PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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PROCEEDINGS

OF THE MARINE SAFETY COUNCIL

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Cover

Some surprising statistics have revealed a disproportionately large number of fatalities among merchant marine heart attack victims. In an effort to improve survival chances for those who suffer heart attacks at sea, emergency cardiac treatment is being taught to some U.S. flag vessel crewmembers. Our cover photo shows one such class being conducted by the Maryland Institute of Emergency Medical Services Systems. William J. Gorham of the MEBA Engineering School in Baltimore, Maryland is shown using paddles to obtain an electrocardiogram and, if indicated, defibrillate to restore a normal sinus rhythm to the heart.

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THIS COPY FOR NOT LESS THAN 20 READERS— PLEASE PASS IT ALONG

maritime sidelights

NEW LNG SAFETY STUDY RESULTS OUT

Of all cargoes being shipped today, Liquefied Natural Gas (LNG) is probably the most controversial--and the most misunderstood. One frequently voiced criticism is that LNG has not been thoroughly researched, that the chemical is being shipped without an adequate knowledge of its hazards. Actually, there exists an extensive body of information extracted from research in the area of LNG safety. In a recent study of this research, performed by Dr. Alan L. Schneider of the Coast Guard's Cargo and Hazardous Materials Division, over 100 safety research projects were examined. This study is presented in a report entitled "Liquefied Natural Gas Safety Research Overview," available from Commandant (G-MHM-3/83), U.S. Coast Guard Headquarters, 400 Seventh St., SW, Washington, DC 20590.

The report's emphasis is on experimental research. Those projects of an exclusively numerical nature, such as risk analysis, or of a purely commercial nature, such as vessel voyage scheduling, are not included. In most instances, the major criterion used in determining whether to include a project was that the project study had been completed and reported in the open literature.

The report has been divided into three major sections: research dealing with shoreside facilities, research covering water transportation, and research applicable to both shore and water. These three sections are further divided into fourteen categories of projects: land storage tanks, rollover, vapor dispersion from spills on land, land spill fire studies, land spill fire protection, ship studies, flameless explosion, vapor dispersion from spills on water, underwater releases, water spill fire studies, vapor cloud deflagrations (fires), vapor cloud detonations (explosions), physical properties, and LNG gelation. In each category, the phenomena in question are fully described along with each research project.

This study should be helpful to those within the Coast Guard, as well as others. The LNG industry is expanding, with terminals in operation in Everett, Massachusetts; Cove Point, Maryland; and Savannah, Georgia; and one is currently under construction at Lake Charles, Louisiana. Several are in the planning stage. There are many more peak shaving facilities in operation, that is, tanks used to store LNG only during cold weather. The continued viability of the industry is dependent on safe operation.

Some people have suggested that the industry is deficient in that the hazards of LNG are poorly understood. An unbiased reading of the report leads to the conclusion that LNG safety is well understood, and that future research will be more of a "fine-tuning" nature than covering "new ground." Furthermore, it is Dr. Schneider's conclusion that, with the proper safeguards, LNG can be safely carried in the marine mode.

key notes

All comments on proposed rulemakings should be submitted to:

Commandant (G-CMC/81)
U.S. Coast Guard
Washington, DC 20590

Comments are available for examination at the Marine Safety Council (G-CMC/81), Room 8117, Department of Transportation, NASSIF Building, 400 Seventh Street, SW, Washington, DC 20590 phone (202) 426-1477.

MARINE SAFETY INVESTIGATIONS (CGD 77-018)

This proposed rule requires reports of specified waterfront incidents, accidents, and acts and establishes procedures for investigating them, in order to determine their cause and prevent their recurrence. Until now there have been no regulations implementing the investigatory authority created by the Ports and Waterways Safety Act of 1972. This proposed amendment would implement the investigatory powers established in Section 8 of the Ports and Waterways Safety Act. That statute authorizes the investigation of any event involving the loss or destruction of, or damage to, any waterfront structure which affects or may affect the safety or environmental quality of U.S. ports and waterways.

These proposed regulations define those events which must be reported to the Coast Guard and explain who is authorized to initiate an investigation. The powers of an investigating officer are set forth. Also detailed are proposed investigative proceedings, rights of parties in interest, testimony by deposition, and reports of investigation.

Comments on this proposed rule are solicited; of particular value would be comments on the notification requirements. All comments must be submitted on or before March 12, 1979.

ELECTRONIC NAVIGATION EQUIPMENT FOR VESSELS OF 1600 GROSS TONS OR MORE (CGD 77-168)

The Coast Guard published a notice of proposed rulemaking (NPRM) on the subject of required electronic navigation equipment for vessels of 1600 gross tons or more in the Federal Register of November 14, 1977. These proposed rules would provide for mandatory installation of such equipment on these vessels for the purpose of reducing vessel accidents and expediting maritime commerce on the navigable waters of the United States.

This supplemental notice proposes a more detailed standard for

(Cont'd on page 23)............

