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According to an article in ***Fire Command*** *magazine, stress is the major killer of U.S. firefighters. George J. Munkenbeck, Jr., Codirector of Maritime Education at the Seaman's Church Institute of New York and New Jersey, illustrates how shipboard firefighters can protect themselves during a fire emergency. The article begins on page 67. (Cover photo from the U.S. Coast Guard files)*

Personal Safety During a Shipboard Fire

George J. Munkenbeck, Jr.

Safety should be every crew member's primary concern. During a shipboard fire, matters frequently get out of hand, and safety procedures may be forgotten under the pressure of fighting a fire. Crew members should be aware of the hazards in fighting fires and should remember they are responsible for their own safety as well as the safety of others. While this duty is often thought of as the officers' job, it is, in fact, everyone's job.

An article in the National Fire Prevention Association's publication, **Fire Command**, June 1984, entitled "U.S. Fire Fighter Deaths — 1983," gives a breakdown of what killed shoreside fire fighters in that year. The article notes that smoke-related deaths have declined due to the widespread use of breathing apparatus, but stress is the major killer. In order of importance of **cause** of injury, it lists the following:

Stress 51.9%
Falls, struck by object, contact with object 27.4%
Caught/trapped 15.1%
Structural collapse 4.7%
Exposure to smoke 0.9

The importance of this list is not the data, but what is listed first. Over half the 106 deaths (55 deaths) were stress-related. Twelve of these 55 stress-related deaths were due to physical exertion, and the remainder were due to emotional stress. The figures for death by **nature** of injury are even more revealing:

Heart attack 49.1%
Internal trauma/fractures 27.4%
Smoke/burns 10.4%
Drowning 6.6
Electrocution 3.7%
Stroke 1.9%
Gunshot 0.9%

Also of interest is that the majority of the heart attacks occurred in the age group over 41, the age group of many merchant seamen today. The younger age groups are more prone to trauma injuries, due to the increased number of risks taken by younger persons. Another fact pointed out by the article's statistics was that almost one-half of the fatal injuries occurred while firefighters were involved in non-fire-suppression duties. In other words, fatal injuries tended to occur after the heavy exertion was over.

How does this apply to a seaman who may suddenly find himself in a fire situation? Even for veteran firefighters, the stress of a "worker" cannot be described until you have experienced it. You never really know how your body will react. Most seamen are middle-aged or older, but even younger personnel are not immune to stress. A firefighter ashore can leave the scene of a fire and go home or go back to the firehouse, but that is no guarantee that the job stress will not follow. The seaman, on the other hand, responds to an alarm in the manner of the volunteer fireman, but in the seaman's case, the firehouse is what's burning. You cannot easily escape what has happened because there is nowhere else to go. Any fire service is demanding, but shipboard service is doubly so. We also tend to act without thinking, to go in without a breathing apparatus or make some other mistake that a shoreside fireman may not make, because the shoreside firefighter has a little more time to get ready when responding to alarms.

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We are all aware of the strain a shipboard emergency puts on the entire crew. I realize in a major fire on a modern ship, everyone will be forced to give 100 percent, but remember at sea there is no "mutual aid," no other department to call on for equipment or manpower, and once your personnel have become exhausted, there are no further resources.

The most important lesson, though, is that your body will be under extreme stress and strain when fighting a fire. The reaction of a particular body to that stress is not predictable. Even more important is that you do not know when or how stress will show up. People have died days later from stress-related injuries which originally went undetected.

The crew of the Coast Guard cutter WHITE HOLLY stands by to assist with firefighting. (Official U.S. Coast Guard photo)

Safety Hints

Smoke and toxic fumes are a fact of life in firefighting. The modern breathing apparatus has reduced this hazard, so the danger of asphyxiation is reduced, but a breathing apparatus that is not properly worn, used, or maintained is useless. If you don't know how to use it, why are you wearing it? Practice makes perfect.

Remember, you are not superhuman, not even with a breathing apparatus. Don't be a hero. Firefighters tend to think they can go anywhere and do anything once they are used to the breathing apparatus. This is not so.

While everyone worries about breathing smoke, we tend to forget that besides having carbon monoxide, sulfur dioxide, and many other delightful chemicals in it, smoke hides dangers. This may be one of the greatest hazards today. Remember, what you **don't** see can kill you.

In light of this, remember that a fall down an access trunk, ladder, companionway, or hatch can kill you faster than fire. So look where you are going, know where you have been, feel your way if you cannot see, proceed with caution, watch slippery decks, be alert for the presence of structural failure, and most of all, **practice teamwork.**

Many firefighters are injured by other **firefighters.** Structural weaknesses on a ship and on the shore can be spotted in many cases, but flying objects and "booby traps" left by others are far more common hazards. Don't break glass or knock in an access without checking the location of other firefighters. Wear a hard hat and firmly grip tools. If you are clearing out an area, don't drop anything without seeing who or what is below, and if you find a hazard, remove it or secure it. Remember, a ship is in constant motion, so the following safety laws apply:

If it can move, it will.
If you are under something, it will fall.
If you drop something, it will hit someone.

Fire and heat are the enemy. They can burn you, exhaust you, and create a trap if not watched. To lower the possibility of injury, wear protective gear and wear it properly. Always remember that water converted to steam can burn as severely as fire. Have a pre-fire plan and stick to it. Watch for heat buildup and smoldering fires. Remember that heat intensifies fatigue and what may appear to be a rational decision isn't. That's why we emphasize the pre-fire plan at The Seamen's Church Institute. Also remember that the crew does not consist of regular firefighters. Fear and emotion can add to your problems.

Always look for signs of backdraft, and **you should** feel doors and bulkheads for heat. Stand back from a door or passage as you open it if you suspect a backdraft. If at all possible, ventilate ahead of your attack.

It is easy to become trapped during a fire aboard ship. Teamwork and planning can prevent or at least lessen the chance of being trapped. Always maintain a way out and have alternates in case you are blocked by smoke, fire, or structural collapse. A very simple precaution is to ensure that your safety lights have fresh batteries. If you do become trapped, control your emotions and keep calm. Keep to your hands and knees. Find a hose and follow it out. Most of all, have confidence in your equipment and in your ship's organization. The Safety Officer should always know where the teams are, and if you have a good pre-fire plan, they will get you out.

You can prevent yourself from becoming a statistic. Know your limits. The difference between a hero and a fool is a fine line.

Some personal safety points to remember:

- You are your brother's keeper. Watch each other. Frequently you may continue beyond the point of exhaustion.
- Rotate personnel. If you have reliefs, use them. Plan your attack, and ventilate if you can to reduce the punishment of your personnel.
- Watch yourself. If you are having trouble breathing, or if you feel "giddy" or exhausted, it's time to get out.
- Use a breathing apparatus if available. Use it properly. Let's try to reduce smoke- and fume-related injuries to their shoreside levels.

Remember: Safety is of the first importance in the performance of your duties. ‡

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National Fishing Week, June 2-8, 1986

Saying that all too often the fishing industry and fishermen are forgotten in the United States, Walter B. Jones (D-NC), Chairman of the House Merchant Marine and Fisheries Committee, introduced House Joint Resolution 433 proclaiming June 2-8, 1986, as "National Fishing Week."

