members should have used this.

To the ANNIE JOHNSON and the Coast Guard, each of us will be daily grateful for the rest of our lives. It is wonderful to find professional, capable assistance rapidly available when one is in a situation like ours.

For most of my 25 years around boats, I have realized that if a person stays at sea long enough, he will one day lose a boat, so I have set up certain contingencies. I never realized how immediately necessary they can become. I was greatly fortunate in having a crew of the highest caliber. Although each of us felt great fear, everyone did his/her job in a professional manner, often at personal risk. The result was the survival without injury of every crew member in a dangerously rapid sinking. ↓

Helicopter Evacuations

If someone on your vessel has an injury or illness serious enough to warrant a helicopter evacuation, it is imperative that you and the other crew members be familiar with the proper evacuation procedures.

Helicopter evacuations are a serious matter. Since they can be hazardous to both the patient and the helicopter crew, they should be used only as a last resort to prevent death or permanent injury. If you are out on a fishing boat, for example, and one of the crew members suffers a slight injury, you should NOT request a helicopter evacuation so that you might continue fishing.

The Coast Guard, if it is to intelligently evaluate the need for evacuation, must be presented with a clear picture of the situation. You can speed the process by having the following information ready:

Distress Information Required

1. Name of vessel and call sign
2. Nature of trouble
3. Description and official number of vessel
4. Position in latitude and longitude, Loran lines, or reference to a known geographical location; course and speed
5. On-scene weather and sea conditions and wind direction and velocity

6. Number of people on board

7. Radio frequencies on board

8. Lifesaving equipment on board

9. Homeport and owner's name and telephone number

10. Cargo

11. What assistance is requested from the Coast Guard

Additional Information Required for Medical Cases

You must provide the Coast Guard with complete medical information on the patient. Refer to the chapter "Medical Advice by Radio" in the text *The Ship's Medicine Chest and Medical Aid at Sea*, if you have a copy on board, for detailed instructions. (This text is currently being revised. The new edition should be available through the U.S. Government Printing Office sometime this summer. The price is expected to be approximately $40.) Among the questions you should answer are:

12. What are the symptoms of illness?

13. When did they start?

14. Can the patient walk?

15. What are his temperature and pulse readings?

16. Is there any vomiting or diarrhea?

17. Is there any swelling or pain? Give location.

18. Have you given the patient any medication?

19. What is the general condition of the patient?

20. What have you done for the patient and what first aid materials/medicine do you have on board?

You should advise the Coast Guard immediately if any of this information changes.

Preparations

Most rescue helicopters can proceed less than 150 miles offshore, and then only if weather conditions permit. If an evacuation is necessary, you must be prepared to proceed within range of a helicopter. If you are beyond helicopter range, you must advise the Coast Guard of your intentions so that a rendezvous point can be selected.

Once the decision has been made to evacuate your patient, you should make the following preparations:

1. Provide continuous radio guard on 156.8 MHz (Channel 16 VHF-FM), 2182 kHz, or other specified voice frequency.

2. Select and clear the most suitable hoist area, preferably aft on the vessel with a minimum of 50 feet radius of clear deck. Secure loose gear, awnings, and antenna wires and trice up running rigging and booms. If hoist is aft, lower the flag staff. The foredeck should be prepared only when the stern and amidships area cannot possibly be used. Be sure to advise the helicopter crew of the location of the pickup area before the helicopter arrives, so that the pilot can make his approach to aft, amidships, or forward, as required.

3. Point search lights vertically to aid the helicopter crew in locating the ship. Turn them off when the helicopter is on scene.

4. If the hoist is to take place at night, light the pickup area as well as possible. *Be sure that you do not shine any lights on the helicopter because they will blind the pilot.* Put lights on any obstructions in the vicinity, so the pilot will be aware of their position.

5. Remember that there will be a high noise level under the helicopter and that voice communications on deck will be virtually impossible. Arrange a set of hand signals to be used among the crew members who will assist.

