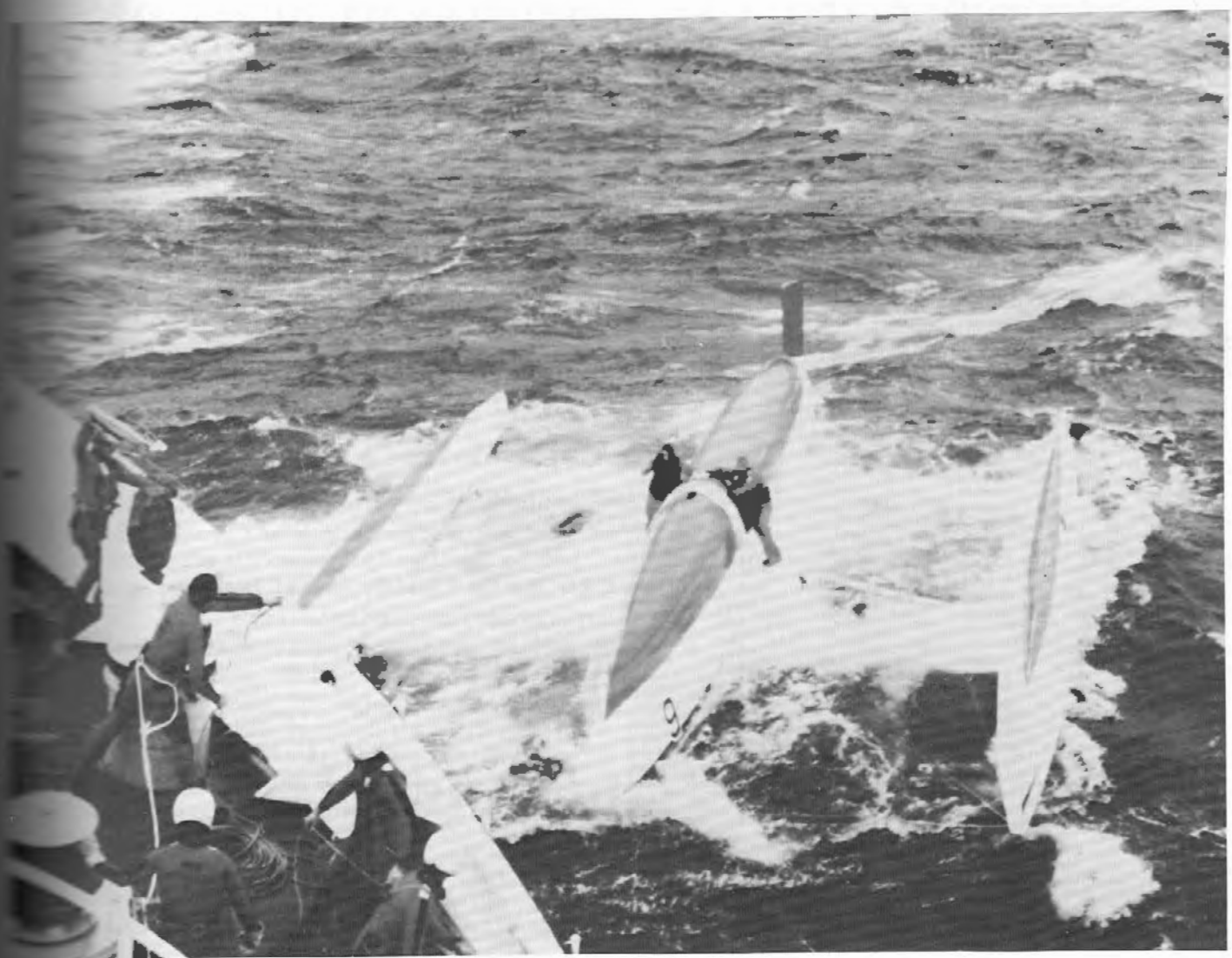
Proceedings

of the Marine Safety Council



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

Contents

Features

Departments

Cover

Coast Guardsmen extend a line to three sailors of a trimaran that capsized 300 miles east of Cape Cod. The distress signal from the boat's Emergency Locator Transmitter was picked up by a Soviet search-and-rescue satellite. For more on the role of satellites in search and rescue, see "Rescues from Outer Space," beginning on page 151.

Modeling Hazardous Chemical Accidents

The Coast Guard's Hazard Assessment Computer System (HACS) contains all of the data necessary to permit hazard assessments for over 900 commonly shipped chemicals. The National Response Center run by the Coast Guard routinely uses HACS to simulate the behavior of hazardous materials when released into bodies of water.

Recently the Coast Guard's Office of Research and Development and Southwest Research Institute (SwRI), of San Antonio, Texas, completed a project to improve a HACS computer program known as the "Mixing and Dilution Model."

The Mixing and Dilution Model predicts what will happen to the concentration levels of soluble chemicals following the release of the chemicals into various types of bodies of water. The Coast Guard/SwRI study verified this model with experiments and also upgraded it by giving it additional capabilities. The new model can take into account the density of floating and sinking chemicals, project the behavior of chemicals in the constantly changing environment of tidal rivers, and determine the effect of evaporation on the mixing and dilution of volatile, buoyant chemicals.

The model's predictions were compared to the results of tests conducted in a large, rectangular flow channel. A wide range of chemical densities, spill rates, spill volumes, and river speeds was simulated. Agreement between the predictions and the test results was generally good.

The Office of Research and Development will test predictions from the revised and verified Mixing and Dilution Model against data from actual spill accidents on its in-house computer before incorporating the model into HACS.

The final report on the project, "Analytical and Experimental Study to Improve Computer Models for Mixing and Dilution of Soluble Hazardous Chemicals," is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161. Orders should specify Coast Guard Report No. CG-D-1-83, Accession No. AD A125-649. A companion volume of test data (Coast Guard Report No. CG-D-2-83, Accession No. AD A126—005) is also available. ‡

Coast Guard project officer studies simulated chemical dispersion in a laboratory test tank.

What do we do first?

In an accident involving a hazardous material, wasted minutes could mean the difference between life and death. Two guides from the International Maritime Organization can eliminate the uncertainty which can get in the way of quick action.

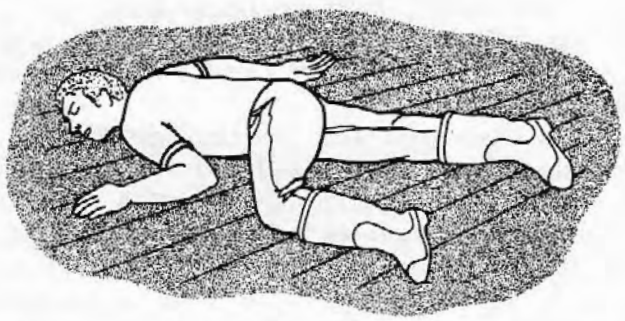
by LT John P. Aherne
Cargo and Hazards Branch
Marine Technical and Hazardous Materials Division

A crewman on a cargo vessel has just lost consciousness. Before passing out, he complained that he was having trouble breathing.

The master quickly checks the dangerous cargo manifest and determines that the only hazardous material the ship is carrying is acrylonitrile. He sends a crew member, outfitted with protective clothing and a breathing apparatus, to check the cargo hold. The crew member confirms the master's suspicions: one of the 55-gallon drums of acrylonitrile is leaking.

Breathing and Unconscious

– Place the victim in the unconscious position



Turn casualty face down, head to one side or other as pictured (NOTE: no pillows should be used under the head). Now pull up the leg and the arm on the side to which the head is facing. Then pull up the chin. Stretch the other arm out as pictured.

The master's knowledge of acrylonitrile is sketchy. He has an unconscious crewman and a leaking drum on his hands that require immediate action. What should he do?

Readers of the *Proceedings* are probably familiar with the Department of Transportation emergency response guidebook. There are also two publications issued by the International Maritime Organization (IMO) that can help a master in such a situation: the *Emergency Procedures for Ships Carrying Dangerous Goods* and the *Medical First Aid Guide for Use in Accidents involving Dangerous Goods.* These two volumes are designed to be used with the index of the International Maritime Dangerous Goods (IMDG) Code.

The master opens his index to the entry for acrylonitrile and learns that he should refer to Emergency Schedule 3-02 of the *Emergency Procedures* and Table 225 of the *Medical First Aid Guide.* (The *Medical First Aid Guide* was still undergoing revision as this issue went to press, and table numbers may have changed by the time of the final printing.)