"Fishing is a tradition deeply rooted in American history," Congressman Jones said. "From the settlers' time to the present day, fishing has provided an immediate and steady food supply as well as a relaxing form of recreation -- only the methods and techniques have changed."

"More than 2,000 U.S. commercial fishermen ply the oceans to satisfy this country's growing taste for seafood. Another 54 million American sport fishermen take to the water for the sheer fun of it. The tackle manufacturers, boat and motor producers, and service industries necessary to support sport and commercial fishing employ nearly 1 million Americans and generate over $27 billion in economic activity," Congressman Jones explained.

"Our fisheries are one of this nation's most important renewable natural resources. Dependence on fisheries for either livelihood or sport promotes respect for both the resource itself and the health of the environment necessary for fisheries to flourish," Mr. Jones continued.

"National Fishing Week will accord recognition to those millions of Americans who fish, whether as family-oriented outdoor recreation or as commercial fishing on the high seas. Each contributes to a healthier and stronger America," Chairman Jones concluded.

CO_2 Requirements for RO/RO Fire Protection

Dr. W.H. McLain
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Carbon dioxide (CO_2) extinguishes fires by reducing the amount of oxygen in the air. Without enough oxygen, fires cannot burn. CO_2 is also highly effective against flammable liquid fires. U.S. Coast Guard regulations[1] state that either a CO_2 fire extinguishing system or an equally effective system for roll-on/roll-off (RO/RO) cargo spaces be aboard RO/RO ships.

How Much and How Fast?

Regulations of the 1974 International Convention for the Safety of Life at Sea (SOLAS)[2] state that an acceptable CO_2 extinguishing system should deliver 66-2/3 percent of its total required quantity in 10 minutes. However, Coast Guard regulations stated that the system must deliver 100 percent of its required quantity in 2 minutes. (Total required quantities for both systems are the same.) During reflaggings, vessels built to conform with SOLAS requirements had to be modified to meet the stricter Coast Guard guidelines, which meant substantial costs to ship owners.

To determine the relative effectiveness of its requirements, the Coast Guard developed an experimental program of fire tests to evaluate CO_2 application rates aboard RO/RO vessels. The tests were conducted in a cargo hold of a Coast Guard test vessel, the MAYO LYKES, which had been modified to simulate a RO/RO automobile carrier. This test ship, located in Mobile, Alabama, is part of the Coast Guard's Fire and Safety Test Detachment, the only full-scale marine fire testing facility in the world.

The Test

We decided to conduct the test as though fuel had been spilled from a ruptured automobile tank or a portable gasoline container. Ship operators told us that automobile tanks usually contain less than 2 gallons of fuel, but we observed that 5-gallon portable containers were commonly carried in the cargo area to refuel the cars. Therefore, we set the scenario of a 5-gallon spill fire to simulate a "typical" Class B fire. Both gasoline and mineral spirits were used as test fuels. Pans of fuel were placed directly under the gas tank to simulate the most probable spill. (Tanks were carefully emptied and vented before the tests to prevent explosions.) The test consisted of a Class B fire (flammable liquid) complicated by tires, upholstery, and other flammable components.

We placed 18 automobiles in the No. 3 hold of the MAYO LYKES. The vehicles were located on the second deck, which had been partitioned with a steel bulkhead. Hatches on the No. 3 hold were in place but not sealed. The test area had a total volume of 37,470 cubic feet and a length of 55 feet.

The cars were installed in a 3-by-6 array with only 1 or 2 feet between bumpers. The close spacing simulated actual shipboard conditions and was deliberately done to measure

[1] *46 CFR, 76.05-1(a), 76.15-5f, 95.05-10(b)(4), 95.15-5(f),*

[2] *International Convention for the Safety of Life at Sea, 1974, as amended, Reg. II-2/53.2.2.1*

how the fire would spread in a tightly packed group. Further, as a "worst-case scenario," we assumed that two adjacent spills might occur at the same time. Therefore, all tests used two pan fires under adjacent cars. In this way, we could also determine the effect of one fire on another.

The test program consisted of 12 fire tests. Four of these tests were conducted using a false overhead about 6 feet above deck. Eight tests were conducted without the false overhead. The CO_2 discharge nozzles were positioned approximately 1 foot under the main deck for all tests.

In all our pan tests, the fire was extinguished before it spread to the automobile interiors. To simulate a severe fire, gasoline was poured into the passenger compartments of two cars, thoroughly soaking the upholstery. In this case, the CO_2 system designed to the SOLAS standard extinguished both the Class A and Class B fires, and the fire did not spread to adjacent cars.

Post-test views of automobiles used on roll-on/roll-off ship fire tests. (Photos courtesy of the author)

Test Results

Data was obtained for the following variables:

- Percent of oxygen at selected locations.
- Percent of CO_2 at selected locations.
- Extinguishment time.
- Time-temperature above the fuel pans.
- Weight of CO_2 applied.
- Quantity of fuel burned.

Using this data, a number of parameters were evaluated. The most important parameter was the number of extinguishments, i.e., how many times the fire was put out before the fuel was entirely consumed. Our results showed that the pan/automobile fires were extinguished by CO_2 in all tests. The next most important parameter was the amount of CO_2 needed to extinguish the fire. To quantitatively measure the amount of CO_2 applied, we constructed a special scale which could accurately ($\pm$ 10 lbs.) weigh the low-pressure tank and its contents (up to 26,000 lbs). The successful amount of CO_2 used for each test was between 1,100 and 1,600 lbs.

Why were the fires extinguished? In a system consisting of gasoline, CO_2, and air, gasoline will not burn if the oxygen concentration is below 14.4 percent. This corresponds to an atmosphere containing approximately 28 percent CO_2. We measured oxygen levels with sensors located 10 inches above deck, and our data verified that the fire was extinguished when the oxygen level was reduced to less than 15 percent.

On the basis of our test results, we drew the following conclusions:

- The application rates prescribed by both SOLAS and the Coast Guard are sufficient to extinguish anticipated gasoline-spill and automobile fires on a RO/RO ship.

- Class B spill fires on an automobile transport ship can be extinguished by CO_2 applied in the quantity and at the application rate specified in the SOLAS regulations.

- The flow of CO_2 to lower levels was not significantly impeded by the simulated two-deck construction.

As a result of these conclusions, Coast Guard regulations were recently modified to align them with the SOLAS requirements.[3] This change will significantly lower the costs involved in reflagging RO/RO ships but will not compromise shipboard fire safety. In this instance, the Coast Guard's unique Fire and Safety Test Detachment provided relevant engineering data to help modify regulations for the maritime industry.

[3] *Federal Register, 22 August 1985, Vol. 50, No. 77, pp. 15750-15751*

Lessons from Casualties

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While the foreign-flag passenger vessel M/V OCEANIC was undergoing rehab work alongside the pier at Port Canaveral, Florida, it suffered a fire within the accommodation area. Through some excellent preplanning, the outbreak was contained to a very small fire.

A 440-volt shore tie was run through a porthole to provide electrical power to the vessel while the vessel was undergoing repair. The movement of the vessel chafed the shore tie, causing the insulation to wear through and causing a short which ignited the combustible materials near the porthole (curtains, etc.). The fire spread throughout the originating stateroom, completely gutting the room. Some heat damage occurred to an adjacent compartment through a common bulkhead. Also, some smoke damage occurred within the area of the gutted stateroom. The fire was contained to the room of origin.