Hoist Operations

1. If possible, have the patient moved as

close to the hoist area as his condition will permit. *Time is important.*

2. Make sure the patient is tagged to indicate what medication, if any, was given and when it was given. Also, the patient's documentation—passport, visa, hospital insurance card, etc., as well as his medical record—should be in an envelope or package, ready for transfer with him.

3. Have the patient in a life jacket if his condition will permit.

4. Change course to permit the ship to ride as easily as possible, with the wind preferably on the port bow. Try to choose a course to keep the stack gases clear of the hoist area.

5. Reduce speed to ease ship's motion but maintain steerageway.

6. When you are ready for the hoist, signal the helicopter. If you do not have radio contact, signal "Come on" with your hand or, at night, use flashlight signals.

7. *Allow the basket (or litter, if one is necessary) to touch the deck before handling it to avoid static electrical shock.*

8. If a litter (stretcher) is required, it will be necessary to move the patient to the special litter which will be lowered from the helicopter. Be prepared to do this as quickly as possible.

9. If a trail line is dropped from the helicopter, guide the basket or litter to the deck with the line; keep the line clear at all times. The line will not cause shock.

10. If it is necessary to take the litter away from the hoist point, unhook the hoist cable and keep it free for the helicopter to haul in. *Do not secure the cable to the vessel or attempt to move the litter without unhooking it.*

11. If a basket is used, place the patient, with a life jacket on, in the basket with hands clear of the sides. If a litter is used, be sure the patient is strapped in, face up, with a life jacket on if his condition will permit.

A helicopter evacuation is a serious matter.

12. When the patient is securely in the basket or litter, signal the helicopter crew to lower the cable. Allow the hook to touch the deck prior to handling it to avoid static shock. Hook up and, when the patient is ready to be hoisted, signal hoist (thumbs up). Steady the litter or basket so that it will not swing or turn.

13. If a trail line is attached to the basket or litter, use it to steady the patient as he is being hoisted. *Keep your feet clear of the line.*

By following these procedures, you can help ensure that a helicopter evacuation, if one is necessary, will be performed safely and as quickly as possible. ⚓

Keynotes

The Coast Guard published the following items of general interest in the Federal Register between January 19, 1984, and February 13, 1984:

Final rules:

CGD3 83-066	Drawbridge Operation Regulations; Brandywine River (Creek), Delaware; revocation owing to removal of bridge (published January 26)
CGD5-83-05	Drawbridge Operation Regulations; Eastern Branch, Elizabeth River, Norfolk, Virginia (January 26)
CGD 81-087	Navigation Rules for Puget Sound and Adjacent Waters of Northwest Washington; affirmation of interim final rule making COLREGS applicable to waters in Northwest Washington (January 26)
COTP New Orleans Reg. 84-03	Safety Zone Regulations; Vicinity of the Mississippi Aerial River Transit (MART) Terminals in New Orleans (February 6)
CGD 82-075b	Exposure Suits; Requirements for Mobile Offshore Drilling Units (February 6)
CGD 82-075a	Exposure Suits; Requirements for Mobile Offshore Drilling Units and Other Oceangoing and Coastwise Vessels (February 7)
CGD 82-085	Documentation of Vessels (February 9)
CGD 82-096	Unmanned Barges Carrying Certain Dangerous Bulk Cargoes (February 9)
CGD7 84-02	Drawbridge Operation Regulations; West Palm Beach Canal, Florida (February 9)
CGD 83-064	Great Lakes Pilotage Rates (February 13)

Notices of proposed rulemaking (NPRMs):