1979 INTERNATIONAL ICE PATROL SERVICE

In February or March 1979, depending upon iceberg conditions, the International Ice Patrol will commence its annual service of guarding the southeastern, southern and southwestern limits of the regions of icebergs in the vicinity of the Grand Banks of Newfoundland for the purpose of informing passing ships of the extent of this dangerous region. Reports of ice in this area will be collected from passing ships and from flights by Ice Patrol aircraft. Information on ice conditions is provided by the Ice Patrol twice each day in an Ice Patrol Bulletin which is sent out by radio and landline circuits. Broadcasts of the Ice Patrol Bulletin will be made as indicated below.

RADIO STATION	TIME OF BROADCASTS (GMT)	FREQUENCIES (kHz)
SITOR ICE BROADCAST Coast Guard Communications Boston/NIK (Broadcast to follow CW transmission)	0050 (APPROX) 1250 (APPROX)	5320, 8502 8502, 12750
CW Broadcasts Coast Guard Communications Station Boston/NIK	0018 1218	5320, 8502 8502, 12750
Canadian CG RADSTA St. John's/VON	0000 and 1330	478
Maritime Command Radio Mill Cove/CFH	0130, 1330	438 (TFC ONLY) (off 1200-1600 second Thursday each month) 4255 (2200-1000) 6430 Continuous 8697 Continuous 12726 (1000-2200) 16926.5 on request 22397.5 on request
Navy LCMP BCST Norfolk, VA/NAM	0630-0800 1000-1100 1230-1300 1900-2000 2300-0200	8090, 12135, 16180. 20225 (1200-2359 only)
Thurso, Scotland		7504.5; 12691 (0800-1900Z only) and 3724 (1900-0800 only).
Keflavik, Iceland		5167 (1900-0800Z).

Radiofacsimile Broadcasts (drum speed 120) Coast Guard Communications Station Boston/NIK	1600	8502, 12750
Maritime Command Radio, Mill Cove/CFH, (Primarily sea ice in Gulf of St. Lawrence and North. Limits of icebergs sometimes given).	0000, 1300, 2200	133.15 Continuous (Off 1200-1600 Second Thursday each month) 4271 (2200-1000)
Special Broadcasts Canadian Coast Guard Radio Station St. John's/VON	As required when icebergs are signted outside the limits of ice between regularly scheduled broadcasts.	Preceded by International Safety Signal (TTT) on 500 kHz

REPORTS OF ICE, SEA SURFACE TEMPERATURES, AND WEATHER

All shipping is requested to assist in the operational of International Ice Patrol by reporting all sightings of ice at once to COMINTICEPAT NEW YORK NY via the radio stations listed in the following section. When reporting ice, please include the following information:

POSITION
SIZE AND SHAPE OF ICEBERG
CONCENTRATION OF ICE (FOR SEA ICE IN EIGHTHS)
THICKNESS OF ICE (FOR SEA ICE, SPECIFY IN FEET OR METERS)

The following tables may be used to describe icebergs reported to the Ice Patrol.

SIZE	HEIGHT (feet)	(meters)	LENGTH (feet)	(meters)
Growler	less than 4	less than 1	less than 20	less than 6
Small Iceberg	4 - 50	1 - 15	20 - 200	6 - 60
Medium Iceberg	51 - 150	16 - 45	201 - 400	61 - 122
Large Iceberg	151 - 250	46 - 75	401 - 700	123 - 213
Very Large Iceberg	more than 250	more than 75	more than 700	more than 213

SHAPE	DESCRIPTION
Blocky	Steep sides with flat top. Very solid. Length-height ratio less than 5:1.
Drydock	Eroded such that a large U-shaped slot is formed with twin columns. Slot extends into or near waterline.
Dome	Large round smooth top. Solid type iceberg.
Pinnacled	Large central spire(s) or pyramid(s) dominating shape.
Tilted-Blocky	Blocky iceberg which has tilted to present a triangular shape from the side.
Tabular	Flat topped iceberg with length-height ratio greater than 5:1.

In addition to ice reports, sea surface temperature and weather reports are of importance to the Ice Patrol in predicting the drift and deterioration of ice and in planning aerial patrols. Shipping is urged to make sea surface temperature and weather reports to the Ice Patrol every 6 hours when within latitude 40 degrees to 50 degrees N and longitudes 42 degrees to 60 degrees W. Ships with but one radio operator should prepare the reports every 6 hours as requested and hold them for transmission when the radio operator is on watch. When reporting, please include the following:

SHIP POSITION, COURSE, SPEED, VISIBILITY, AIR AND SEA SURFACE TEMPERATURE, WIND DIRECTION AND SPEED.

It is not necessary to make the above weather report if the ship is making routine weather reports to METEO WASHINGTON.

(Cont'd next page).............

COMMUNICATIONS WITH COMMANDER, INTERNATIONAL ICE PATROL (COMINTICEPAT)

Ice sightings, weather, and sea surface temperature should be reported to COMINTICEPAT NEW YORK NY through U.S. Coast Guard Communication Stations, and if unable to work these stations, Canadian Coast Guard radio station St. John's/VON on the frequencies indicated below. Merchant ships calling to transmit Ice Patrol traffic are requested to use the regularly assigned international call sign of the station being called; however, Coast Guard stations will be alert to answer NIK, or NIDK calls if used. Calling and traffic passing should be as shown in the following table.