His first concern is the unconscious crewman. Table 225 tells him that cyanides and nitriles are extremely toxic and that, if exposure occurs, death may occur very rapidly. He has someone radio for medical advice as he continues to look at the table. After checking for symptoms of skin and eye contact and talking with some of the

TABLE 225

CYANIDES AND NITRILES

General Information

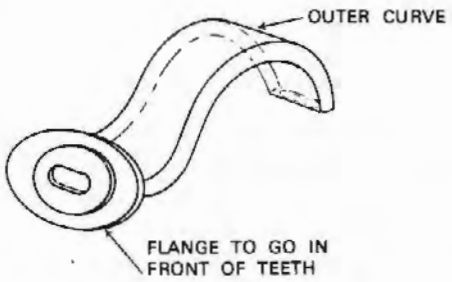
These chemicals are extremely toxic. They are generally toxic to the whole body. If exposure occurs, treatment must be given **immediately**, since death may occur very rapidly. Nitriles contain Cyanide and therefore act in the same way. If Inorganic cyanides are brought into contact with acids, Hydrogen cyanide is produced (Table 645).

RADIO FOR MEDICAL ADVICE.

SIGNS AND SYMPTOMS	TREATMENT
Skin Contact There may be irritation and pain. Chemical burns can occur. These chemicals are absorbed through the intact skin, producing similar signs to those of inhalation and ingestion (see below).	**Skin Contact** Emergency Treatment: see 8.1. If general symptoms occur, treat as for inhalation and ingestion below.
Eye Contact There may be irritation and redness. Chemical burns can occur.	**Eye Contact** Emergency Treatment: see 8.2.
Inhalation and Ingestion There may be chest pain with shortness of breath, anxiety and rapid loss of consciousness. Convulsions may occur and in severe cases death can occur within 30 minutes. The patient may have a smell of bitter almonds on his breath.	**Inhalation and Ingestion** **IMMEDIATE ACTION IS REQUIRED.** **If the patient is conscious**, he should be placed flat on his back, and rest quietly under supervision. **If the patient is unconscious**, place in the unconscious position and insert a Guedel airway (see 5.4). Start artificial respiretion by the Silvester method and heart compression if breathing has stopped and the pulse cannot be felt. If the breathing and pulse are present, break an ampoule of amyl nitrite 0.17 mg into a handkerchief or cloth, and hold under the casualty's nose so that he inhales the vapour. This should be repeated with a further ampoule at 3 minute intervals, using up to 5 ampoules. Emergency Treatment: see 8.3 and 8.4. Convulsions: see 6.3.2.

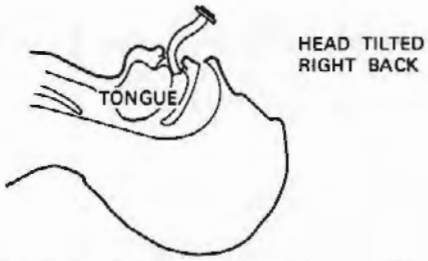
5.4 INSERTION OF GUEDEL AIRWAY

This airway is for use in an unconscious patient who is breathing on his own, but with great difficulty. The function of the airway is to ensure a clear passage between the lips and the back of the throat.



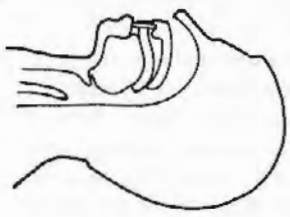
First remove any dentures and suck or swab out any blood or vomit which is in the mouth in order to clear the air passage. Then, with the head fully back, slide the airway gently into the mouth with the outer curve of the airway towards the tongue. This operation will be easier if the airway is wetted.

If there is any attempt by the patient to gag, retch or vomit, it is better not to proceed with the insertion of the airway. If necessary, try again later to insert it.



Continue to slide the airway in until the flange of the airway reaches the lips. Then, rotate the airway through 180° so that the outer curve is towards the roof of the mouth.

Bring the jaw upwards and push the airway in until the flange at the end of the airway is outside the teeth (or gums) and inside the lips. If necessary tape one or both lips so that the end of the airway is not covered by them.



Check now that the casualty's breath is coming through the airway. Continue to keep the jaws upwards and the head fully back so that the airway will be held in place by the teeth or gums and by its shape.

As the patient regains consciousness, he will spit out the airway.

He should remain in the unconscious position under constant observation until he is *fully* conscious. If he relapses into unconsciousness it may be necessary to reinsert the airway if breathing is still difficult.

other crewmen, the master determines that the crewman is suffering from inhalation exposure only. He directs the mate to place the man in the "unconscious position." Since the man is having trouble breathing, the mate follows the instructions and illustrations in section 5.4 for inserting a Guedel airway. Artificial respiration and heart compression are not necessary in the crewman's case. The mate holds amyl nitrite under the crewman's nose as directed. The master has a second crew member check the other emergency treatment sections to make sure everything necessary is being done for an unconscious, still-breathing victim of inhalation exposure. The medical advice received over the radio confirms that the ship's crew is handling the emergency correctly.

The master next looks to the emergency schedule to find out how to deal with the spill. The proper procedures and action for acrylonitrile are shown in the schedule reproduced on the opposite page. The master assembles a team of crewmen to stop and clean up the leakage. He tells them to don protective gloves, boots, coveralls, and headgear as well as self-contained breathing apparatuses. Since the spillage is below deck, he instructs them to ensure that "adequate ventilation" is provided and collect the spillage, using absorbent material, for safe disposal. They should take special care to make sure no sources of ignition are present.

By following the instructions given in the two IMO manuals, the master

averts a potential disaster.

In addition to the chemical tables, the *Medical First Aid Guide for Use In Accidents involving Dangerous Goods* has a general introductory section on medical advice for ships carrying hazardous chemicals. It also has sections on first aid, poisoning, general toxic hazards, and emergency treatment. *Emergency Procedures for Ships Carrying Dangerous Goods* has an introductory section covering special equipment to be carried on vessels, preparations to be carried out by the emergency team, emergency action, and the different classes of substances.

Both of these publications can be ordered directly from IMO, Publications Section, 4 Albert Embankment, London SE1 7SR. Payment must be enclosed. The English-language edition of the medical guide, Sales No. 251.82.17.E, costs £ 3.75. The English-language edition of the emergency schedules, Sales No. 81.18.E, costs £ 3.75. The publications are also available from the following U.S. distributors:

Labelmaster
5724 North Pulaski Road
Chicago, IL 60646
Tel.: 1-800-621-5808

New York Nautical Instrument and Service Corporation
140 West Broadway
New York, NY 10013
Tel.: (212) 962-4522

Southwest Instrument Company
235 West 7th Street
San Pedro, CA 90731
Tel.: (213) 519-7800

The volumes cost approximately $10 each. Interested persons should call the distributors to find out exact prices and postage and handling charges.

It should be stressed once again that the two publications were set up to be used with the index to the IMDG Code. It is not necessary to buy the entire Code; the index alone can be purchased from the just-named distributors. ↕

EMERGENCY SCHEDULE 3-02

1 CLASS 3.1 INFLAMMABLE LIQUIDS, FLASHPOINT BELOW −18°C c.c., TOXIC AND/OR CORROSIVE; MISCIBLE WITH WATER*
2 CLASS 3.2 INFLAMMABLE LIQUIDS, FLASHPOINT −18°C TO 23°C c.c., TOXIC AND/OR CORROSIVE; MISCIBLE WITH WATER*
3 CLASS 3.3 INFLAMMABLE LIQUIDS, FLASHPOINT 23°C TO 61°C c.c., TOXIC AND/OR CORROSIVE, MISCIBLE WITH WATER*

Special Emergency Equipment to be carried

Protective clothing (gloves, boots, coveralls, headgear).
Self-contained breathing apparatus.
Spray nozzles.

EMERGENCY PROCEDURES

Wear protective clothing and self-contained breathing apparatus when dealing with SPILLAGE or FIRE.

EMERGENCY ACTION

Avoid all sources of ignition (e.g. naked lights, unprotected light bulbs, electric handtools). Turn ship off wind.

	On deck	*Under deck*
SPILLAGE	Wash spillage overboard with copious quantities of water.	Provide adequate ventilation. Collect spillage, where practicable, using absorbent material, for safe disposal.
FIRE	Use water spray, or dry chemical. Do *NOT* use water jet or foam. If possible remove receptacles likely to be involved or keep them cool with copious quantities of water.	Batten down; use ship's fixed fire-fighting installation. Otherwise adopt action as for "on deck".

First Aid — See IMCO Medical First Aid Guide (MFAG)

UN No.	Substance or Article	Remarks
2029	HYDRAZINE, ANHYDROUS or HYDRAZINE AQUEOUS SOLUTIONS . . .	Possible self-ignition at ambient temperatures

* Include substances which are partially miscible with water.

Is Your Port Prepared for a Major Marine Fire?

The M/V GOLDEN OPPORTUNITY was a clean ship, not one of the many grimy vessels we all read about. It had been built in Japan seven years ago to carry a cargo of a thousand-odd containers and had been traveling to Atlantic coast ports ever since. As it lay alongside Norfolk International Terminals, no one suspected that the GOLDEN OPPORTUNITY was a disaster waiting to befall the Port of Hampton Roads.

by LCDR J. H. B. Morton
Assistant Port Operations Officer
Marine Safety Office
Hampton Roads, Virginia

The M/V GOLDEN OPPORTUNITY's dangerous cargo manifest was spread neatly on the desk of the chief mate, awaiting confirmation of the day's moves from the ship's agent. Contained in the list were numerous containers of materials classed as flammable liquids, corrosives, poisons, and oxidizers.