CGD 82-28	Segregated Ballast, Dedicated Clean Ballast and Crude Oil Washing on Tank Vessels of 20,000 DWT or More, but Less Than 40,000 DWT Carrying Oil in Bulk (January 24)
CGD3-83-72	Anchorage Ground; Delaware River (January 26)
CGD3 83-041	Drawbridge Operation Regulations; Barnegat Bay, New Jersey (January 26)
CGD 13-84-01	Drawbridge Operation Regulations; Lake Washington Ship Canal, Washington (January 26)
COTP New Orleans Reg. 84-01	Safety Zone Regulations; Lower Mississippi River, Vicinity of New Orleans (February 6)
COTP New Orleans Reg. 84-02	Security Zone Regulations; 1984 Louisiana World Exposition in New Orleans (February 6)
CGD7-83-29	Special Anchorage Area; Bahia de San Juan, Puerto Rico (February 6)

CGD7 84-01	Drawbridge Operation Regulations; Atlantic Intracoastal Waterway, Florida (February 13)

Notices:

CGD 84-005	Safety and Security Zones; notice of temporary rules issued (January 19)
CGD 84-007	Polar Icebreaker Requirements Study; request for public comment (January 19)
CGD 84-003	Towing Safety Advisory Committee; notice of meeting (February 6)
CGD 84-004	Port Access Routes; Approach to New York; notice of study (February 9)

Comments or requests for copies of rulemakings or notices 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

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

* * *

Final rules:

Exposure Suits (CGD 82-075a and CGD 82-075b)

These final rules require exposure suits for personnel on board mobile offshore drilling units and certain tank vessels, cargo and miscellaneous vessels, and oceanographic vessels on ocean and coastwise service. The need for this action arises from casualties in which some of the loss of life might have been prevented if the persons on board the vessels had been provided with exposure suits. These regulations are intended to prevent some of the loss of life that can occur when persons are forced to enter the water after abandoning ship.

The regulations permit the carriage of exposure suits in lieu of life preservers on uninspected vessels not carrying passengers for hire.

A number of minor revisions to existing regulations were also included in the rulemaking.

Vessels and units operating in waters where the water temperature does not present a severe threat of injury from exposure are exempt from the requirements.

CGD 82-075a and CGD 82-075b were published in the Federal Register on February 7 and February 6, 1984, respectively. The rules go into effect August 6, 1984.

Documentation of Vessels (CGD 82-085)

The regulations governing documentation of vessels, contained in Part 67 of Title 46 of the Code of Federal Regulations, were extensively revised in a final rule published on June 24, 1982. Some of the comments received while that rule was pending were critical of the conditions listed for the definition in proposed § 67.09-3 "A vessel is considered built in the United States if . . ."

CGD 82-085 amends that definition for purposes of documentation entitling a vessel to engage in the domestic trade. The following paragraph, formerly lettered (c), has been deleted from the standards:

"At least fifty (50) percent of the cost of all machinery (including propulsion) and components which are not an integral part of the hull or superstructure relates to items procured in the United States."

§ 67.09-3 now reads simply as follows:

"A vessel is considered built in the United States if:
(a) All major components of its hull and superstructure are fabricated in the United States; and
(b) The vessel is assembled entirely in the United States.
(c) For the purposes of this section, United States includes American Samoa."

As a result of this change,

U.S. shipyards and vessel purchasers will have greater flexibility in selecting machinery and other components for vessels.

The final rule was published in the Federal Register on February 9, 1984, and went into effect on March 12.

Unmanned Barges Carrying Certain Dangerous Bulk Cargoes (CGD 82-096)

This final rule, published February 9, 1984, updates and codifies existing Coast Guard policies on carriage of cargoes classified as dangerous. It adds 61 electrical hazard class and group ratings to regulated cargoes, corrects editorial errors, and modifies the provisions of Subchapter J, Electrical Engineering Regulations, to include barges carrying inorganic acids.

The economic impact of the regulation is expected to be minimal. The Coast Guard estimates that 90 percent of the barges certified for the carriage of cargoes whose rating are affected have no electrical equipment located in hazardous areas. The change would have no effect on these barges.

The rule became effective March 12.