PURPOSE	FREQUENCIES WHICH SHOULD BE USED
Calling	500 kHz (if 500 kHz is being used for distress traffic then 512 kHz may be used as supplementary calling frequency). Appendix 15C, ITU Radio Regulations HF(CW) calling frequencies. Recommend use of Channel 4 when calling USCG COMMSTA's Boston/NMF/NIK and Portsmouth/NMN.
Working Frequencies	(All frequencies listed are kHz.)
Station Coast Guard Communications Station Boston/NMF/NIK	Voice (Ship Transmit): 6200.0 Voice (Shore Transmit): 6506.4 CW: 472, 8459, 12783
Coast Guard Communications Station Portsmouth/NMN (Guards 4, 6, 8 MHz 0200-1200Z; 12MHz 1200-0200Z; 16 MHz on request only)	Voice (Ship Transmit): 4134.3, 6200.0, 8241.5, 12342.4 and 16534.4 Voice (Shore Transmit): 4428.7, 6506.4, 8765.4, 13113.2 and 17307.3 CW: 466,8465, 12718.5, 16976
Canadian CG RADSTA St. John's/VON	CW: 478

GULF OF ST. LAWRENCE INFORMATION

Sea ice information services for the Gulf of St. Lawrence, as well as the approaches, from 58-00W to 66-30W longitudes including the Strait of Belle Isle to West of Belle Isle itself, are provided by the Canadian Ministry of Transport during the approximate period December to late June. Ships may obtain ice information by contacting Ice Operations Officer, Dartmouth, Nova Scotia via any east coast Canadian Coast Guard radio station. Details of the services are available from Ice Operations Office, Marine Services Information Center, Ministry of Transport, P.O. Box 1013, Dartmouth, Nova Scotia; telephone 902-426-5664 or 5665; TELEX 019-22625.

SUPPLEMENTARY ICE INFORMATION

Supplementary ice conditions and navigational warnings for the Strait of Belle Isle, the coast of Newfoundland, and the Grand Banks may be obtained by contacting Canadian Coast Guard radio stations, St. Anthony/VCM, Comfort Cove/VOO, St. Lawrence/VCP, or St. John's/VON.

WARNINGS

1. Shipping is reminded that in spite of the best efforts of the Ice Patrol to prevent such occurrence, icebergs have and will drift unnoticed into the usual shipping routes in the area of the Grand Banks. The positions of icebergs in the Ice Bulletin are updated for drift at 12-hour intervals. However, it is stressed that after about five days without resighting, the positions estimated by driftiug are unreliable. Date of an iceberg sighting is indicated in the Ice Bulletin.

2. In general, only icebergs south of about 48 degrees N are included in the Ice Bulletin. In the event there are large numbers of icebergs south of 48 degrees N, the Ice Bulletin will carry the positions of only those icebergs near the limits of ice and isolated icebergs or iceberg groups.

(Cont'd next page).............

3. Carefully conducted tests by the Ice Patrol have proven that radar cannot provide positive assurance of iceberg detection. Since sea water is a better reflector of radar signals than ice, an iceberg or growler inside the area of sea return on the radar scope may not be detected. The average range of radar detection of a dangerous growler or very small iceberg, if detected at all, is only four miles. While radar remains a valuable aid for ice detection, its use cannot replace the traditional caution exercised in the vicinity of the Grand Banks while transiting south of the estimated limits of all known ice.

NOTE: Comments concerning operation of the Ice Patrol, particularly concerning the effectiveness of the times and frequencies of radio transmissions, are of much interest to the Ice Patrol and are earnestly solicited. Ships are also requested to mail facsimile charts received at sea to Commander, International Ice Patrol, Building 110, Governors Island, New York, NY 10004. Please indicate the frequency used and date, time, and position when the facsimile broadcast was received on the chart.

KEYNOTES

(Cont'd from page 19). . . . .

marine LORAN-C receivers, provides for a "phase in" period, and modifies the proposed warranty requirement.

Numerous comments were received in response to the NPRM of November 14, 1977, nrging that the Coast Guard incorporate the "Minimum Performance Standards (MPS) for Marine LORAN-C Receiving Equipment," developed by the Radio Technical Commission for Marine Services (RTCM), an advisory group to the Federal Communications Commission, as the required standard for LORAN-C receivers. That document became available in January 1978. In reviewing the MPS, it was evident that the standard is a more detailed version of that which the Coast Guard proposed in the NPRM. Although objectively similar, it is so clearly superior to the previously proposed standard that the Coast Guard considers its incorporation worthy of consideration. Therefore, in response to the commenters and in recognition of the fact that use of the MPS will achieve the same objectives and that it is a technically superior document, the Coast Guard proposes to incorporate it as the LORAN-C standard.

Comments on this supplemental notice of proposed rulemaking are due by March 12, 1979.