The vessel's crew responded rapidly to the blaze, and within 30 minutes, the fire was under control. In addition to the crew responding rapidly, the port fire authorities and the Coast Guard also responded.

Much of the rapid response can be attributed to an excellent preplanning document between the port authority, the Coast Guard, and the various vessels that call at the port. As a result of the S.S. SCANDINAVIAN SEA fire in 1984, the port fire contingency plan was rewritten to provide a better, more resposive plan. For all who participated in the M/V OCEANIC fire, the new plan was a great success. All appropriate personnel were notified, and all notifications were done in a timely manner. Had the vessel's crew been unsuccessful in combating the fire, the port authority fire brigade and the Coast Guard were on scene ready for action.

This casualty dramatically demonstrates two important facts:

1. A vessel with proper structural fire protection, built to the highest international fire safety standards, will contain a fire to its place of origin for a specified time period.

2. There is no substitute for proper fire/emergency preplanning.

continued on page 84

Search and Rescue at Sea -- Part 2

On June 22, 1985, the International Convention on Maritime Search and Rescue entered into force. It is an indication of the Convention's importance and the subject itself that the theme of last year's World Maritime Day (celebrated by IMO on September 26, 1985) was maritime search and rescue.

*In the last issue of **Proceedings**, a special article dealt with the background to search and rescue at sea. In this issue we look at the SAR Convention itself.*

Search and Rescue Operations

The obligation of ships to respond to distress mesages and signals from other ships is one of the oldest traditions of the sea. It is also enshrined in various international conventions. One of them is the Brussels Convention on Assistance and Salvage of 1910.

Article 11 of that convention established in international law the tradition of the brotherhood of the sea. It stated that "every master is bound, so far as he can do without serious danger to his vessel, her crew, and her passengers, to render assistance to everybody, even though an enemy, found at sea in danger of being lost." The convention also required Contracting Parties to adopt national laws or regulations to give effect to this provision.

The obligation to provide assistance to persons in distress at sea had been embodied in other international conventions, particularly the International Conventions for the Safety of Life at Sea and the Convention on the High Seas (1958).

Regulation 10 of Chapter V of SOLAS 1974 states, "The master of a ship at sea, on receiving a signal from any source that a ship or aircraft or survival craft thereof is in distress, is bound to proceed with all speed to the assistance of the persons in distress, informing them if possible that he is doing so..."

The regulation goes on to outline various other obligations with regard to rescue operations, and in Regulation 15 the SOLAS Convention gives basic requirements for Governments regarding search and rescue operations.

It says, "Each Contracting Government undertakes to ensure that any necessary arrangements are made for coast watching and for the rescue of persons in distress at sea round its coasts. These arrangements should include the establishment, operation, and maintenance of such maritime safety facilities as are deemed practicable and necessary regarding the density of seagoing traffic and the navigational dangers and should, so far as possible, afford adequate means of locating and rescuing such persons."

In addition, "Each Contracting Government undertakes to make available information concerning its existing rescue facilities and the plans for changes therein, if any."

These international instruments operate without prejudice to each other, and the repetition of the same principle in more than one convention does not introduce any inconsistencies but strengthens the legal obligations which give added force to tradition.

When IMO was established in 1959, its first major action was to convene an International Conference on the Safety of Life at Sea. This met in 1960 and adopted a new version of the SOLAS Convention. It also adopted a number of recommendations which requested IMO to take appropriate action to improve search and rescue at sea. These included the following:

Contracting Governments should establish coast radio stations to keep a continuous listening watch on the radio-

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*This article was originally published in the No. 3, 1985, issue of the **IMO News**.*

telegraph and radiotelephone distress frequencies and on frequencies used by survival craft.

Joint studies by IMO, the International Civil Aviation Organization (ICAO), the International Telecommunication Union (ITU), and the World Meteorological Organization (WMO) should be undertaken on matters regarding the planning and provision of facilities for search and rescue.

Urgent consideration should be given by IMO, ICAO, ITU, and WMO on the best way of establishing communications between aircraft and ships involved in cases of distress.

Contracting Governments should encourage all ships to participate in merchant ship position reporting systems established for search and rescue. These systems should be free of cost to user ships.

Governments should encourage ships to fit emergency position-indicating radio beacons (EPIRBs) where appropriate.

These recommendations provided the basis for IMO work in this area during the next few years, but many delegations felt that more needed to be done to improve and to standardize search and rescue organizations.

It was recognized that IMO had a crucial role to play both in providing advice and guidance and also in formulating an international search and rescue plan.

As a first step, a manual on search and rescue operations was prepared for the guidance of those requiring assistance at sea or who find themselves in a position to provide assistance to others. The draft was completed by 1969 and was finally adopted by the IMO Assembly in 1971 under the title of the **Merchant Ship Search and Rescue Manual (MERSAR).**

The MERSAR manual is primarily designed to aid the master of any vessel who might be called upon to conduct search and rescue (SAR) operations at sea. It is divided into eight chapters which deal with SAR coordination, action by a ship in distress, acting by assisting ships, assistance by SAR aircraft, planning and conducting the search, conclusion of search, communications, and aircraft casualties at sea.

Although the MERSAR manual provides valuable guidance, it was always envisioned that international search and rescue requirements should be established. The Assembly resolution which adopted the manual notes "with approval that the Maritime Safety Committee (MSC) has included in its long-term work program the formulation of an international agreement on a search and rescue system." It then goes on to request the MSC to consider "in due course the status of the Manual in the context of the agreement on a search and rescue system."

The Coast Guard stands by while monitoring the condition of the fishing vessel LADY BARBARA. (Official U.S. Coast Guard photo)

The International Convention on Maritime Search and Rescue, 1979

Based on the recommendations of a Search and Rescue Seminar held by the United States in October 1970, the Maritime Safety Committee established a Group of Experts on Search and Rescue which was instructed to prepare a draft International Convention on Maritime Search and Rescue. It also prepared a second manual called the **IMO Search and**

Rescue Manual (IMOSAR) which was adopted by the Maritime Safety Committee in 1978.

The manual provides guidelines rather than requirements for a common maritime search and rescue policy, encouraging all coastal states to develop their organizations on similar lines and enabling adjacent states to cooperate and provide mutual assistance.

Taking into account that maritime and aeronautical search and rescue organizations are complementary, the Manual has been aligned as closely as possible with the International Civil Aviation Organization (ICAO) Search and Rescue Manual to ensure a common policy and to facilitate consultation of the two Manuals for administrative or operational reasons.

The material has been arranged into two parts:

Part 1, **the search and rescue organization**, deals with matters pertaining to states, regarding the organization of existing services and facilities and the establishment of additional services and facilities necessary to provide practical and economical search and rescue coverage of a given area.

Part 2, **search and rescue procedures**, contains material to assist all personnel who will participate in search and rescue operations and exercises.

Appended to the Manual is a Maritime Search and Rescue Recognition Code which is intended to facilitate the communication of essential descriptive information regarding merchant vessels and small craft within and between maritime SAR organizations.

The Group of Experts also prepared a draft of the proposed SAR Convention which was adopted at a conference held in Hamburg in 1979. It entered into force on June 22, 1985, and is expected to remedy a number of weaknesses in the current SAR system.