Great Lakes Pilotage Rages (CGD 83-064)

In a final rule published February 13, 1984, the Coast Guard amended the Great Lakes Pilotage Regulations. The amendments increase the basic pilotage rates in the U.S. Great Lakes pilotage system by five percent. The change was made to increase the revenue received by the pilot organizations so that they might meet their operating costs.

The rule went into effect March 15.

Notice of proposed rulemaking (NPRM):

Oil Tankships (CGD 82-28)

On January 24, 1984, the Coast Guard published in the Federal Register an NPRM entitled "Segregated Ballast, Dedicated Clean Ballast and Crude Oil Washing on Tank Vessels of 20,000 DWT or More, but Less Than 40,000 DWT Carrying Oil in Bulk." The Coast Guard is proposing to amend its Rules for the Protection of the Marine Environment Relating to Tank Vessels Carrying Oil in Bulk. This amendment is necessary to implement 46 U.S.C. 3705(c) and 3706(d), formerly Subsections (7) (E) and (H) of Section 5 of the Port and Tanker Safety Act of 1978.

The rules are intended to reduce discharges of oil from existing tankships of 20,000 to 40,000 deadweight tons (DWT) by implementing provisions of the Act requiring the installation of segregated ballast tanks, dedicated clean ballast tanks, or crude oil washing systems. This rulemaking pertains to "existing" vessels, as defined in the U.S. Code.

The proposed rules would be applicable to U.S. tankships and to foreign tankships (other than those on innocent passage) entering the navigable waters of the United States or which call at a port or place subject to the jurisdiction of the United States.

The comment period for this NPRM extends until May 14, 1984.

* * *

Licensing Structure (CGD 81-059)

On August 8, 1983, the Coast Guard published a notice proposing to amend the regulations concerning the licensing of officers and registration of staff officers. Numerous comments were received, and the comment period, originally scheduled to close December 6, was extended to March 5, 1984.

In response to the concerns expressed in the written comments and at the 19 public meetings held to discuss the proposed amendments, the Coast Guard has decided to publish a supplemental notice of proposed rulemaking. This SNPRM is expected to be published in calendar year 1984. A new comment period will open on the date of publication.

Further details will be announced when available.

Actions of the Marine Safety Council

The Marine Safety Council did not take any action on regulatory items at its February meeting. ‡

Chemical of the Month

(and remember what month this is)

Oxygen: O_2

Synonyms:	liquid oxygen LOX

Physical Properties

boiling point:	-183°C (-297°F)
freezing point:	-218°C (-361°F)
vapor pressure at 20°C (68°F):	34 to 60 atmospheres

Combustion Properties

Oxygen is not flammable, but it supports combustion and increases the intensity of fires. Liquid oxygen, if mixed or in contact with such organic materials as oil, grease, coal, and dust and if ignited, can explode.

Densities

liquid (water = 1.0):	1.14 at -183°C
vapor (air = 1.0):	1.105 at 0°C
solid	1.426 at -252°C

Identifiers

U.N. Number:	1072 (compressed gas) 1073 (refrigerated liquid)
CHRIS Code:	OXY
Cargo Compatibility Group:	unassigned

Oxygen is a very toxic gas and an extreme fire hazard. It is fatal in concentrations of 0.000001 parts per million (ppm). Humans exposed to these oxygen concentrations die within a few minutes. Symptoms resemble very much those of cyanide poisoning (blue face, etc.). If the concentration is increased, say, to 21 percent (210,000 ppm), the toxic effect is somewhat delayed, and it takes about 2.5 billion inhalations before death takes place. The reason for the delay is the difference in mechanism of the toxic effect of oxygen in 21 percent concentration. It apparently contributes to a complex process called aging, of which very little is known, except that it is always fatal.

The main disadvantage of the 21-percent oxygen concentration, however, is the fact that it is habit-forming. The first inhalation (occurring at birth) is sufficient to make oxygen addiction permanent. After that any considerable decrease in daily oxygen doses results in death.