U.S. MARINE SAFETY INFORMATION SYSTEM (CGD 77-213)

On April 13, 1978, the Coast Guard published a notice of proposed rulemaking (NPRM) proposing a requirement that oil tankers of 20,000 deadweight tons that call at U.S. ports, places, or deepwater ports for the purpose of commercial services report ownership information, all registered names the vessel has had, and the country of current registry.

The proposed regulations would have prohibited a vessel from entering the safety zone of a U.S. deepwater port unless the required information had been disclosed to the Captain of the Port.

A large majority of the comments received at 3 public hearings and in 30 letters were opposed to portions of the proposal, particularly the stockholder ownership disclosure requirement. Numerous commenters, including several foreign governments, explained that it would be impractical and in many cases impossible for anyone to provide stockholder information where a corporation is the owner of a vessel.

In the light of the information which the Coast Guard has obtained from other sources and the reasons stated in the substantial adverse comments received, the Coast Guard has determined that this rulemaking is not appropriate at this time and has withdrawn the proposed rule as of January 29, 1979.

WATERFRONT FACILITIES REGULATIONS UPDATE (CGD 78-023)

This final rule, effective on January 22, 1979, corrects regulations governing waterfront facilities which handle dangerous cargoes.

In a separate rulemaking proceeding, the Coast Guard is currently involved in revising waterfront facilities regulations to reflect new initiatives under the Ports and Waterways Safety Act. As a part of this revision project, an advance notice of proposed rulemaking for waterfront facilities was published on April 10, 1978. It is anticipated that this project will be completed in approximately two years. In the interim, this rule corrects outdated references in the current regulations pending publication of the revised regulations.

No notice of proposed rulemaking is being published because this rule is an editorial correction to current regulations and does not change the substantive content of these regulations.

FIRE STATION HYDRANTS, HOSE, AND NOZZLES (CGD 76-086)

This final rule, effective on February 12, 1979, amends the firefighting and fire protection equipment regulations to require only Coast Guard approved combination solid stream and water spray firehose nozzles and low velocity applicators on Coast Guard certificated vessels.

Straight or "smoothbore" firehose nozzles that emit only a solid stream of water are ineffective on some types of fire and lack cutoff capability. Since the installation of these types of firehose nozzles is prohibited and the installation of approved combination solid stream and water spray firehose nozzles and low velocity applicators is required on most new and existing vessels, those vessels will have a more effective firefighting capability.

(Cont'd on page 37)............

Gently-rolling seas stretch to the horizon, reflecting the sun's warmth. Aboard the Liverpool-bound freighter, the first two days have passed uneventfully, the daily routine unbroken. But just after noontime on the second day, ominous signs that could mean cargo smoldering are discovered. Crewmen rushing to investigate locate flames in one cargo hold, although the severity of the blaze is not immediately known. Are other merchant ships nearby which can help if it gets out of control? Which ones? Where are they? Thousands of miles distant, on Governors Island in New York Harbor, the AMVER Center will find help.

The United States Coast Guard's AMVER (Automated Mutual-assistance VEssel Rescue) system is a computer which is revolutionizing search and rescue. Able to forecast the locations of merchant vessels near an emergency, the computer is told where help is needed and in only moments can identify the names and whereabouts of nearby ships. The rescue center controller handling the case can use this information to tell a suitable vessel that her help is needed.

How does a ship participate? To place her voyage on computer plot, a merchant vessel leaving port on an offshore voyage of 24 hours or more sends a simple sail plan to the AMVER Center. While underway, she also forwards periodic position reports to keep her plot accurate. Messages can be sent free of charge through any of the approximately 70 cooperating radio stations around the globe. At the AMVER Center in New York, hundreds of ships' communications are fed daily into the computer. Instructions for participation are available in 14 languages.

Before her first AMVER-plotted voyage, a vessel completes a questionnaire providing her radio watch schedule, available medical and communications facilities, and other useful characteristics. Stored in AMVER's brain, this information can be electronically researched with great speed in an emergency at the same time a position is being calculated.

THE AMVER STORY

Aiding fellow mariners in distress is a custom as timeless as sea travel itself. In the vast, unpredictable ocean expanses, life or death has often hinged on pure chance--the chance that help is near and the chance that it can be summoned in time. Keeping a constant electronic watch, AMVER seeks to reduce this uncertainty. The obligation of AMVER vessels to assist others in need stems from universal tradition and international agreement, which pertain to all ships. Merchant vessels from nations throughout the world voluntarily participate in the AMVER program by sending their position and movement reports to the AMVER Center. A participating ship has the added security of knowing that the rescue center, when notified that she has become overdue or is missing, can plan a search based on her last submitted positiou and on AMVER-predicted information. The likelihood of her rescue can thus be increased. What's more, AMVER participation automatically meets the 24-hour notice of arrival requirements for vessels headed for U.S. ports.