Coordination and control of search and rescue operations is at present organized by each individual country in accordance with its own requirements and as dictated by its own resources. As a result, national organizational plans have developed along different lines. The dissimilarity of such plans and lack of agreed and standardized procedures on a worldwide basis may give rise to difficulties, particularly at the initial stages of alert. In some cases this results in an uneconomical use of search and rescue facilities or in unnecessary duplication of effort.

However, in some geographical regions, neighboring countries have established regional arrangements which operate successfully, have agreed on links of communications, and have accepted standard procedures and areas of responsibility for coordination and control in cases of distress. Exchange of personnel and frequent contacts between those responsible for operating the search and rescue services help to resolve operational difficulties which might arise and contribute to the effectiveness of the regional system.

The technical provisions of the convention are contained in an annex consisting of six chapters, the first of which deals with terms and definitions. The other chapters are as follows:

Chapter 2: Organization

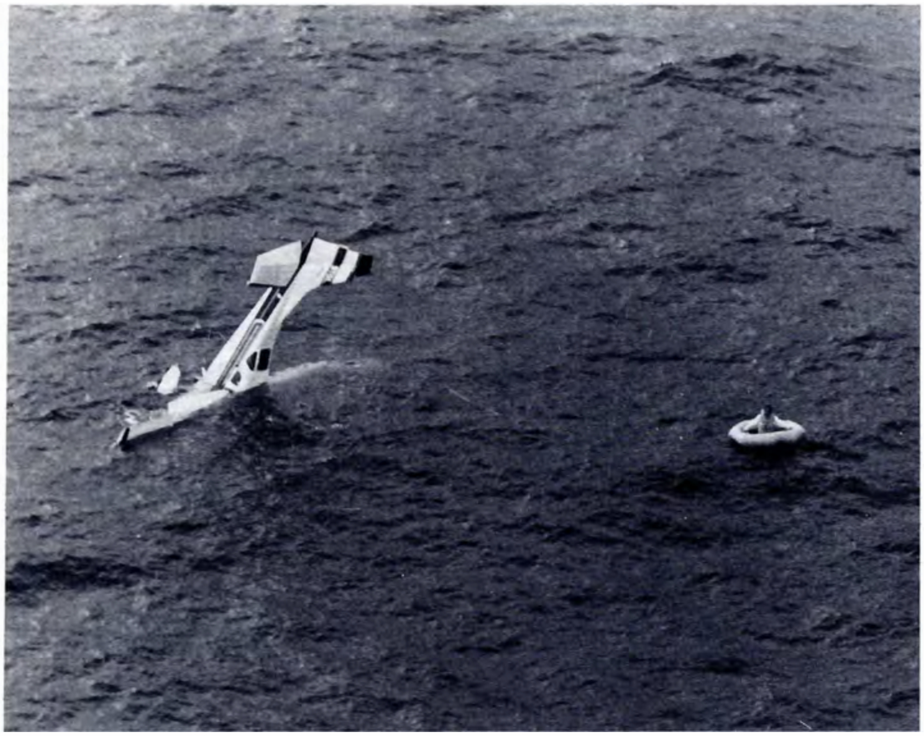
This deals with the basic structure of a search and rescue organization. Parties are required to ensure that necessary arrangements are made for the provision of adequate search and rescue services for persons in distress at sea around their coasts.

A similar (but more extensive) requirement is contained in Regulation 15, Chapter V of the International Convention for the Safety of Life at Sea, 1960 and 1974. The same paragraph of the SOLAS Convention also requires that each search and rescue region shall be established by agreement among the Parties concerned. However, it is recognized in the SAR Convention that it will not always be possible for all Parties to reach agreement, in which case they shall use their best endeavors to reach agreement on appropriate arrangements which would provide equivalent overall coordination of search and rescue services.

To facilitate agreement on the dimensions of search and rescue regions, the convention stipulates that the delimitation of such regions is not related to and shall not prejudice the delimitation of any boundary between states.

Parties should arrange that their SAR services can and do give prompt response to any distress call and must take urgent steps to provide the most appropriate assistance to any person in distress.

Information concerning SAR services must be submitted to IMO and then circulated to all Parties. Parties are required to coordinate their SAR facilities and services nationally by establishing rescue coordination centers (RCCs) and rescue subcenters (RSCs). They must also ensure that each RCC and RSC has adequate means for receiving distress communication and communicating with its rescue



Emergency position-indicating radio beacons (EPIRBs) will guide SAR vessels to the location of a casualty when radio contact is lost. (Official U.S. Coast Guard photo)

units and with RCCs and RSCs in adjacent areas.

Parties are required to designate state services as rescue units. Each rescue unit **must** be provided with appropriate facilities and equipment and **should** have a rapid and reliable means of communication with other units engaged in the same operation.

The chapter concluded with details of color coding and other information to be used on containers and packages of survival equipment for dropping to survivors.

Chapter 3: Cooperation

In addition to requiring Parties to coordinate their own search and rescue organization, this chapter also recommends that they coordinate search and rescue operations with those of neighboring states.

The convention **recommends** that, subject to applicable national legislation, **authorization should be given** for the immediate entry into or over its territorial sea or territory of rescue units of other Parties which are engaged in a search and rescue operation. It **requires** that search and rescue operations in such cases shall, as far as is practicable, be coordinated by the appropriate RCC or RSC of the party which has authorized entry.

A Party which wishes its rescue units to enter into or over the territory of another Party solely for search and rescue purposes shall send a request to the RCC or other designated authority of that Party. This request must give full details of the intended mission and the need for it. The Party receiving such a request must immediately acknowledge it and, as soon as possible, state any conditions under which the intended mission may be undertaken. However, to prevent unnecessary delays and formalities, Parties are recommended to enter into agreements with neighboring states on the conditions for entry of their rescue units into or over their respective territorial sea or territory.

The convention also recommends that each party should authorize its RCCs to

- request and provide such assistance as may be needed from or by other RCCS;
- grant any necessary permission for the entry of SAR units into or over its territorial sea or territory and to make the necessary arrangements with customs, immigration, and other authorities.

Agreements with neighboring states are also recommended for the pooling of facilities, the establishment of common procedures, the conduct of joint training and exercises, regular checks of interstate communications, liaison visits by RCC personnel, and exchange of search and rescue information.

Aircraft play a crucial role in SAR operations today, and the convention recognizes the importance of this aspect by requiring Parties to ensure the closest practical coordination between maritime and aeronautical services. Where practicable, joint RCCs and RSCs should be established to serve both maritime and aeronautical purposes. However, if separate RCCs or RSCs are established to serve the same area, the closest practical coordination must be ensured, and common procedures must, as far as possible, be established for maritime and aeronautical purposes.

Chapter 4: Preparatory Measures

This chapter deals with the preparatory measures to be taken by RCCs and RSCs and the state of preparedness of rescue units.

Each RCC and RSC must have available up-to-date information relating to its area, including details of available rescue units and coast watching units; its resources, such as transportation facilities and fuel supplies; means of communication, including names, cable and telex addresses; telephone and telex numbers of shipping agents, consular authorities, international organizations, and other agencies that may be able to assist in obtaining vital information on vessels; identities of maritime mobile service and other radio stations; and other information.