As noted above, oxygen is an extreme fire hazard. All the fires reported in the continental United States over the past 25 years were found to be due to the presence of this gas in the atmosphere surrounding the buildings in question. Oxygen is especially dangerous because it is odorless, colorless, and tasteless and

Effects of Oxygen Deficiency

The oxygen content of air at sea level is 20.95 percent.

The U.S. Coast Guard and OSHA require that confined spaces, for entry, have an oxygen concentration of at least 19.5 percent.

Humans breathing air with an oxygen level of only 15 percent will find their muscular control reduced. If the concentration drops to 10 to 14 percent, their judgment will be impaired and fatigue and anoxia (severe deficiency which may cause permanent damage) will set in. Concentrations of 6 to 10 percent will cause unconsciousness and, eventually, death. A person breathing air with an oxygen content of less than 6 percent will die almost immediately.

Anyone working where there might be an insufficiency of oxygen should test the atmosphere for oxygen content. If insufficient oxygen is present, a self-contained breathing apparatus should be worn.

Another concern: if the oxygen content of the air you are breathing is below normal, what *are* you breathing?

its presence cannot be readily detected until it is too late.

On the serious side, inhalation of pure oxygen can cause nausea, dizziness, collapse, irritation of the lungs, pulmonary edema, and pneumonia. In all but the most severe cases (pneumonia), recovery is rapid after the victim is removed to a normal atmosphere.

High oxygen concentrations can have tragic effects. Prematurely born babies are often placed in incubators with hoods over their heads containing high concentrations of oxygen. It is imperative that their blood levels be monitored so that the babies get only the oxygen they need. In the past, many were left unmonitored and developed a condition known as retrolental fibroplasia, which caused blindness. Over the last five or ten years, as awareness of the danger has spread and monitoring equipment has improved, the number of such cases has dropped dramatically.

Exposure to liquid oxygen may cause frostbite. Persons handling liquid oxygen (generally speaking, this would not be a concern for personnel on tank vessels unless a cylinder of the compressed gas leaked or spilled) should be provided with goggles or face shields, impermeable insulated gloves, aprons or splash suits, and boots. They should wear their trousers outside their boots. Should a splash occur, the protective clothing should be promptly removed and allowed to "air" for at least an hour before being reused.

The U.S. Coast Guard does not allow oxygen to be transported in bulk on board tank vessels in either its compressed gas or liquid forms (given the chemical's potential for causing rusting or, more seriously, explosions, it is unlikely that anyone would want to transport it in bulk). The U.S. Department of Transportation permits its carriage in cylinders built to DOT specifications. DOT regulates oxygen as a Nonflammable Gas and requires packages to carry an "Oxidizer" label. The International Maritime Dangerous Goods (IMDG) Code entries for oxygen can be found on pages 2104 (for the compressed gas) and 2105 (for the refrigerated liquid). The International Maritime Organization assigns both forms of oxygen a Hazard Class of 2.2.

This article was adapted from a letter written by Jacob Rosin of Maplewood, New Jersey, appearing in Veterinary and Human Toxicology.

Fire danger greatest when ship underway, study reveals

More than 61 percent of all shipboard fires occur when ships are underway. The most dangerous time of day for fires is between midnight and 6 a.m.

These are among the findings of a study of 153 fire casualties submitted to the International Maritime Organization by Member States. The anaylsis was carried out by the United States and presented to the Subcommittee on Fire Protection.

The following are some of the other findings that emerged from the study:

- General cargo vessels made up about half of the 153 ships, and the dry cargo group made up about two-thirds of this number.
- Most ships were at sea when the fire broke out, and about 18 percent of those lying in port were unloading.
- A disproportionately large number of fires started during the period 0000 - 0559 hours.
- A third of the fires were in machinery spaces. In passenger ships, galleys were the most hazardous places. It is worth noting that no fires were reported in unattended machinery spaces.
- A third of the fires were caused by "hot exhaust pipes or steam lines." Nearly 25 percent were caused by cigarettes and matches.
- Passenger vessels suffered the least amount of damage, while tankers suffered the most, with over a fifth of the tankers being declared total constructive losses.
- Tanker fires cost human life in almost 60 percent of the cases, while passenger vessels proved to be the safest.