RADI, HILO, and TRAK--they sound like strange names, but are actually computer abbreviations for the kinds of vessel listings available to rescue centers. In the case of the smoldering freighter, the rescue center calls the computer on the teletype to give it the ship's location and the radius of the circular area within which the controller wants to locate other ships. The RADI or Radius SURPIC (SURface PICture) is quickly received, with the closest ship listed first and the others following in order. As time goes by, how near will each one pass to the distressed ship and when? Do any carry doctors? The SURPIC will include all this as well as how each can be contacted, where she is going, and what her speed and course are.

The rescue center may prefer to locate vessels within a rectangular area by specifying two latitudes and two longitudes. Called a HILO SURPIC, it can cover vast areas.

A crippled aircraft will need to know what ships near its track it will be passing over, and in what order. A Trackline (TRAK) SURPIC between two points and having a specified width will be sent to the air traffic controller and he will speed it to the aircraft.

The computer can also be asked to list only eastbound or westbound ships, only those carrying doctors, or only east- or westbound doctor ships within any given SURPIC. This great selectivity assures that ships not suited to help can proceed without interruption. Everyone, from the vessel which is not called upon unnecessarily to the crewmen on a derelict hull located with the help of AMVER information, benefits from swift and certain search and rescue.

AMVER computer terminal at Governors Island, New York.

What had begun as a routine passage for the Philippine freighter DON JOSE FIGUERAS flashed into a mariner's nightmare at noon as flames of unknown origin raged out of control in her number 3 and 4 cargo holds. Four hours after the vessel's call for help she was listing 26 degrees to starboard with the fire spreading quickly to hold number 2. Attempts by Coast Guard aircraft to drop pumping and firefighting equipment had failed, and the ship was being kept under surveillance by a succession of Coast Guard, Air Force, and navy planes which relieved each other as their individual endurance limits were reached.

Meanwhile two vessels, the S/S OGISHIMA MARU and the S/S CUBA MARU, had appeared on AMVER SURPIC and had proceeded to the emergency. Although the original plan was to have them stand by, it was obvious that evacuation would be necessary. As the DON JOSE took on a 30-degree list, the flames unchecked, her crew was transferred to the waiting CUBA MARU. She was ultimately gutted and later turned over to a commercial towing vessel, but 42 crewmembers and Badong, a mascot dog, were unharmed and able to ship out again.

Radioman keeps in touch with the world.

AMVER responds to over 1,500 calls for SURPICS each year, not all involving fires or founderings. Precautionary SURPICs are available to the pilot of any aircraft carrying a national head of state on long overwater flights. HILO SURPICs are sent daily to the International Ice Patrol during the season when treacherous icebergs enter shipping waters. Knowing which vessels are in the areas of heavy ice concentration enables the patrol to ask them individually for additional ice observations, which then increase the accuracy of ice broadcasts to all ships. SURPICs have been requested for the area where an overdue or missing ship is thought to be located, so that vessels there can be contacted and questioned about possible sightings. Severe storms have been followed and accurate warnings issued based on weather data from ships located by weather authorities using SURPICs. These and many other humanitarian uses for AMVER information will continue to make the seas safer for all. As more and more vessels cooperate, the security of all seafarers is strengthened through this electronic tool for mutual assistance.

The AMVER articles and photos (all official Coast Guard photographs) published herein are provided by courtesy of the AMVER Bulletin.

On July 18, 1978, the U.S. Coast Guard's AMVER system, "The Lifesaving Computer of the Seas," completed its 20th full year of service to the mariners of the world. Day and night for the last 20 years, the tireless electronic brain of AMVER's computer has kept track of thousands of merchant vessels as they navigated the high seas. In 1977, ships flying the flags of over 80 different nations participated in AMVER.

When a distress occurs, the computer can provide a listing of vessels predicted to be in that area, and help choose the one best snited to give assistance. Called a "surface picture," this vital information can be made available to the rescue agency in any country within minutes, and saves valuable time in the coordination of search and rescue operations at sea.

MODEST BEGINNINGS IN ATLANTIC

The beginnings of the AMVER system were in a modest hand-calculated plot of shipping limited to the U.S. Coast Guard's Atlantic Ocean area of maritime SAR responsibility. This involved ships sending position reports from within the area so their locations would be known if an emergency arose. As the quantity of shipping increased, the laborious hand-plotting procedure proved inadequate, prompting the purchase of an IBM RAMAC 305 computer in 1958. With the plotting function automated, it became feasible to extend the area within which ships could be tracked to 15 degrees West longitude, limited still to the North Atlantic. This occurred in 1960.

OVER 20 YEARS OF SERVICE

COUNTLESS LIVES SAVED

AMVER is a name which a good many seafarers have canse to remember over the past 20 years. The system is credited with saving countless lives at sea, in instances ranging from ship fires and sinkings to medical emergencies and man overboard cases. The value of ships and cargoes kept from going to the bottom is in the untold millions.

Each case sounds its own note of urgency: a ship's master is ill and desperately needs a doctor; a merchant vessel on a distant ocean has flames racing through her cargo holds; a seaman has been critically injured in a shipboard accident. The information stored in AMVER's computer can mean the difference between life and death. This is why the experiment begun in 1958 has turned into one of the big success stories of modern maritime history.