Each RCC and RSC should have ready access to all appropriate information concerning the vessels within its area which may be able to provide assistance to vessels or persons in distress at sea. Each RCC and RSC must have detailed plans or instructions for the conduct of search and rescue operations in its area. These should contain details concerning action to be taken by those engaged in SAR operations in the area. The chapter goes on to list those details which should be covered.

Chapter 5: Operating Procedures

Parties are required to ensure that continuous radio watches are maintained on international distress frequencies when this is considered practicable and necessary. Detailed requirements are given concerning the actions to be taken by coast radio stations which receive distress messages.

Any element of the search and rescue organization which has reason to believe that a ship is in a state of emergency should, as soon as possible, give all available information to the approporiate RCC or RSC. These in turn must evaluate this information and determine the emergency phase and the extent of search and rescue operation required.

For operational purposes, there are three emergency phases:

1. The **uncertainty phase**, when a vessel is overdue or has failed to make an expected position or safety report.

2. The **alert phase**, when attempts to contact the vessel and other inquiries have been unsuccessful or when information is received that the operating efficiency of the vessel is impaired but a distress situation is unlikely.

3. The **distress phase**, when positive information is received that a vessel or a person is in need of immediate assistance; or when further attempts to establish contact with the vessel have failed, and it appears likely that the vessel is in distress; or that the vessel's operating efficiency has been impaired to the extent that a distress situation is likely.

The chapter gives details of the procedure which must be followed in each of these phases.

Procedures are also outlined for the initiation of SAR operation for vessels whose position is unknown.

The chapter then deals with a number of other operational matters, including coordination when two or more Parties are involved; termination and suspension of SAR operations; on-scene coordination of SAR activities; designation of the on-scene commander and his responsibilities; designation of the coordinator for surface search and his responsibilities; and initial action and searches.

Chapter 6: Ship Reporting Systems

In view of the importance of ship reporting systems for search and rescue operations, the conference decided to include a chapter on this subject in the convention.

However, it would not be practical or necessary for each Party to establish such a system, and the provisions of this chapter are therefore only of a recommendatory nature.

The convention says that Parties should establish a ship reporting system within any search and rescue region for which they are responsible, where this is considered necessary and practicable for search and rescue purposes. Parties wishing to do so should take account of relevant IMO recommendations.

A ship reporting system should provide up-to-date information on the movements of vessels. During a distress incident, this could reduce the interval between loss of contact with a vessel and the initiation of search and rescue operations, permit rapid selection of vessels which are in a position to assist, limit the search area, and facilitate the provision of medical assistance or advice.

To achieve the above objectives, the ship reporting system should provide information which would make it possible to predict vessel movements, including sailing plans and position reports; maintain a shipping plot, receive periodic reports of participating vessels; be simple in design and operation; and use an internationally agreed standard ship reporting format and procedures.

A ship reporting system should incorporate the following reports, each containing the name and call sign or ship station identity:

- the sailing plan, giving the date, time, and point of departure, next port of call, intended route, speed, and expected date and time of arrival;

- the position report, with date, time, position, course, and speed; and

- the final report, giving date and time of arrival at destination or of leaving the area covered by the system.

Parties should encourage all vessels to participate in such ship reporting systems and should pass information on the position of vessels whenever requested for search and rescue purposes. To assist in establishing ship reporting systems, a resolution establishing general principles for them was adopted by the IMO Assembly in 1983.

The SAR conference also adopted eight resolutions as follows:

Arrangements for provision and coordination of SAR services. States are urged to coordinate all SAR services including those for aeronautical purposes. IMO is invited to continue to work closely with ICAO to harmonize aeronautical and maritime SAR plans and procedures.

Coast Guard personnel attempt to recover a pleasure boat just off the New York shore. (Official U.S. Coast Guard photo)

Cost to ships of participating in ship reporting systems. States are recommended to arrange for participation in such systems to be cost-free to the ships concerned.

Need for an internationally agreed format and procedure for ship reporting systems. The resolution invites IMO to develop an internationally agreed format for ship reporting systems using as a basis a format annexed to the resolution. Such a format was adopted by the 13th Assembly of IMO in November 1983 by Resolution A.531(13).

Search and rescue manuals. The resolution encourages the use of the MERSAR and IMOSAR manuals.

Frequencies for maritime search and rescue. The resolution urges the allocation of one frequency for use exclusively for distress and safety purposes in the 4, 6, 8, 12, and 16 MHz maritime mobile bands.

Development of a global maritime distress and safety system. IMO is invited to develop a global maritime telecommunications system for distress and safety purposes which will support the SAR plan prescribed in the convention.

Harmonization of SAR services with maritime meteorological services. IMO is invited to work closely with the World Meteorological Organization to explore the practicability of harmonizing the areas of maritime meteorological forecasts and warnings with SAR regions.

Promotion of technical cooperation. States are urged, in consultation with, and with the assistance of IMO, to support states requiring technical assistance for training personnel in SAR and for the acquisition of SAR equipment and the development of SAR facilities.

The Present Position

The entry into force of

the SAR Convention does not mean that a worldwide search and rescue system has immediately come into operation. The Convention does not provide a time schedule and does not stipulate any date on which the system should become operative. What it does is to describe the way in which an international SAR system and its component SAR areas should be established.

The world's oceans have been divided into 13 areas for search and rescue purposes, and in most of them, one or more countries have been designated to collect SAR information. The areas, collectors, and current status are shown in table 1.

It can be seen from this table that considerable progress has been made in virtually every region, with search and rescue plans already complete in a number of areas (particularly those where maritime traffic is greater than average). In some of these areas, plans have been drawn up by the countries in the region concerned, but IMO has played a significant part in developing plans in a number of areas.

In 1981 IMO, in coordination with the Economic Commission for Latin America, initiated a project to improve search and rescue services in the Caribbean. It began with a seminar held in Barbados in 1981 and was completed in April 1984 when delegates from 26 countries met in Caracas, Venezuela, and adopted a provisional maritime SAR plan for the Greater Caribbean Area.

IMO is also assisting countries in the Asia and Pacific region. A seminar and workshop held at Jakarta, Indonesia, in October 1984 considered various aspects of SAR

TABLE 1

Area and Collector of Information		ANNEX Status: Collection of Information	ANNEX Status: Provision of SAR Plans
1	North Atlantic (USA)	Substantially Complete	Substantially Complete
2	North Sea (UK)	Complete	Complete
3	Baltic Sea (Sweden)	Complete	Substantially Complete
4	Eastern South Atlantic (—)	Incomplete	None
5	Western South Atlantic (Argentina and Brazil)	Substantially Complete	None
6	Eastern North Pacific (USA)	Substantially Complete	Substantially Complete
7	Western North Pacific (Japan)	Substantially Complete	Progressed at Workshop in Jakarta, Indonesia, in October 1984
8	Eastern South Pacific (Chile)	Substantially Complete	None
9	Western South Pacific (New Zealand)	Incomplete	Progressed at Workshop in Jakarta, Indonesia, in October 1984
10	Indian Ocean (Australia)	Incomplete	Progressed at Workshop in Jakarta, Indonesia, in October 1984
11	Caribbean (—)	Substantially Complete	Substantially Complete
12a	Mediterranean (France)	Incomplete	None
12b	Black Sea (—)	Substantially Complete	None
13	Arctic Ocean	Complete	None

and prepared a draft provisional maritime SAR plan for the Asia and Pacific region. One of the resolutions adopted invited Governments to review a draft provisional maritime SAR plan which covers the Western North Pacific, Western South Pacific, and Indian Ocean SAR region, which will be finalized at a Final Regional Meeting in 1986.