The cook was in the galley preparing homemade pastry for breakfast. The thermostat switch on his deep-fat fryer hadn't been working right lately. Knowing the pastry wouldn't cook if the oil weren't hot enough, he pushed the switch to its maximum setting, making a mental note to mention the matter to the ship's electrician. He had been so busy lately that he had really not been able to attend to all his duties. Another thing he had overlooked recently was having someone clean the vent hood over the deep-fat fryer. That oversight, plus several contributing actions, would definitely have an impact on the events of his day.

As the heat of the oil in the fryer increased, the cook remembered some items he'd forgotten to take out for breakfast. He went off to get them, leaving the fryer unattended. As the oil became hotter, it began to bubble and spatter over the cooking area. In only a few minutes, the oil in the fryer reached its autoignition temperature. Suddenly, the whole area was covered with flames. The fire quickly spread over the counter and deck area, as the oil in the fryer splattered out. The oily vent hood over the fryer soon caught fire, and the flames began to travel up the vent to other areas of the ship. Although the fusible link in the overhead vent melted as it was designed to, the fire damper failed to close properly, and the flames continued to move up the ventilation trunk.

As the alarms began to sound, first on the GOLDEN OPPORTUNITY, then on the marine facility, and, finally, in the local fire department, the need for a coordinated response effort became readily apparent. Communication networks needed to be activated, specialized equipment located and mobilized, and an effective command post set up at the scene. The time to plan for such an incident had just passed.

While the scenario described above is fictitious, it is realistic enough to illustrate how vulnerable our ports are to a severe marine fire. The port of Hampton Roads, Virginia, has recognized the seriousness of this threat and, through the cooperative efforts of local, state, and Federal government agencies and commercial enterprises, assembled an extensive marine firefighting contingency plan. This plan coordinates the response by all agencies to fire threats within the port. For the purposes of this plan, a marine disaster has been defined as any emergency that poses a threat to the harbor's facilities or vessels because of fire or the potential for fire.

Combating major marine disasters requires expertise, equipment, and manpower. However, none of these can be effectively put into play unless efforts are coordinated. Unless we know in advance what steps we are going to take, the potential for destruction of facilities and vessels in a port area is great. There is also a strong possibility of unwarranted injury or loss of personnel.

The Hampton Roads Marine Firefighting Contingency Plan serves as a master mutual-assistance agreement for the organizations in Virginia's Tidewater area. It sets forth the reponsibilities and jurisdictional areas of each agency involved. It also lists locations of and means of access to marine facilities, identifies specialized firefighting equipment, and describes in detail how to set up and man an on-scene command post.

In developing this plan, the local organizations touched on several important points. Of particular note was clarification of the role of the U.S. Coast Guard. Too often, it is assumed that the Coast Guard, as the Federal government's lead maritime agency, is also a port's chief marine firefighter. Firefighting is not, by law, the responsibility of the Coast Guard, although the Coast Guard does have limited resources for coping with its own firefighting needs. The Hampton Roads contingency plan clearly defines the role of the U.S. Coast Guard Captain of the Port. He is charged with enforcing applicable Coast Guard regulations and acting to ensure the safety of the harbor, its facilities, and vessels. The Captain of the Port can be regarded as the final on-scene authority in marine disasters. The extent to which he exercises his authority depends on a number of factors, primarily the nature of the incident and the degree of danger it poses to the port.

Shoreside and port firefighters from the New Orleans area were called in to fight the fires resulting from a 1974 collision between the M/V KEY TRADER and the S/S BAUNE.

The suggested outline for a command-post set-up includes who should be there, what their responsibilities are, and how the post can be best employed to combat a major marine disaster. The command post should include the fire chief, the vessel master/terminal manager, the Coast Guard Captain of the Port or his representative, a marine chemist, a communications officer, a logistics officer, and a naval architect or ship's salvage expert. Additionally, consideration should be given to having on hand a telephone company representative (to assist with setting up outside communications), an electric company representative, a U.S. Army Corps of Engineers representative, and, lastly, as the situation requires, a translator (to assist in communicating with a foreign vessel's crew and officers).

The command post atmosphere must be conducive to planning for and reacting to emergencies. The fire department must be able to coordinate its efforts with the ship's master (in the case of a vessel fire) or with the terminal manager (in the case of a fire in a marine facility). The master or manager must have detailed information available on the layout of the vessel or facility and must be able to communicate easily with the firefighters and all support factions.

The contingency plan lists several suitable embarkation points for staging and transferring equipment and men to fight harbor fires. It also contains a list of alternative firefighting sites, such as suitable piers or anchorages where a vessel might be better positioned during firefighting efforts.

The last section of the plan consists of a list of specialized firefighting equipment available in the Hampton Roads area and a list of marine facilities and their 24-hour phone numbers. The plan also includes information on how to access the Tidewater Red Cross Language Center, which has a listing of persons in the area who are fluent in various languages and may be helpful in bridging a language gap.

The contingency plan is only one part of the overall firefighting effort. The Hampton Roads group also developed a User's Guide to inform marine facility operators, shipping agents, and vessel operators of what should be done to notify agencies of a fire emergency and what information is of initial importance. The guide also details what steps should be taken when

the fire occurs.

Also, the group recognized that its organizational efforts had to be accompanied by a training program. Training, in cooperation with the National Fire Academy and the Commonwealth of Virginia's Department of Fire Programs, is to begin this month. The program has been broken down into two areas: one for command personnel and the other for fire-suppression personnel. Each program is five days long and includes two days of hands-on training. Outside experts will be heavily involved in teaching and certifying student performance, and the firefighters will tour a variety of vessels to familiarize themselves with portable and fixed shipboard systems. This training will be evaluated through command post exercises and an annual drill involving the complete plan.

The CV SEA WITCH burns in New York Harbor after a collision with the ESSO BRUSSELS.

The local, state, and Federal agencies and the commercial enterprises whose cooperative efforts have made this contingency plan and training possible feel strongly that their efforts will be effective in combating a major marine disaster. Is your port prepared to contend with a major marine fire?

Copies of the Hampton Roads Marine Firefighting Contingency Plan are available from LCDR J. H. B. Morton, USCG MSO Hampton Roads, Norfolk Federal Building, 200 Granby Mall, Norfolk, Virginia 23510. ‡

NVIC Update

Thus far in 1983, the Coast Guard has published the following Navigation and Vessel Inspection Circulars:

NVIC No.	Name of NVIC	Price
1-83	Painters for Life Floats and Buoyant Apparatus	$2.50
2-83	Smith & Wesson Line Thrower Rockets	$1.75
3-83	Voluntary Qualifications for U.S. Merchant Marine Entry Ratings	$1.50
4-83	Guidelines Governing the Use of Reinforced Thermosetting Resin Pipe (RTRP) on Coast Guard Inspected Vessels	$2.00
5-83	Unified Interpretations of the International Convention on Load Lines, 1966	$3.00

NVIC orders should be directed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. A check or money order payable to "Superintendent of Documents, Government Printing Office" should be enclosed with each order. ‡

Rescues from Outer Space

by LCDR Jerry L. Millsaps
Sensor Technology Branch
Office of Research and Development

At first glance, a satellite orbiting the earth at an altitude of 600 miles and a speed of 25,000 miles per hour might seem an unlikely source of help to people in distress. But SARSAT, the centerpiece of a project in the Coast Guard's Office of Research and Development, is exactly that.

SARSAT is an acronym standing for "Search and Rescue Satellite Aided Tracking." Although still under development, this program has already been credited with assisting in the saving of 42 lives. One example:

At 3 a.m. on Sunday, November 8, 1982, five Americans in a small sailing vessel struck a reef and capsized in the Caribbean Sea north of Puerto Rico. A Soviet satellite detected the vessel's EPIRB signal on one of its passes and relayed it to a ground station, which, in turn, notified the Coast Guard. A helicopter was sent to the area, picked up the EPIRB signal, and, at 2 p.m., lifted the five sailors to safety. They were found within 10 miles of the position indicated by the satellite. The Coast Guard confirmed that the satellite alert and location provided the only data used in this rescue. There were almost no overflying aircraft in this very remote area, and it is likely that without the satellite data the EPIRB batteries would have been exhausted before the survivors were detected.

This article tells the SARSAT story and examines the role that pilots and mariners must play to make SARSAT a success.

The Search and Rescue Problem

In 1970 Congress passed a law requiring general aviation aircraft to carry an Emergency Locator Transmitter (ELT) that would automatically emit a signal under the typical stresses of an accident.

In 1972, on the recommendation of the National Transportation Safety Board, the Coast Guard promulgated a regulation requiring oceangoing vessels to carry an Emergency Position-Indicating Radio Beacon (EPIRB) that could be activated either manually or by immersion in water.