AMVER was expanded to the Prime Meridian in 1963, and further eastward to the North Sea, Mediterranean and South Atlantic area in 1964. By that time, the electronic equipment then in use had become outdated and inadequate. Computer technology had progressed to a point where a new and more efficient system could be obtained--the IBM 1401. AMVER's coverage was expanded in 1965 to serve both the North and South Pacific using the new computer system.

At present, a Control Data Corporation model 3300 serves AMVER's needs and is programmed to plot all offshore voyages greater than 24 hours in length anywhere between 83 degrees North and 83 degrees South. The 1,500 emergency surface pictures supplied during a typical year testify to the use made of the AMVER system.

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SUPPORT FROM THE MARITIME COMMUNITY

The AMVER system has undergone many changes since those early days--equipment is constantly being refined and updated; more and more ships participate every year; the communications network expands to include more countries. But AMVER has by no means attained its full potential.

About 30 percent of all ships at sea now participate in AMVER, thanks to the superb recognition and support from shipowners and masters alike. But the U.S. Coast Guardsmen who operate the system are dedicated to increasing that percentage and meeting the goal that, for those who journey on the oceans of the world, "No Call for Help Shall Go Unanswered."

AMVER personnel check and recheck information before it goes to the computer.

AMVER's teletype and telex communications network keeps in touch with radio stations and rescue centers throughout the world.

The AMVER System, operated by the United States Coast Guard, is a maritime mutual assistance program that provides important aid to the development and coordination of search and rescue (SAR) efforts in the oceans of the world. Merchant vessels of all nations making offshore passages of more than 24 hours are encouraged to send sail plans and periodic position reports to the AMVER Center in New York. There is no charge for these radio messages when they are sent through one of the cooperating AMVER radio stations. Information from these messages is entered into an electronic computer that generates and maintains dead reckoning positions of participating vessels throughout their voyages. The predicted locations and SAR characteristics of all vessels known to be within a given area are furnished upon request to recognized SAR agencies of any nation for use during an emergency. Predicted vessels locations are disclosed only for reasons related to maritime safety.

AMVER is a free and voluntary program. Benefits to shipping include: (1) improved likelihood of rapid aid in emergencies; (2) reduced number of calls for assistance to vessels not favorably located; (3) reduced time lost for vessels responding to calls for assistance. An AMVER participant is under no greater obligation to render assistance during an emergency than a vessel that is not participating.

Details of AMVER System operations may be obtained from Commander, Atlantic Area, U.S. Coast Guard, Governors Island, New York, N.Y. 10004, and Commander, Pacific Area, U.S. Coast Guard, 630 Sansome Street, San Francisco, CA 94126. AMVER instructions are also available at Coast Guard Captain of the Port and Marine Inspection Offices in major United States coastal ports. The instructions are published in the following languages: Danish, Dutch, English, French, German, Greek, Italian, Japanese, Norwegian, Polish, Portugese, Russian, Spanish, and Swedish. Requests for instructions should state the language desired if other than English.

HEART ATTA
HOW BIG

How extensive is the problem of merchant marine personnel suffering heart attacks while at sea aboard U.S. flag vessels? Also, what are an individual's chances of surviving a heart attack if he has one while at sea? What is currently being done to improve his chances of survival? This article will discuss these vital questions and describe some of the equipment and techniques currently available for emergency cardiac treatment.

Preston Harrison
Calhoon MEBA Engineering School

LCDR John E. Lindak, USCG
U.S. Coast Guard Headquarters

Note: References to specific equipment manufacturers are for example only and are not intended to indicate Coast Guard endorsement.

Marine casualty statistics are kept on file by the Information and Analysis Staff of the Office of Merchant Marine Safety, U.S. Coast Guard Headquarters, Washington, DC. Our interpretation of this information indicates that during the period of time from July 1, 1972 to September 30, 1977 there were approximately 646 heart attack victims aboard U.S. flag vessels. Of these 646 heart attacks, 599 (about 93 percent) resulted in death to the victim. Over 430 (67 percent) of the heart attacks occurred while the vessel was underway, and the remainder occurred while the vessel was docked or at anchor.

There are 219 personnel for whom age data is available. Of these 219 heart attack victims, the following age distribution was noted:

	20 Years or Less	20-29 Years	30-39 Years	40-49 Years	50-59 Years	60-69 Years	70 Years and Up
Number	2	1	8	55	77	64	12
Percentage	0.91	0.46	3.7	25.1	35.1	29.2	5.5

ACKS AT SEA: A PROBLEM?

It is readily apparent that three age groups (40-49 years, 50-59 years, 60-69 years) encompass over 89 percent of the victims. This takes on a grim significance when one realizes that the average age of all U.S. merchant marine personnel is approximately 50 years and is gradually increasing. This trend is illustrated by the table below.