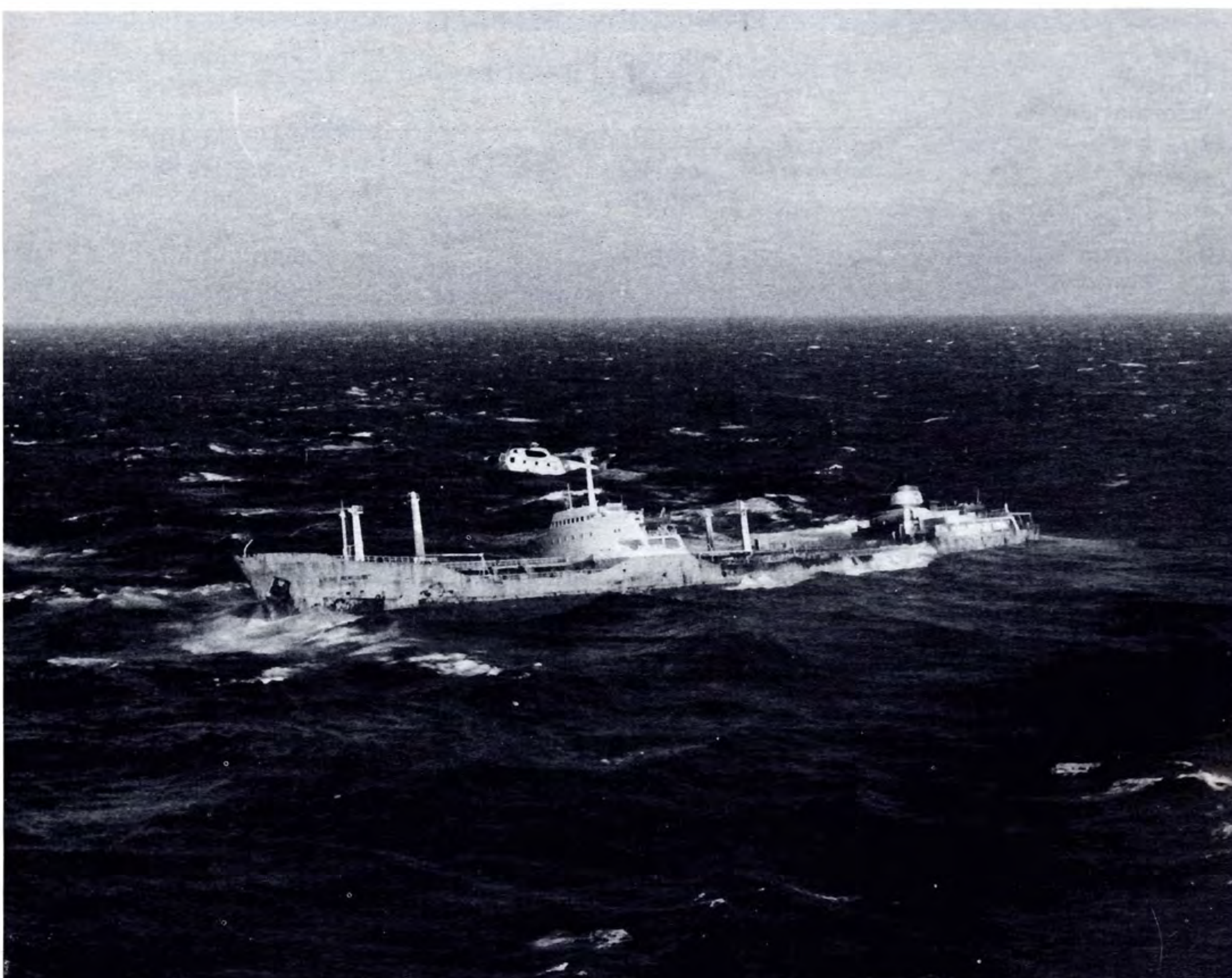
Conclusion

This article has described some of the steps IMO has taken to improve the prospects of survival of those who are involved in maritime casualties. The entry into force of the SAR Convention is another major contribution, and it will become increasingly important in the years to come as more and more countries ratify it and put its requirements into effect.

In the early 1990s, the Future Global Maritime Distress and Safety System will also be instituted (although some of its provisions might come into operation before that date). This will represent another major contribution to maritime safety by improving communications and reducing the delays in receiving distress messages and initiating rescue operations.

These IMO initiatives have received universal support from Member Governments of the Organization and other international and national bodies involved in SAR activities. This has also led to improvements in SAR operations in many areas, and the process is likely to continue in the years to come.

For the first time, the international maritime community has a common basis for SAR operations in the SAR Convention, and the technological advances now taking place in communications and other key areas offer tremendous opportunities for shipping in the future. ‡



The SS ARGO MERCHANT sank in international waters in 1976. (Official U.S. Coast Guard photo)

Watertight Doors -- Open or Closed?

On the evening of December 12, 1985, the river steamboat MISSISSIPPI QUEEN was involved in an accident about 70 miles up river from New Orleans. In the accident, the machinery space was holed, and it flooded within less than 10 minutes. At the time, 405 persons were on board. The MISSISSIPPI QUEEN is designed to withstand the flooding of a single compartment, but the machinery space is connected to an adjacent refrigeration machinery space by a watertight door. The preliminary investigation indicates this door was open at the time of the casualty. Fortunately, it was closed quickly by a crew member.

The MISSISSIPPI QUEEN made it to shore, and no lives were lost. However, if the single compartment damage had been greater, and if the flooding had been quicker, the crew member might have had to abandon his efforts to close the door. This could have caused the MISSISSIPPI QUEEN to sink within a very few minutes as in the case of the EUROPEAN GATEWAY's sinking. The EUROPEAN GATEWAY was a roll-on/roll-off vessel which flooded and sank off the coast of England several years ago because several of its watertight doors were open.

Since the original Safety of Life at Sea (SOLAS) Convention in 1929, many requirements have been adopted for passenger ships to remain afloat after flooding portions of the internal volume. Internal flooding is limited by requiring internal watertight barriers. The idea of openings in such barriers has been only reluctantly permitted by these coventions and other international agreements. All such openings must be provided with watertight doors. If they are not closed when an accident occurs, installing **watertight** doors is useless, and the ship and its passengers are unprotected.

During the past few years, several ships with watertight doors left open for easier ship operation have flooded. Some of these vessels sank, and some were saved by beaching. These casualties occurred worldwide. The International Maritime Organization is currently discussing a better international agreement on whether these doors should remain closed or whether there are certain instances in which these doors may remain open if fitted with bridge-controlled doors. Several alternatives are being discussed.

In North America, several instances of close calls because of open watertight doors have occurred recently. In addition to the MISSISSIPPI QUEEN discussed above, a small passenger vessel, SUNDANCER, traversing the west coast of Canada with overnight passengers, struck a rock. The bridge watch activated the automatic door-closing mechanisms, and all doors closed — except for one. This door operated, but it did not close completely. Investigators theorized that the door was jammed open by a piece of floating debris. Fortunately, the vessel was quickly beached, and there were no severe injuries. Open watertight doors also significantly contributed to the sinking of the tug MORTON S. BOUCHARD, JR. and the offshore supply vessel LAVERNE HEBERT.