ELTs and EPIRBs thus emerged as distress-alerting devices. These small, lightweight, shock-resistant, self-energizing beacons are capable of 48 hours of continuous broadcasting on the 121.5 and 243 MHz channels reserved worldwide for aeronautical and maritime distress calls. More than a quarter of a million aircraft and ships of several nations now carry ELTs and EPIRBs.

However, for a distress transmitter to be successful, its transmitted signal must be received. International Civil Aviation Organiza-

tion (ICAO) regulations require that aircraft making long flights over water monitor for EPIRB transmissions from oceangoing vessels. Unfortunately, no similar regulation requires aircraft flying over land to monitor for ELTs from downed planes. The most significant constraint on the effectiveness of these beacons, however, has to do with basic geometry. Even if a passing aircraft has its distress radio turned on, it will detect the transmitting ELT or EPIRB only if the beacon is in direct line of sight and not blocked by any obstructions. This means that unless the aircraft is within about 200 miles of the distress location there is little chance of its detecting a signal. The ELT and EPIRB systems depend for their success on the (often slim) chance that an overflying aircraft has its distress monitor on and is near enough to the distress location to receive the signal.

The SARSAT Project

The objective of the SARSAT project is to further international cooperation in search-and-rescue missions by demonstrating that equipment carried on satellites in low-altitude orbits can greatly improve the chances of detecting distress signals and determining their site coordinates.

The basic operational concept of the system is illustrated in Figure 1. Satellites circling the globe in near-polar orbits about every 102 minutes detect signals emanating from 121.5 and 243 MHz ELT/EPIRBs and from experimental 406 MHz ELT/EPIRBs and relay the data to ground stations. (The 406 MHz beacons are not commercially available; they are presently being used for testing only.) Ground stations, referred to as Local User Terminals (LUTs), process the signals received from the satellites, determine the locations of the beacons, and transmit the position information to a Mission Control Center (MCC). The MCC sorts the incoming data by geographic position and distributes the information to the appropriate Rescue Coordination Center (RCC).

As indicated above, the project has both a space segment and a ground segment. As part of the SARSAT ground segment, the United States operates and maintains a U.S. Mission Control Center and three ground stations. Figure 2 shows the U.S. ground installations, the Canadian ground station, and their areas of coverage. The U.S. ground stations provide regional coverage of the contiguous 48 states,

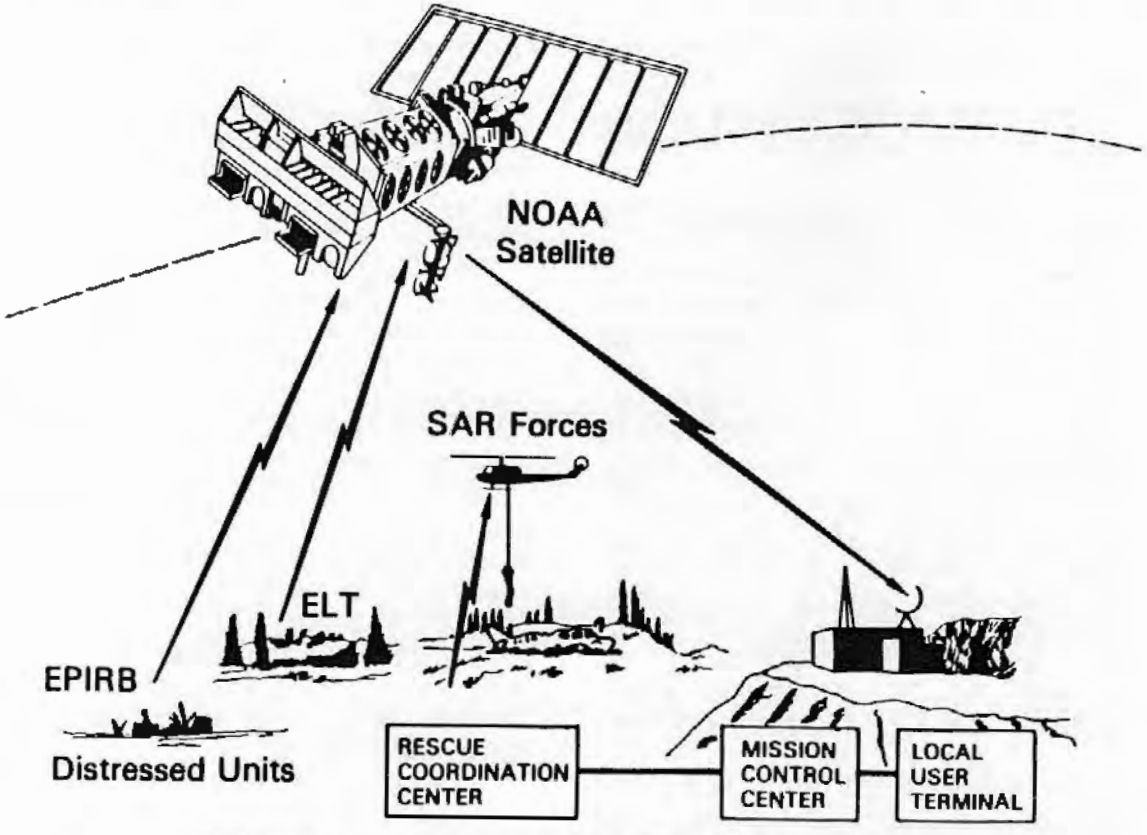


Figure 1 The path of a distress message

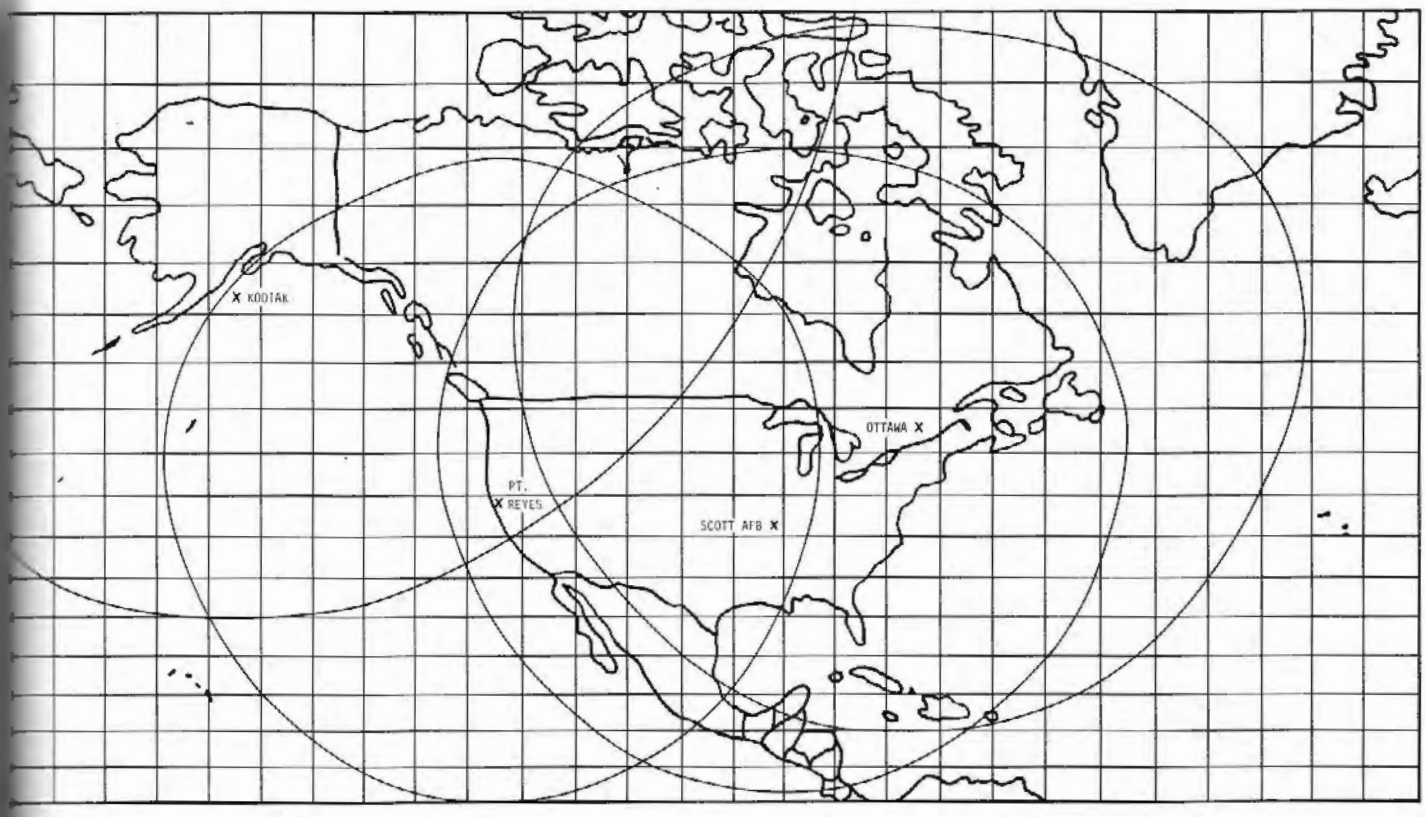


Figure 2 The U.S. and Canadian ground stations and their areas of coverage

The overlap increases the chances that a signal will be picked up.