Seaman's Employment Analysis, Nationwide Median Ages[1]
(including Great Lakes)

Year	Licensed Deck	Licensed Engine	Radio	Staff	Unlicensed Deck	Unlicensed Engine	Cooks, Stewards
1962-3	45.2	47.3	48.2	42.7	39.9	43.1	47.2
1970	45.9	47.0	49.1	45.9	43.7	44.7	41.3
1977	48.9	49.4	52.5	50.9	47.3	49.0	50.2

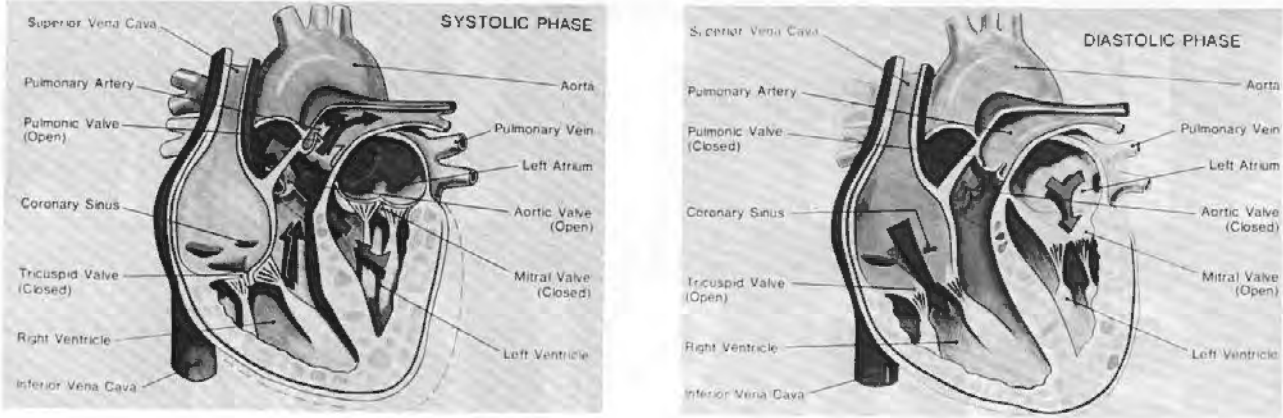
The U.S. merchant marine faces an even greater potential for heart attacks in the years ahead if this trend continues.

For the entire 646 personnel, a partial breakdown of the activity engaged in when a heart attack occurred reveals that 19.5 percent were off duty, 25.9 percent were working on deck, 12 percent were working in the engine spaces, 6.3 percent were involved in steward duties, and over 14 percent were passengers.

What is the significance of this interesting, yet admittedly incomplete, data? For the American general public, it has been estimated that between 40 and 70 percent of all heart attack victims die before reaching a hospital.[2] Also, the American Heart Association estimates that in 1979 over one million heart attacks will occur, resulting in at least 650,000 deaths (65 percent fatalities). The key point is that both of these sources indicate significantly lower mortality rates for the general public than the 93 percent fatalities which currently exist for merchant marine heart attack victims. Additionally, it has been estimated that perhaps up to 10 percent of all heart attack fatalities could be saved by prompt, effective pre-hospital care involving cardiopulmonary resuscitation, since the two hours immediately after the initial heart attack are the most crucial. When applied to the 599 merchant marine mortalities stemming from heart attacks, the implications of a 10 percent death reduction are considerable. The advanced life support techniques discussed later in this article have the potential for increasing this death reduction percentage several-fold.

(Continued on next page)

[1] Data obtained from: U.S. Department of Commerce; Maritime Administration, Office of Maritime Manpower
[2] Robert J. Huszar, M.D., Emergency Cardiac Care (Bowie, MD: Robert J. Brady Co., 1974).



The left ventricle of the heart contracts during the systolic phase, forcing oxygen-rich blood onward and keeping up circulation. During the diastolic phase, the heart cavities expand and fill with blood. Blood pressure is read as a fraction having the systolic (maximum) pressure as numerator and the diastolic (minimum) pressure as denominator, such as 120/80. Photo credit: Robert J. Brady Company, "Emergency Cardiac Care" slide series.

Statistics aside, we can see that the number of heart attacks occurring aboard U.S. flag vessels is large enough to be of concern; this problem, if anything, will grow in the years ahead; and that of those who have suffered a heart attack in the last five years, a higher than normal percentage died.

In recent years, much interest has centered around cardiopulmonary resuscitation (CPR),[3] a set of emergency procedures whereby a person trained in basic cardiac life support principles can provide temporary artificial breathing and blood circulation for a heart attack victim who is suffering cardiac arrest. Cardiac arrest is when the heart suddenly ceases to provide sufficient blood circulation to sustain life. CPR, if initiated promptly and performed correctly, can prevent immediate death. As previously stated, the first two hours following a heart attack are the most critical since most heart attack deaths occur during this period. CPR has been effective as emergency pre-hospital treatment for many types of heart attacks (acute myocardial infarction, cardiac standstill, cardiovascular collapse) which result in cardiac arrest.

A common type of heart condition called ventricular fibrillation accounts for most deaths in heart attacks. Essentially, this means that the individual heart muscle fibers are beating irregularly and convulsively instead of in unison; this results in the heart being unable to pump blood throughout the body. Unfortunately, this phenonmenon is not self-correcting, nor will effective CPR be corrective. A procedure called "defibrillation"[4] must be employed to electrically shock the heart, stopping all muscular action and allowing the heart to reset itself and resume beating in a normal or near-normal rhythm, pumping blood.