The U.S. Coast Guard reminds all persons in the maritime industry that the watertight-boundary concept of limiting flooding is dependent on doors that remain closed at all times except when in actual use. It was to this end that the regulatory wording regarding watertight doors has remained conservative, cautioning designers to provide a "minimum" of openings and cautioning operators to keep the doors closed while the ship is not secured to a pier.

The wording of 46 CFR 78.15 is repeated here for emphasis:

78.15 -- Doors Closed at Sea
(a) All watertight doors in subdivision bulkheads shall be ***kept closed during navigation*** *except when necessarily opened for working of the vessel, . . .*

Note: "Opened for working" does not include routinely left open and then closed in an emergency. It means normally closed, opened only when specifically necessary, and then immediately closed as soon as each pass-through is completed.

Patrick S. Gardella

Pyridine

Pyridine is the parent of a series of compounds important in medicinal, agricultural, and industrial chemistry. The main use for the pure chemical is as a solvent. In the past, pyridine was used mainly as an antiseptic and as a treatment for asthma, but this practice ended when the chemical's harmful effects to humans became known.

Pyridine is normally a slightly yellow or colorless liquid, and its main characteristic is its disagreeable odor. Pyridine can be detected by smell in a quantity as small as 0.012 parts per million. It may also be identified by its very sharp taste, although this test is **not** recommended. Almost all simple pyridine compounds are basic, as is pure pyridine. Pyridine is not found naturally in its pure state and must be isolated from coal or coal tar.

Pyridine is generally shipped in its liquid form, and the most common means of transportation is by multimodal tank transport. It is also shipped in drums and in bulk on parcel tankers. Since pyridine is an excellent solvent, this aspect should be considered when gaskets, O-rings, and other sealants will be in contact with the liquid. Usually, PTFE (polytetrafluoroethylene, Teflon), graphite, and asbestos-based gaskets are used.

In its pure form, pyridine is highly reactive. It will react violently with nitrogen tetroxide (N_2O_4) and will incandesce when contacted with fluorine. It may be combined with other chemicals to form literally thousands of compounds. It is miscible in all proportions in water but is volatile in steam.

When pyridine vapor is inhaled, it will cause respiratory irritation and may cause headache, nausea, giddiness, and vomiting. It has caused conjunctivitis when in contact with the eyes. Dermatitis has resulted from skin contact. If the liquid is taken by mouth, it affects the central nervous system, and if large enough doses are taken, it will act as a heart poison. Death has occurred in laboratory rats when doses of 4,000 parts per million per hour are inhaled or when 891 mg/kg of body weight is taken orally.

First aid for accidental exposure follows standard procedures. For skin contact, the contaminated areas should be rinsed with large quantities of water. For eye contact, the eyes should be flushed with water continuously for 15 minutes. In cases of ingestion, contact the Poison Control Center as quickly as possible for directions. If this is impossible or impractical, you should induce vomiting in a conscious victim. (Unconscious victims should never be made to vomit.) The victim should be brought into fresh air and given artificial respiration or oxygen, if necessary. As with all poisonings, seek medical attention immediately.

Pyridine fires should be extinguished with alcohol foam, dry chemicals, or CO_2. Steam must not be used to extinguish the fire as it may cause an explosion. To prevent explosions or additional fires, the storage tanks must be kept cool with a constant spray of water. Firefighters should be provided with a self-contained breathing apparatus and gloves.

Care should be exercised in case of accidental leakage. Any leakages or spills should be isolated and shut off. After clearing all personnel from the area, clean-up workers should cover the spill with a sand and soda ash mixture (90-10) or flush the area with plenty of water to dilute the pyridine. This area should be ventilated to evaporate any remaining liquid and to dispel any vapors. Clean-up workers should also be provided with a self-contained breathing apparatus and gloves to prevent unnecessary contact. ‡

Patrick S. Gardella was a Fourth-Class Cadet at the U.S. Coast Guard Academy at the time this article was written. It was written under the direction of LCDR J.J. Kichner for a class on hazardous materials transportation.

Chemical name:	Pyridine
Formula:	C_5H_5N
Synonyms:	azabenzene azine NCL-C55301
Physical Properties:	
boiling point:	115.3°C (239°F)
freezing point:	-42°C (-43.6°F)
vapor pressure:	
20°C (68°F)	18 mm/Hg
46°C (115°F)	1.3 psia
Threshold Limit Values (TLV)	
time-weighted average:	5 ppm; 15 mg/m^3
Flammability Limits in Air	
lower flammability limit:	1.8% by vol.
upper flammability limit:	12.4% by vol.
Combustion Properties	
flash point (c.c.):	20°C (68°F)
autoignition temperature:	482°C (900°F)
Densities	
vapor (air=1):	2.72
specific gravity (at 25°C):	0.9780
density (at 20°C):	0.9830
Identifiers	
U.N. Number:	1282
CHRIS Code:	PRD
Cargo compatibility group:	9 (Aromatic Amines)

Hazardous Chemical Guide Out of Stock

In the February 1986 issue of **Proceedings,** we informed our readers that the Hazardous Chemical Data Manual (CHRIS Manual II) was available for purchase through the Government Printing Office. Unfortunately, we were not aware that only a limited number of manuals were printed, and the existing copies were sold out almost immediately.

Problems in the publication process have delayed the next printing of the Manual; however, additional copies should be ready by late May or early June 1986. **The Proceedings** will publish another notice when these copies are available for sale.

We apologize to our readers for this inconvenience. ⚓

Nautical Queries

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

ENGINEER

1. In the operation of a marine main propulsion boiler, which end point is likely to be reached first?

A. Moisture carryover
B. Combustion
C. Water circulation
D. Steam flow

Reference: Latham, Introduction to Marine Engineering

2. A boiler brought from full load to partial load will always require

A. larger burner sprayer plates.
B. an increase in the percentage of excess air.
C. a decrease by 25% in the number of operating burners.
D. a smaller burner diffuser.

Reference: Babcock and Wilcox, Steam: Its Generation and Use

3. When renewing sections of pipe in a hydraulic system, the nominal pipe size as denoted on a piping diagram always indicates the

A. actual inside diameter.
B. actual outside diameter.
C. wall thickness.
D. thread size for connections.

Reference: Sperry-Vickers, Industrial Hydraulics Manual 935100-A; NAVPERS 16193-B, Fluid Power

4. A vessel's immediate protection in the event of a broken stern tube is which bulkhead?

A. Aft collision
B. Stern frame
C. After peak
D. Aft machinery space WT

Reference: Baker, Introduction to Steel Shipbuilding; American Bureau of Shipping, Rules for Building and Classing Steel Vessels

5. In a refrigeration system, the heat which normally produces the flash gas at the thermostatic expansion valve comes from

A. the hot gas bypass connection.
B. the portion of liquid refrigerant which does not flash.
C. exposure to the relatively high ambient temperature within the coil.
D. exposure to the relatively high ambient temperature of the space to be cooled.