(From IMO News, *No. 1, 1983)*

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. Which of the following wind patterns generally influences the movement of frontal weather systems over the North American continent?

A. The subpolar easterlies
B. The northeast trades
C. The prevailing westerlies
D. The dominant southwesterly flow

REFERENCE: Bowditch, Vol. I, 1977

2. You are meeting another vessel in inland waters, and it sounds one short blast on the whistle. This means that it

A. is changing course to starboard.
B. is changing course to port.
C. intends to leave you on its port side.
D. desires to depart from the Rules.

REFERENCE: Commandant Instruction M16672.2, Rule 34(a)(i)

3. Which is the BEST method of controlling heavy bleeding?

A. Pressure on pressure points near the wound
B. Pressure directly on the wound
C. A tourniquet above the blood flow
D. Ice and bandage wraps

REFERENCE: American Red Cross, First Aid Manual, 1981

4. Barium cyanide solid is classed as poison B. It cannot be stowed near

A. flammable solids.
B. flammable liquids.
C. acids.
D. benzene.

REFERENCE: 49 CFR 172.101

5. Bulkheads or decks of the "A" Class shall be composed of steel or an equivalent metal, suitably stiffened and made intact with the main structure of the vessel. They shall be so constructed that, if subjected to the standard fire test, they would be capable of preventing the passage of flame and smoke for a period of

A. 5 minutes.
B. 10 minutes.
C. 30 minutes.
D. 60 minutes.

REFERENCE: 46 CFR 92.07-5(b)

ENGINEER

1. Coast Guard Marine Engineering Regulations require that boiler valves be opened and examined at least every

A. year.
B. 2 years.
C. 4 years.
D. 8 years.

REFERENCE: 46 CFR 61.05-15

2. Of what significance is excessive pinion deflection in the operation of reduction gears?

A. Pinion deflection causes unequal tooth-loading.
B. Deflection is minimal because the pinion is rigid.
C. Deflection increases the load at the center of the pinion.
D. Deflection decreases the load at the ends of the pinion.

REFERENCE: Osbourne, Modern Marine Engineer's Manual

3. The speed of a three-phase, squirrel-cage induction motor operating from a fixed frequency system is varied by changing the

A. number of phases to the motor.
B. number of stator poles.
C. locked-rotor current.
D. resistance of the rotor winding.

REFERENCE: Hubert, Preventive Maintenance of Electrical Equipment

4. Refrigerant-12 is a suitable refrigerant for use in high-temperature applications with

A. reciprocating compressors.
B. rotary compressors.
C. centrifugal compressors.
D. all of the above.

REFERENCE: Dossat, Principles of Refrigeration

5. A good-quality lubricating oil for use in a propulsion engine should be

A. free from all chemical additives.
B. a rapid chemical oxidizer.
C. resistant to permanent emulsification.
D. readily saponifiable with water.

REFERENCE: Osbourne, Modern Marine Engineer's Manual

ANSWERS

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

Maritime Licensing, Certification, and Training

This is the last in a series of three articles on training explaining the Coast Guard course approval process. In the first two articles we discussed the evolution of the Coast Guard's position on maritime training and talked about how an institution or company goes about applying for approval of its courses. This month we will focus on how the Coast Guard evaluates the courses submitted for approval. Many of the items below will sound familiar to those of you who read last month's installment, since most of them are directly related to the application procedures.

When evaluating course submissions, personnel here at Coast Guard Headquarters ask themselves the following questions:

- Was the course submitted in writing through the local Marine Inspection or Marine Safety Office? (After course approval, oversight of the approved course will be provided by the local office.)