Alaska, parts of Canada, Mexico, and coastal maritime areas. The Canadian ground station, located in Ottawa, covers most of Canada and the United States and a large portion of the western Atlantic.

The space segment involves placing special instruments on board three Tiros weather satellites supplied by the National Oceanic and Atmospheric Administration (NOAA). Each satellite will carry a Canadian-supplied "repeater" to rebeam signals from ELTs and EPIRBs now in use to the ground and a data processor provided by France to support the experimental 406 MHz program. The first satellite to carry this equipment was launched in March 1983.

The repeater is necessary because signals from existing ELT and EPIRB transmitters operating at 121.5 and 243 MHz cannot be processed on board the satellite. They must be immediately rebeamed to the ground station. For this to occur, the satellite must simultaneously be in view of both the ELT/EPIRB and the ground station. Regional coverage is thus necessary for beacons operating on these frequencies.

Signals from the experimental 406 MHz transmitters can be received, processed, and stored on board the satellite itself. The stored data can then be transmitted to the ground on command when a ground station is in view of the satellite. This system thus provides full-orbit or global coverage.

The 406 MHz system can pinpoint the site of the distress within two to five kilometers (one to three miles). The regional coverage system using the 121.5 and 243 MHz ELTs and EPIRBs provides a location accuracy of 10 to 20 kilometers (5 - 10 miles). Both systems use "Doppler" data, determining location according to whether a signal's radio waves come together or fan out as the satellite either approaches or moves away from the signal.

COSPAS/SARSAT

The SARSAT project was initiated by Canada, France, and the United States. It has a parallel in the Soviet Union's search-and-rescue satellite program, COSPAS. Following an agreement reached in 1980, the Soviet Ministry of Merchant Marine (MORFLOT) was designated to coordinate its satellite search-and-rescue program with the SARSAT program.

408-354 O - 83 - 2

COSPAS is flying receivers on Soviet satellites, coordinating its launches with those of the National Oceanic and Atmospheric Administration to provide complementary world coverage. The compatibility between the two projects permits the SARSAT ground stations to use the COSPAS satellite when it is in view.

The Soviet-built COSPAS repeaters relay only the 121.5 MHz distress frequency. They do not process the 243 MHz frequency. As of this writing, Soviet ground stations were not monitoring the 121.5 frequency.

The Soviets have developed their own 406 MHz experimental beacons and will fly their own satellite receiver/processors, which are similar to those that France provided for SARSAT.

Demonstration and Evaluation

Both the SARSAT and the COSPAS teams are now in a two-year evaluation period, testing the operation and performance of the system in a "real-world" situation. Ground-station terminal coverage is being analyzed, the number of distress calls that can be processed simultaneously is being noted, and location accuracy is being studied. This information will demonstrate the program's value in supporting actual search-and-rescue operations, as well as provide search-and-rescue agencies with experience in using the system.

In the United States there are four agencies participating in demonstration and evaluation. These agencies are the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, the Air Force, and the Coast Guard. NOAA is providing the spacecraft. NASA is providing the spaceborne hardware, providing a ground station at Coast Guard Communications Station Kodiak, conducting the technical performance evaluation, and coordinating international activities. The Air Force is providing the U.S. Mission Control Center and a ground station at Scott Air Force Base in Illinois and is conducting the inland SAR evaluation. The Coast Guard is providing a ground station at Communications Station San Francisco, operating the Kodiak LUT for NASA, and conducting the maritime SAR evaluation. The demonstration and evaluation phase of the project officially started February 1, 1983, using the COSPAS satellite.

The COSPAS/SARSAT parties are prepared to consider proposals from other countries interested in supplying additional ELT/EPIRBs and ground stations during the demonstration and evaluation phase. Such proposed participation will be welcome provided it does not cost the COSPAS or SARSAT parties anything, it is technically compatible with the COSPAS/SARSAT system, it contributes to the COSPAS/SARSAT objectives, and it includes significant user involvement.

The Coast Guard Cutter VIGOROUS goes to the aid of three men clinging to their capsized trimaran. The three men owe their lives to COSPAS, which supplied the coordinates of their ELT signal.

The Role Pilots and Mariners Must Play

Since the start of the demonstration and evaluation phase, the Coast Guard and the Air Force have been deluged with alerts that were later found to be false alarms. Approximately 96 percent of all distress transmissions fall into this category. Pilots and mariners must do their part to ensure that their radios do not transmit distress signals in non-emergency situations. False alarms not only reduce the efficiency and effectiveness of the entire program, they also reduce other people's chances of getting the help they may desperately need. Satellite-aided techniques alone cannot make the program a success; a great deal depends on the people who use them.

How Can You Help?

Pilots:

1. Make sure you understand how your ELT is designed to work. There are four types:

   - Automatic Fixed (AF), which is intended for permanent attachment to the airframe,

   - Automatic Portable (AP), which is intended to be conveniently removed from the aircraft by the operator in a survival situation,

   - Automatic Deployable (AD), which is intended to be automatically detached from the airframe at an appropriate time during the crash sequence, and

   - Personal (P) or Survival (S), which are designed to be carried out of the aircraft and have only an ON/OFF switch.

2. Check the installation of the ELT in your plane. If it is not rigidly installed, arrange to see that it is as soon as possible.

3. Familiarize yourself with the ELT control switch and run tests on a regular basis with Federal Aviation Administration coordination. Testing is limited to three audio sweeps during the first five minutes of every hour. After testing, be sure to return the switch to the "ARM" position.

4. As the last step before you leave the plane, listen to the 121.5 MHz channel on your airplane VHF receiver to verify that your ELT has not been left on accidentally.

Mariners:

1. Distinguish among Class A, Class B, and Class C EPIRBs and choose the one that best suits your needs:

   - Class A: Float-free device that is mounted externally on the vessel and actuates automatically when it begins to float. Class A EPIRBs are required on inspected commercial vessels.

   - Class B: Device designed to be stored in a readily accessible place so that it can be activated manually and taken aboard a lifeboat.

   - Class C: Signals from these devices will not be picked up by SARSAT. Class C EPIRBs operate alternating between channels 15 and 16 in the FM marine band and are intended for use within 20 miles of the coast.

2. Do not depend on your EPIRB as your only means of signaling distress. Make sure that you have the required flares. Use any other means of communication available—a marine or CB transmitter, mirrors, etc.

3. If your EPIRB is not fitted with an external test circuit, testing must be done under the control of the Coast Guard or in brief operational tests conducted during the first five minutes of any hour. These tests must be no longer than three audio sweeps.

If the satellite system now being tested proves to be a success, pilots and mariners will be able to replace their 121.5/243-MHz ELTs or EPIRBs with the advanced ELTs or EPIRBs operating at 406 MHz. The 406 MHz ELT/EPIRBs have a number of advantages. Their higher power will provide a more reliable link to the satellites. More sophisticated coding of information will inform the rescue forces of the identification (wing number, registration number) and type of the distressed vehicle (pleasure aircraft, commercial marine vessel, etc.) and, in some cases, the nature of the distress. Rescuers will be able to tell whether they should prepare for a fire, a crash/sinking, or some other type of emergency and whether medical assistance will be required.

If successful, the 406 MHz system will provide the basis from which a much improved global alerting system will evolve. The 406 MHz system will be capable of detecting and locating from 200 to 400 distress signals at a time. Such a system could be instrumental in saving lives. Also, its global coverage will greatly increase the chances that a distress call will be heard from a 406 MHz transmitter anywhere in the world. With that type of system in place, the phenomenon of vessels lost without a trace should become a thing of the past.