Reference: NAVPERS 10788, Principles of Naval Engineering

DECK

1. When carrying asphalt, one of the biggest dangers is

A. water in the tanks or pipelines.
B. having the asphalt too hot.
C. explosion of vapors after discharge.
D. having to breathe the fumes.

Reference: Baptist, Tanker Handbook for Deck Officers

2. A 6 x 19 wire rope would be

A. six (6) inches in diameter with nineteen (19) strands.
B. six (6) inches in circumference with nineteen (19) strands.
C. six (6) strands with nineteen (19) wires in each strand.
D. nineteen (19) strands with six (6) wires in each strand.

Reference: American Merchant Seaman's Manual

3. The datum from which the predicted heights of tides are reckoned in the Tide Tables is

A. mean low water.
B. the same as that used for the charts of the locality.
C. the highest possible level.
D. given in table three of the Tide Tables.

Reference: American Practical Navigator

4. Lines drawn through points on the earth having the same atmospheric pressure are known as

A. isothermals.
B. millibars.
C. isobars.
D. seismics.

Reference: Donn, Meteorology

5. The gnomonic chart can be used for which of the following purposes?

I. To determine the great circle course between two points.
II. To measure the great circle distance between two points.

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

Reference: American Practical Navigator

ANSWERS

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

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

LESSONS FROM CASUALTIES

continued from page 72

As a result of the SCANDINAVIAN SEA and SCANDINAVIAN SUN casualties, the Coast Guard Captains of the Port are working with local shipping representatives, port authorities, and response organizations to develop emergency response, accountability, and evacuation procedures for passenger vessels using their ports. One immediate result is that the Marine Safety Office in Jacksonville now invites the port authority fire personnel to accompany them when conducting Control Verification examinations. This allows the firefighting personnel to become familiar with the vessel's arrangement under "normal" conditions, as opposed to going aboard a vessel for the first time during a fire.

Notice of Proposed Rulemaking

CGD 84-069a — Lifesaving Equipment; Immersion Suits — (February 4)

The Coast Guard proposes to revise the specifications for approval of exposure suits. Currently approved exposure suits will be phased out and suits meeting the new standards will be assured of international marketability and acceptance. Comments on this proposal must be received on or before May 5, 1986.

CGD 85-026 — Pollution Prevention; Implementation of Amendments to MARPOL 73/8 — (February 7)

The Coast Guard proposes to amend the oil pollution prevention regulations for ships in order to implement the amendments and interpretations to Annex I of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) that were adopted at the 20th Session of the Marine Environment Protection Committee (MEPC) of the International Maritime Organization and correct the MARPOL 73/78 implementing the final rulemaking of October 6, 1983. (48 FR 45704) Comments must be received by March 24, 1986. (51 FR 4768)

CGD 79-059 — Offshore Cranes — (February 14)

The Coast Guard is proposing to issue regulations concerning offshore crane design standards and operations on Outer Continental Shelf facilities, on deepwater ports, and on mobile offshore drilling units. These proposals are intended to reduce the degree of hazard associated with crane operations. Comments must be received on or before June 16. 1986. (51 FR 5547)

Supplemental Notice of Proposed Rulemaking

CGD 83-013 — Carriage and the Use of Liquefied and Non-Liquefied Flammable Gas as Cooking Fuels on Vessels Carrying Passengers For Hire — (February 6)

Coast Guard regulations currently prohibit the carriage and use of liquefied and non-liquefied flammable gas as ships' stores on vessels carrying passengers for hire. The Coast Guard published proposed rules in the March 22, 1984, Federal Register (49 FR 10685) which would have removed this prohibition as it pertains to cooking appliances and promulgated standards to govern the design, installation, and testing of cooking appliances using these fuels. The purpose of this supplemental proposed rule is to allow for further comment before publication as a final rule because of the substantive changes made to the initial proposal as a result of the comments received. Comments must be received on or before May 7, 1986.

Withdrawal of Notice of Proposed Rulemaking

CGD 79-160 — Lifesaving Equipment; Line-Throwing Appliances, Required Equipment on Merchant Vessels — (February 18)

This rule dealt with the requirements for line-throwing appliances for vessels on other than international voyages. It is being withdrawn because many of its provisions are covered by other rulemaking proposals, and a reevaluation of the remaining provisions revealed inappropriate regulations from a safety standpoint.

Proposed Rule

CGD 79-168	Lifesaving Equipment; Launching	(February 13)

The Coast Guard proposes to adopt specifications for approving liferaft launching devices and automatic disengaging devices. This equipment is often used to lower liferafts from vessels with high freeboard, and its use is required on mobile offshore drilling units and deepwater ports. Most of the standards and tests in these specifications have been applied as guidelines for several years in approving liferaft launching equipment. Comments on this proposal must be received on or before May 14, 1986. (51 FR 5377)

Final Rule

CGD 78-174A	Hybrid PFD Carriage Requirements (Two Documents)	(February 4)

(First document): These rules authorize carriage of hybrid inflatable personal flotation devices (hybrid PFDs) on recreational boats and on Outer Continental Shelf facilities and establish conditions for their use. These rules become effective on August 4, 1986. (Second document): These rules authorize the carriage of commercial hybrid PFDs in place of life preservers on uninspected commercial vessels and as work vests on certain inspected commercial vessels. These rules become effective on March 6, 1986.

Requests for copies of NPRMs should be directed to the Marine Safety Council. The address is Commandant (G-CMC), U.S. Coast Guard, 2100 Second Street, SW. Washington, DC 20593; telephone (202) 426-1477. The office, Room 2110, is open between the hours of 9:00 a.m. and 4:00 p.m. Monday through Friday. Comments are available for inspection or copying during those hours.

Carnegie Hero Medals Awarded Posthumously

Two Carnegie Hero Medals were recently awarded posthumously to Captain William A. Fournier and Seaman Daniel J. Govoni by the Carnegie Hero Fund Commission. The medallions are awarded annually by the commission, citing the heroic actions of one individual to save another's life.

Captain Fournier and Mr. Govoni were awarded the bronze medals for their actions on April 11, 1985, to rescue fellow crew member Richard Lisa, who was trapped in an oxygen-deficient hold of a barge owned by Penobscot Bay Towing Company of Belfast, Maine. Mr. Lisa survived the barge accident, but his two 20-year-old rescuers suffocated and drowned in 2 feet of bilge water in the hold. The men were part of a crew working aboard tugs and barges at the Penobscot Bay Towing Company, a subsidiary of Fournier Marine Corporation.

According to Walter Rutkowski, assistant secretary for the Carnegie Commission, a $2,500 honorarium was presented to the families of Captain Fournier and Mr. Govoni along with their medals. ‡

*Reprinted from the February 1, 1986, issue of **Maritime Reporter and Engineering News.***

***Proceedings** readers from outside the Coast Guard are invited to submit articles for publication in future issues. Articles should deal with maritime safety topics and should be approximately 10 pages (double-spaced) in length. If possible, please submit illustrations or photographs (either black and white or color) with your articles. We cannot accept slides for publication.*

*If you have questions about submitting an article, please contact **Proceedings** Magazine, U.S. Coast Guard (G-CMC), 2100 Second St., SW, Washington, DC 20593; or call Mrs. Sharon Chapman at (202) 426-1477 between 8:30 a.m. and 4:00 p.m. Monday through Friday.* ‡