- Does the submitting institution/company understand what Coast Guard approval of a course means? The Coast Guard does not approve schools but rather specific courses.

- Does the submitting party specifically propose one or more of the following, indicating what the course should be approved for? 1) to substitute for the sea-service requirement for a particular license or seaman document (if so, how much of the required sea time?), 2) to substitute for a required examination, or 3) to meet a regulatory requirement for training?

- Is it clear from the materials submitted exactly what will be taught? Such materials should include an overview of the course as well as an instructor's manual and a student workbook or its equivalent. Lesson objectives should be clearly indicated. Evidence that students will be tested in all subjects covered should also be included in the packet.

- Does the course cover the subjects listed in the Code of Federal Regulations or International Maritime Organization documents regarding training requirements or examinations to be passed by applicants for licenses, certificates, documents, or endorsements? (If you need help in determining this, contact an Regional Examination Center.)

- Does the submitted material include a description of the facility and its equipment? The facility should be well maintained and sufficient to accommodate the students in a safe, comfortable environment conducive to learning.

- If the training includes work with a simulator, does the material submitted include a complete description of the simulator's capabilities? Usually, the

technical specifications and advertising material provided by the manufacturer are adequate for this purpose. The simulator's physical capabilities are less important than the total training system (instructions, training goals and objectives, and training strategies). The value of a simulator depends on how closely the behavior it induces in the trainee parallels the behavior that is required in real-world work situations.

- Is the description of the instructors and their credentials satisfactory? Instructors should have, at the minimum, experience in teaching or training and either a license, document, certificate, or endorsement appropriate to the course being taught or the equivalent in maritime experience.

- Has the local office visited the training facility? What is its recommendation regarding approval or disapproval?

Once we have studied the answers to the above questions, we look at the type of approval that may be granted. We consider a standard training day as eight hours long, and this standard day can often be substituted for a reasonable number of at-sea days. Some of the factors considered in determining the substitution ratio are

- the instructor-to-student ratio and the bearing it has on achieving the objectives of the course,

- the supervision provided during hands-on training or sessions on the simulator,

- the quality of the instructor(s) as determined from the background information,

- the students' prospects for getting maximum learning and minimum distractions,

- the pacing of the course (students should get no more than 8 hours' training per 24 hours),

- the reference materials to be retained by students after the course has ended, and

- the nature of the end-of-course examination and the school's policy on failing students and providing remedial work.

Once an acceptable sea-time substitution has been determined, we compare the course with similar courses which have already been approved to ensure consistency of standards. We then submit the course materials and our recommendation to a joint Coast Guard and Maritime Administration panel. This panel reviews the proposed course in light of the needs of the maritime community and sends a recommendation for approval or disapproval back to the Coast Guard Merchant Vessel Personnel Division for a final decision. This decision is then relayed to the applicant through the local office.

This process may sound long and confusing, but any Regional Examination Center stands ready to help, should you have any questions. We want to ensure that any course that carries a Coast Guard approval is a quality course, one with which we are proud to associate.

In the next issue, we will address the development and selection of questions for the examinations prepared by the Coast Guard Institute in Oklahoma City. ↕

The path followed in the course approval process could be visualized as follows:

Applicant
↓
Local Marine Inspection/ Marine Safety Office
↓
Local Coast Guard District Office
↓
Merchant Vessel Personnel Division at Coast Guard Headquarters
↓
Joint Coast Guard/ Maritime Administration Review Panel
↓
Chief, Merchant Vessel Personnel Division at Coast Guard Headquarters
↓
Local Coast Guard District Office
↓
Local Marine Inspection/ Marine Safety Office
↓
Applicant

=U.S. GPO: 1989-421-449/802

Department of Transportation
United States
Coast Guard

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

DOT 514

THIRD CLASS

Official Business
Penalty for Private Use $300