The assistance of the Goddard Space Flight Center in Greenbelt, Maryland, in the writing of this article is gratefully acknowledged. ‡

Keynotes

The Coast Guard published the following items of general interest in the Federal Register between April 18, 1983, and May 12, 1983:

Final rules:

CGD 83-06	COTP Hampton Roads, Virginia, Safety Zone Regulations; Chesapeake Bay, Hampton Roads, Willoughby Bay, Norfolk, Virginia (Published April 18)
CGD11 11-27-83	Establishment of Special Local Regulations for the Annual Spring Regatta (April 21)
CGD3-83-007	Revocation of Drawbridge Operation Regulations; Appoquinimink River, Delaware (April 21)
CGD 83-01	COTP Willmington, North Carolina, Safety Zone Regulations; Approaches to Cape Fear River at Southport, North Carolina (April 21)
CGD 83-02	COTP Willmington, North Carolina, Safety Zone Regulations; Port of Morehead City, North Carolina (April 21)
CGD 83-07	COTP Hampton Roads, Virginia, Safety Zone Regulations; James River, Newport News, Virginia (April 21)
CGD3-82-018	Drawbridge Operation Regulations; Mantua Creek, New Jersey (April 28)
CGD3-83-04	Safety Zone Regulations; New York, New York, East River (April 28)
CGD3-83-09	Safety Zone Regulations; New York, New York Harbor, East River, Buttermilk Channel (April 28)
CGD 13-83-06	Special Local Regulations; Seattle Opening Day Yacht Parade and Crew Race (May 2)
CGD 82-016	Drawbridge Operation Regulations; Mitchell River, Chatham, Massachusetts (May 2)
CGD 05-83-01	Drawbridge Operation Regulations; Kent Island Narrows, Maryland (May 5)
CGD 83-01	COTP Hampton Roads, Virginia; Safety Zone Regulations; Elizabeth River, Norfolk, Virginia (May 5)
CGD 09-83-01	Drawbridge Operation Regulations; Sheboygan River, Wisconsin (May 12)
CGD 83-08	COTP Hampton Roads, Virginia; Safety Zone Regulations; Elizabeth River, Portsmouth, Virginia (May 12)

Notices of proposed rulemaking (NPRMs):

CGD 83-03	COTP Willmington, North Carolina, Safety Zone Regulations; Upper Cape Fear River, North Carolina (April 21)

CGD03-82-034	Drawbridge Operation Regulations; South River, New Jersey (April 21)
CGD01-83-02	Marine Parade; 1983 America's Cup Races (April 28)
CGD 05-82-30	Anchorage Ground; Eastern Branch, Elizabeth River, Norfolk, Virginia (April 28)

Questions concerning regulatory dockets or comments on the proposal described below 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

* * *

Documentation of Vessels (CGD 82-085)

On May 5, 1983, the Coast Guard published in the Federal Register an NPRM to amend section 67.09-3 of Title 46 of the Code of Federal Regulations. This is the portion of the vessel documentation regulations which prescribes which vessels will be considered "built in the United States" for purposes of the Vessel Documentation Act. Because of problems with existing regulations, an advance notice of proposed rulemaking (ANPRM) was issued to elicit comments on the subject. The amendment, which would change the factors to be considered in determining whether a vessel is "built in the United States," is being proposed in response to the comments received.

In the current rule, §67.09-3 reads

"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; and

"(c) 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.

"(d) For the purposes of this section, United States includes American Samoa."

With the proposed change, §67.09-3 would read

"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."

Comments on this NPRM should be submitted to the Marine Safety Council by July 5.

Actions of the Marine Safety Council

At its May meeting, the Marine Safety Council approved further action on the following items:

CGD 83-026 Reassessment of Coast Guard Fire Protection Regulations to Incorporate SOLAS 74

This project involves reviewing Subchapters D, H, and I of Title 46 of the Code of Federal Regulations. Changes will be proposed to bring the Coast Guard's requirements for fire protection, including structural fire protection and firefighting installations, into agreement with the international requirements of SOLAS 74.

An NPRM is planned for May 1984.

CGD 83-027 Towing Hawser Length

This project proposes that section 163.10 be eliminated from Title 33 of the Code of Federal Regulations. That section limits hawser length to 450 feet but lists numerous exceptions when hawsers limited to that length would be unsafe. Coast Guard District Commanders feel that the matter

of hawser length is best left to the judgment of the towboat operator.

An NPRM on the subject should be published in the Federal Register next month.

CGD 83-028 Extending the Applicability of Certain Western Rivers Provisions of the Inland Navigation Rules to Other Waters

In 1986 the Tennessee-Tombigbee Waterway will be connected with the Tennessee River. The Tennessee River, as a tributary of the Mississippi River, is defined as a Western River; it is therefore subject to special provisions in the Inland Navigation Rules. The Tennessee-Tombigbee, however, since it will not be a tributary, would not be subject to the same provisions. The physical characteristics of the two waterways are similar, however, and the traffic which will use the route will in both cases be Western Rivers traffic. It would be confusing and impractical for a vessel navigating on the Western Rivers to have to change its lighting and philosophy of operating when entering the Tennessee-Tombigbee Waterway.

This proposal would forestall such confusion by designating Inland Navigation Rules 9(a)(ii), 15(b), and 24(i) as applying to the following waters: the Tennessee-Tombigbee Waterway and the Tombigbee, Mobile, Alabama, Black Warrior, Coosa, Appalachicola, Chattahoochee, and Flint Rivers. An NPRM should be published this month.

Please enclose your mailing label when sending in a change of address. Allow eight weeks for change to take effect.

CGD 83-32 Shipping Fairway System off the Coast of California

This proposal would implement the results of the Port Access Route study as mandated by the Ports and Waterways Safety Act. Authorities in the Eleventh Coast Guard District determined, on the basis of the study, that potential conflicts between oil drilling and shipping required the creation of a fairway system off the coast of California. No structures would be permitted in the fairway.

In addition to establishing fairways, the proposal would alter the traffic separation scheme for San Francisco and extend the one in Santa Barbara.

The project is very time-critical because the Department of Interior is leasing tracts off the coast of California for oil and gas exploration. Creation of the fairway through these tracts would obviously have an impact on their value and the cost and feasibility of extracting oil from areas under the fairway. The potential cost in lost revenues, based on Department of the Interior estimates, ranges into the billions of dollars.

An NPRM is scheduled for November 1983.

Rip Current

TAKE THE EASY WAY OUT

A break in the wave pattern, a discoloration in the water. Sharp-eyed swimmers often can spot and avoid a rip current, the strong, narrow outflow of ocean water that carries back to sea the water brought in by waves.

If you're caught in such a current, don't panic. They're seldom more than 10 to 20 feet wide. Swim across the current, parallel to the beach and you'll be out of danger soon.

Or relax and let the current carry you seaward to the riphead, where it slows down. Then you can swim ashore parallel to the rip current but outside its seaward pull.

Don't fight a rip current. Take the easy way out.

A public service message from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Maritime Sidelights

Next Volume of Light List to be Released

Volume II of the Coast Guard's 1983 Light List, Atlantic and Gulf Coast (CG-160), should be available by the time you receive this issue of the *Proceedings*.

Volume II covers lights, fog signals, buoys, daybeacons, radiobeacons, racons, and Loran stations on the Atlantic and Gulf coasts from Little River, South Carolina, to Rio Grande, Texas, as well as the Antilles.

Volume II of the Light List can be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. It can also be purchased from GPO branch bookstores in cities across the country or from GPO sales agents located in principal seaports. The cost is $11; the stock no. is 050-012-00180-4.

71st Annual National Safety Congress Scheduled

The National Safety Council will hold its 71st National Safety Congress October 17 - 20, 1983, in Chicago.

More than 12,000 safety professionals representing industry, agriculture, and the recreation, transportation, and occupational health fields are expected to attend this international event. Other delegates will include safety engineers, personnel directors, fire protection authorities, medical specialists, and union representatives.

About 175 sessions involving more than 500 speakers and panelists are planned. In addition, about 350 manufacturers and distributors of safety-related products and services will be on hand to provide samples, demonstrations, and specifications.

For more information, write to Congress Planning, National Safety Council, 444 North Michigan Avenue, Chicago, Illinois 60611, or call (312) 527-4800.

1982 Edition of Hazardous Materials Regulations Available

The 1982 edition of Title 49 of the Code of Federal Regulations, Parts 100 - 177 and 178 - 199, is now available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402; tel.: (202) 783-3238. It is also available at regional Government Printing Office bookstores throughout the country.

Single copies of amendments to Title 49 published after the 1982 edition (October 1982) may be obtained, upon written request, from:

Dockets Branch
Office of Regulatory Analysis, DMT-63
Materials Transportation Bureau
Department of Transportation
Washington, DC 20590

Title 49 deals with packaged cargoes.

New Safety Film Tells How to Handle and Store Hazardous Chemicals

"Handling Hazardous Chemicals Safely" shows how to handle and store oxidizers, poisons, corrosives, flammables, and water-sensitive chemicals. An emergency response segment tells what to do in case of a spill.

This 16-minute sound and color film and its accompanying workbook are available for license or rental in either the 16mm film or videocassette (Betamax or VHS) format.

For prices and/or details, contact:

BNA Communications Inc.
9417 Decoverly Hall Road
Rockville, Maryland 20850
Attn.: E. A. Allen
Tel.: (301) 948-0540

National Boating Reference Resource Center Opened

One of the nation's largest and most comprehensive reference resource centers dedicated solely to recreational boating opened its doors to the public recently under the sponsorship of the BOAT/U.S. Foundation for Boating Safety.

The Foundation's newly established Resource Center has over 100 different categories of information relating to recreational boating and boating safety. It is stocked with more than 2,000 books and over 7,000 periodicals, as well as numerous reports,

pamphlets, newsletters, reprints, and 16mm films.

The boating community will be able to find everything from books on the America's Cup to articles on wooden boat repair. The Resource Center is particularly well catalogued with cruising guides, books on fishing, how-to books, and information on navigation and piloting, electronics, and marine photography and art. Almost every issue of each of the major boating publications from the past 17 years can be found on the center's shelves.

Located in the Foundation's headquarters in Alexandria, Virginia, the center is open weekdays from 10 a.m. to 4 p.m. Those wishing to make optimum use of the facilities are urged to phone ahead for an appointment. To promote boating safety, the Reference Resource Center provides services at no charge and will serve both the boating community at large and members of the Association.

The Foundation for Boating Safety is a non-profit organization founded to conduct research into recreational boating practices and accidents and develop and disseminate new safety data, educational materials, and techniques to the boating community.

Projects underway besides the Reference Resource Center include production of a towing safety manual, the setting up of boating education seminars, and the development of boating safety public service announcements for radio and television.

For further information, contact Director Jim Ellis, BOAT/U.S. Foundation for Boating Safety, 880 South Pickett Street, Alexandria, Virginia, 22304; tel. (703) 823-9550. ‡

"IMO"

'Tain't no small potatoes

On May 17, 1983, Queen Elizabeth II formally opened the new London headquarters of the International Maritime Organization.

The Coast Guard has a substantial involvement in the deliberations that take place within that organization. Some of the more amusing ones were those surrounding the selection of the organization's name and its subsequent amendment.

When the organization was but a glint in the eye of some master planner, the questioning started. What was a suitable name for what would no doubt come to be a noble institution? Inasmuch as the organization was not yet in place, it became a question of who was influencing whom. The concept of the organization would change even as the names people were trying to come up with names to describe it; when the names players attempted to catch up and be ever more encompassing, the planners would expand the concept to cover everything implied by the suggested names.

What to do but be nonlimiting, nonoffensive, and, probably, nondescript? In their wisdom, our (now) elder statesmen and diplomats christened the organization the Inter-Governmental Maritime Consultative Organization. That surely met the criteria of nonlimiting, nonoffensive, and nondescript. Those who needed to refer to the organization on any kind of a regular basis gradually came to call it "IMCO," which led pursuers of truth to ask for the proper name and, when it was proffered, forced them to ask again, "OK, but what is it?"

As the organization grew and established a truly fine reputation for efficiency and responsiveness, the title no longer had to be governed by the old criteria.

It was decided: the name would be changed. The debate was short. There was unanimity. They would call it the International Maritime Organization. The process was set in motion to draft the formal text and amendments necessary to officially change the name.

Then, during a discussion one day, when all were justifiably proud, a delegate seized upon the new acronym, pronouncing it "eemo" in a speech. The delegate from Japan raised his card and, apologizing in advance, politely asked that the letters be pronounced individually as "I," "M," "O," not together as "eemo," since "eemo" meant "small potatoes" in Japanese. His nation would not object if all countries used the individual-letters pronunciation.

The spirit of compromise prevailed, and "IMO" was assured a lasting place in nautical vocabularies. ‡

by Robert P. Wagner

This is the third in a series of five Chemicals of the Month written by guest authors--chemistry students at the Coast Guard Academy in New London, Connecticut.

Chloroform: $CHCl_3$

Synonyms:	trichloromethane
Physical Properties	
Boiling point:	61.7°C (143°F)
Freezing point:	-63.5°C (-82.3°F)
Vapor pressure at 61.3°C (142.3°F):	760 mm Hg
10.4°C (50.7°F):	100 mm Hg
Threshold Limit Values (TLV)	
Time Weighted Average:	10 ppm; 50 mg/m^3
Short Term Exposure Limit:	50 ppm; 225 mg/m^3
Flammability Limits in Air	
Chloroform is nonflammable.	
Combustion Properties	
Chloroform is noncombustible.	
Densities	
Liquid (water = 1.0):	1.50 at 15°C (59°F)
Vapor (air = 1.0):	4.12 at 0°C (32°F)
Identifiers	
U.N. Number:	1888
CHRIS Code:	CRF
Cargo Compatibility Group:	36 (Halogenated Hydrocarbons)

In 1853, while giving birth to Prince Leopold, Queen Victoria was given a dose of chloroform. This ensured the popularity of the new substance, which had been discovered in 1831 and first used as an anesthetic in 1847. Chloroform remained the most widely used anesthetic up until the early 20th century, when safer anesthetics began to take its place.

Because fats and oils dissolve easily in it, chloroform is used today as an industrial solvent for tars, waxes, rubber, and plastics. It is also used as an extractant solvent in the manufacture of pharmaceuticals. The chemical industry uses it as a raw material in the preparation of refrigerants and resins.

Chloroform is a heavy, colorless, sweet-smelling, nonflammable liquid. It is a highly toxic chemical—the margin of safety between anesthetic and lethal doses is very small. If workers must be exposed to it, they should be exposed to concentrations no greater than 10 parts per million (ppm), averaged over an eight-hour day, 5-day week, with a 15-minute maximum of 50 ppm. The American Conference of Governmental Industrial Hygienists lists it among "industrial substances suspect of carcinogenic potential for man." Exposure levels should thus be carefully controlled.

Chloroform acts as a depressant on most organs of the body, especially the heart and blood vessels, the liver, the pancreas, and the kidneys. Prolonged exposure may result in vomiting, jaundice, hepatitis, narcosis, coma, and death. Victims of short-term exposure to high concentrations may suffer impairment of judgment, irritation, or irreversible tissue damage. The high doses used for anesthesia (10,000 ppm or more) sometimes resulted in necrosis, or a killing off, of the liver tissue, causing delayed deaths, on the second post-operative day or later, among surgery patients. This is one of the reasons chloroform is no longer used as an anesthetic.

Because chloroform is toxic, immediate medical care should be given to anyone who has ingested or inhaled it. The first step is to move the victim to fresh air. (Chloroform can be deadly, so make sure you have proper respiratory protection and protective clothing when going to the aid of a victim.) If he has swallowed chloroform, get him to vomit by

having him touch the back of his throat with his finger or by giving him syrup of ipecac. If he has inhaled chloroform, give him artificial respiration or oxygen, as needed. In either case, get the victim to a medical facility.

Although chloroform is not flammable, exposure to heat or flame may cause it to decompose into several compounds even more toxic than chloroform itself. These include phosgene and chlorine (two types of poison gas used in World War I), hydrochloric acid, and ethyl chloride. To a limited extent, chloroform can also decompose when it is exposed to light and air. In addition, the chemical may react explosively with sodium hydroxide (caustic soda); it should thus be segregated from caustics for shipping. Chloroform that has no trace of water in it will react with aluminum, so "anhydrous" chloroform should not be stored or handled in anything made of that material.

Because it is a liquid, chloroform can be shipped at normal temperature and pressure. It may be transported by ship, barge, tank car, tank truck, or plane. The specific capacity limits and packaging requirements vary with each method of transportation, but, in all cases, chloroform must be stored away from living quarters and food supplies.

Chloroform is considered a toxic cargo by the U.S. Coast Guard, which regulates it under Subchapter O for shipment by tank barge or tankship. The U.S. Department of Transportation classifies it as an ORM-A material. (Substances in the ORM (Other Regulated Material) category are those not meeting any of the definitions of the other hazard classes specified in Subchapter C of Title 49, Hazardous Materials Regulations. Those in class A are described as having "an anesthetic, irritating, noxious, toxic, or other similar property" and capable of causing "extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation.") The International Maritime Organization considers chloroform a toxic liquid and includes it in Chapter 6 of its Chemical Code (chemicals to which the Code applies). Chloroform can be found on page 6052-1 of the IMDG (International Maritime Dangerous Goods) Code and is assigned a Hazard Class of 6.1.

Robert P. Wagner is a second-class Cadet at the Coast Guard Academy. He wrote this article in connection with a class on hazardous materials transportation taught by LCDR Thomas J. Haas. Technical assistance was provided by personnel in the Cargo and Hazards Branch at Coast Guard Headquarters.

New Approach to Sea Rescues Suggested

Surgeon Commander Frank Golden, Senior Medical Officer at England's Institute of Naval Medicine, has advocated a new approach to sea rescues after research showed that 20 percent of deaths in cold water occurred after the victim had been rescued.

Some of the deaths were the result of drowning or shock, but others were due to collapse thought to be caused by the change from water pressure on the body to air pressure at a time when the effects of cold make it harder for the body to adjust. "It has the same effect as a sudden hemorrhage," says CDR Golden; "the blood rushes to the feet."

CDR Golden recommends the use of a double lift for rescues from the air. This would bring a person up in a seated or fetal position. For rescues using ships, he suggests that it might be possible to lower a lifeboat, assuming the sea is not too rough. It is also important, he feels, to avoid making the victim climb a rescue net, as he or she may suffer a collapse and fall back into the sea and drown.

(Reproduced from Coastguard: the Magazine of Her Majesty's Coastguard, *October - December 1982)*

Rear Admiral Bobby F. Hollingsworth
Chief, Office of Marine Environment and Systems

The Office of Marine Environment and Systems is charged with establishing and maintaining the Coast Guard's environmental program. It is also responsible for a comprehensive ports and waterways system encompassing all aspects of marine transportation except vessel safety, aids to navigation, and bridge administration. Rear Admiral Bobby F. Hollingsworth was appointed Chief of this Office in May 1982.

He was promoted to Rear Admiral and named to his present position following a 16-month assignment as Chairman of an intra-agency task force which studied Coast Guard roles and missions and developed recommendations for the Secretary of Transportation and Congress on the future of the Coast Guard to the year 2000.

A native of Boca Raton, Florida, he entered the University of Florida in 1950. After one year of study, he was appointed to the Coast Guard Academy, from which he graduated in 1955. His first assignment was as Deck Watch Officer on the Coast Guard Cutter INGHAM. This was followed by a tour of duty as Commanding Officer of the Coast Guard Loran Station in Eniwetok in the Marshall Islands.

Rear Admiral Hollingsworth received advanced training in communications engineering at the U.S. Naval Postgraduate School in Monterey, California, from 1960 to 1962. He has held a number of communications assignments, the highest of them being Chief of the Telecommunications Management Division at Coast Guard Headquarters from 1978 to 1979.

In addition to his time on the INGHAM, the admiral's service at sea includes a tour as Commanding Officer of the JARVIS (1973-75), a Coast Guard cutter engaged in fisheries law enforcement patrols in Alaskan waters. He also served as Commanding Officer of the Coast Guard cutter CAPE UPRIGHT and Executive Officer of the Coast Guard cutter McCULLOCH.

RADM Hollingsworth

From June 1979 until January 1981 he served as Deputy Chief of the Coast Guard's Office of Operations.

Rear Admiral Hollingsworth has been awarded the Coast Guard Meritorious Service Medal twice and the Coast Guard Commendation Medal three times.

He is married to the former Patricia Marc-Aurele of New London, Connecticut. They currently reside in Reston, Virginia, with their son Matthew. They have two married daughters, Denise DeFranco of Camp Pendleton, California, and Alicia Bowden of Honolulu, Hawaii. ‡

Stability

Fish are slippery, and a catch is not likely to stay neatly in one place on deck. If a fishing vessel cannot withstand the sudden shifting of its fish, it fails the stability test.

by LCDR T. E. Hart
Chief, Marine Safety Evaluation Branch
Marine Investigation Division

A report recently crossed my desk which detailed the circumstances surrounding the capsizing and sinking of a fishing vessel off the Pacific coast. An investigation of the incident pointed to a shifting of a deckload of fish to one side of the vessel as the most probable cause of the capsizing. An underlying factor was the vessel's apparently insufficient stability--it could not right itself after assuming the initial list.

This particular vessel was built according to a design for a vessel to be used as a crabber. However, as constructed, the 76-foot vessel was capable of trolling, trawling, and crabbing. Changes from the original design were necessary to give the vessel this capability. Three net reels mounted on a gantry were installed, as were two trawl winches. Furtbermore, fuel tank and fish tank arrangements were different from those in the original design. One of the effects of these changes was to increase the unloaded deck weight by about 36,000 pounds. No stability tests were done on the vessel.

During sea trials, the vessel exhibited characteristics associated with vessels having little reserve stability. The vessel would roll, hang for a moment, and then come back. Little "snap" at the end of the roll was observed. At the time of the vessel's capsizing, an estimated 25,000 pounds of fish were on deck. This additional topside weight and the fact that the fuel and water tanks were half empty probably caused a further deterioration in stability.

The fishing vessel incident is not unique. Capsizings and sinkings occur all too often. Several vessels were lost this past winter, and, although the investigations of these losses have not yet been completed, some of the losses appear to be stability-related.

Unfortunately, little exists in the way of stability standards for vessels in the size range of fishing vessels. The International Maritime Organization (IMO) has issued two recommendations to provide some guidance to naval architects, marine surveyors, and others: Resolution A (ESIV) 168, "Recommendation on Intact Stability of Fishing Vessels," and Resolution A (VII) 207, "Interim Simplified Stability Criterion for Decked Fishing Vessels Under 30 Metres in Length." Resolution A 168 is most useful for vessels more than 100 feet long but may be used with caution for vessels down to 80 feet.

Even the most inherently stable vessel can capsize if operated beyond its capabilities and without regard to its stability.

Resolution A 207 is based on European criteria for vessels in the 75-to 100-foot range, and exactly how useful it is for smaller fishing vessels has not been determined. The two IMO recommendations are available from the Coast Guard. Persons wanting copies of these recommendations should request Navigation and Vessel Inspection Circular No. 3-76. A check made payable to "Treasury of the United States" in the amount of $4.50 per copy should accompany the order. The mailing address is

Commandant (G-MP-4/14)
U.S. Coast Guard
Washington, DC 20593
Attn.: NVICs

These recommendations provide some measure of guidance for designing vessels. They are not a panacea against capsizings, however. Recommendation A 168 specifically states, "Compliance with the stability criteria does not ensure immunity against capsizing. Masters should exercise prudence and good seamanship having regard to the season of the year, weather forecasts, and the navigational zone." This is not a point to be taken lightly. Even the most inherently stable vessel can capsize if operated beyond its capabilities and without regard to its stability.

Taking on fuel, bringing in a catch, maneuvering, loading fishing equipment—the effects of all these on the vessel's stability must be considered. Owners can go one step farther by having stability tests done for their vessels and having on board a letter of stability for use by the crew.

A stability test assumes even greater importance after a vessel has undergone conversion, as the capsizing recounted in the opening paragraphs demonstrates. What might have been a very reliable, safe, stable vessel becomes an unknown entity after conversion. Stability tests can provide an additional measure of safety which could mean the difference in whether the vessel and crew return from a fishing trip safely, or even at all. ↕

What might have been a very reliable, safe, stable vessel becomes an unknown entity after conversion.

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. The temperature at which air becomes saturated with water vapor is called the

A. vapor point.
B. dew point.
C. absolute humidity.
D. adiabatic temperature.

REFERENCE: Donn's Meteorology, 4th Edition

2. What proof load shall be applied to a cargo winch and its accessory gear, which has a safe working load of 25 tons?

A. 25 tons
B. 30 tons
C. 40 tons
D. 50 tons

REFERENCE: 46 CFR 91.37-40

3. A thrust bearing is designed to

A. transmit the thrust of the engine to the propeller.
B. transmit the thrust of the propeller to the vessel.
C. absorb the shock of wave pressure at the bow.
D. be placed between the en-

gines and the foundation to absorb the vibration.

REFERENCE: International Maritime Industry

4. Sometimes it is desirable to connect a member both by riveting and welding. Which of the following statements is true concerning this procedure?

A. Tearing through the member is more likely in this type of connection.
B. The weld may be broken by the stresses caused by riveting.
C. The weld will increase the tensile stress on the rivet heads.
D. The welding must be completed before the riveting commences.

REFERENCE: Ladage, Modern Ships

5. A tide is diurnal when

A. only one high and one low water occur during a tidal day.
B. the high tide is higher and the low tide is lower than usual.
C. the high tide and low tide are exactly six hours apart.
D. two high tides occur during a lunar day.

REFERENCE: Bowditch, Vol. 1

ENGINEER

1. If a sealing line becomes restricted in a centrifugal pump operating under a negative suction head (suction lift), the inner end of the stuffing box will be

A. under a vacuum, and air will tend to leak into the pump.
B. sealed by the fluid being pumped, and no leakage will occur.
C. under pressure, and fluid will tend to leak into the pump.
D. sealed by the seal cage or pump lantern ring.

REFERENCE: Karassik

2. If a motor-driven air compressor repeatedly blows fuses upon starting, the cause may be

A. a defective pressure switch.
B. a leaking suction unloader.
C. the fact that the compressor is starting against full load.
D. the fact that the compressor is starting without any load.

REFERENCE: Hubert

3. A ballast pump with a capacity of 200 gpm takes suction on a tank containing 300 long tons of sea-water ballast. How much ballast remains in the tank after one hour of pumping?

A. 45.83 long tons
B. 91.66 long tons
C. 183.32 long tons
D. 254.17 long tons

REFERENCE: Basic Math

4. The heaviest scale formation in a flash evaporator is most likely to occur in the

A. distillate cooler.
B. first-stage condenser.
C. saltwater heater.
D. flash chamber.

REFERENCE: Harrington

5. The hydraulic system of a deck winch has been drained, flushed, and refilled with hydraulic fluid. An erratic knocking noise from the hydraulic motor when the winch is started would indicate

A. the fluid is too cold.
B. there is air trapped in the system.
C. the suction-line-fluid filters are clogged.
D. there is abrasive matter circulating in the oil.

REFERENCE: Fluid Power

ANSWERS

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

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.

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