CPR, in the case of ventricular fibrillation, is only a means of preventing biological death until defibrillation can be accomplished. Even then, certain other essential life-supporting procedures such as blood gas control and drug therapy must be performed to prevent a recurrence of the heart failure before the victim can be transported to an appropriate medical facility for the additional necessary care.

While the U.S. Public Health Service provides extensive shoreside medical and hospital facilities for merchant marine personnel, medical care at sea is not as comprehensive. On board, the master, chief mate or purser (if available) is usually responsible for administering medical care. The formal medical training of shipboard personnel is somewhat limited. Current Coast Guard original license regulations require all officers to possess a valid American National Red Cross or U.S. Public Health Service first aid certificate. Also, they must possess a currently valid certificate of completion of a CPR course given by the American National Red Cross or American Heart Association. On board reference material includes The Ship's Medicine Chest and Medical Aid at Sea,[5] which contains an excellent chapter on CPR. Ship/shore radio communications are also available to obtain qualified medical advice during an emergency that lasts more than a few hours. Another encouraging sign is that the maritime union schools are offering CPR instruction to both licensed and unlicensed personnel.

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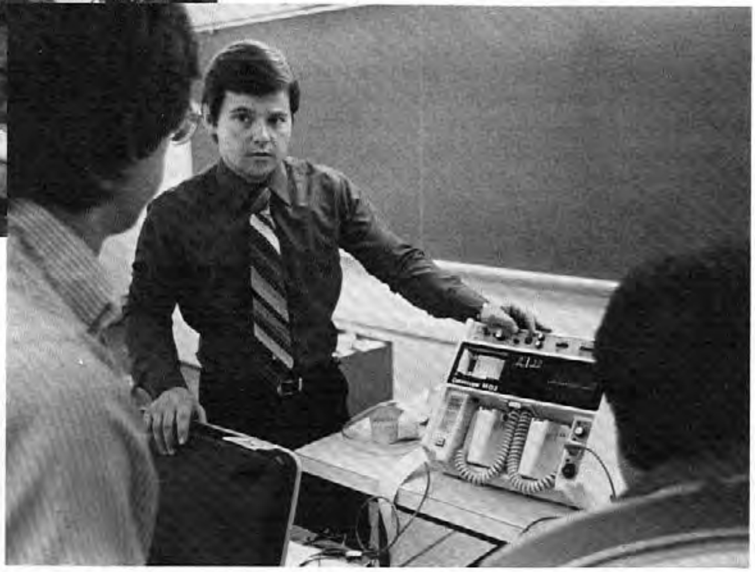
[3] U.S. Department of Health, Education, and Welfare, Public Health Service, The Ship's Medicine Chest and Medical Aid at Sea (U.S. Government Printing Office, Stock No. 017-029-00026-6, 1978).

[4] Huszar.

[5] U.S. Department of Health, Education, and Welfare, Ship's Medicine Chest.

Maryland Institute of Emergency Medical Services Systems (MIEMSS) instructor Lou Jordan shows LNG students how to insert an airway adjunct. Left to Right: C/M George H. Overstreet; C/E Robert B. MacGregor, El Paso Arzew; C/M George R. Sandberg; 3rd A/E David Taylor, Marine Floridian; 2nd A/E Leo T. Carey, Ultrasea. Photo credit: MIEMSS.



MIEMSS instructor Ronald B. Schaefer demonstrating the use of ECG monitor in diagnosing heart conditions.

NEW DEVELOPMENTS IN EMERGENCY CARDIAC TREATMENT TECHNIQUES

In recent years, technological advances in communications make feasible the transmission of an electrocardiogram (ECG) via satellite from a ship at sea to a hospital ashore. ECG monitoring is essential for proper diagnosis and prompt treatment of heart attack victims.[6] If the heart attack is a ventricular fibrillation, the ECG is utilized in conjunction with an electrical capacitive discharge device known as a defibrillator. ECG/defibrillators are commercially available as single compact, portable units[7] that can be utilized on board ships with a minimum of training for the operator.

On March 6, 1975 the National Maritime Research Center located at Kingspoint, New York conducted a test to determine if an ECG could be transmitted from a ship at sea to a hospital ashore for analysis, utilizing the "MARISAT" satellite system. On this date an ECG was sent from the LASH ATLANTICO, at sea off the coast of France, to North Shore University Hospital in Long Island, New York. From this test, it was determined that such communications with a Public Health Service hospital ashore are technically feasible and could extend comprehensive health care far to sea, and become a vital factor in emergency cardiac treatment.

.... (Continued on next page)

[6] Huszar.
[7] Datascope m/D3 Defibrillator, Datascope Corp., Paramus, New Jersey 07652

In November and December 1978, two paramedic instructors, Mr. Ronald Schaefer and Mr. Louis Jordan of the Maryland Institute for Emergency Medical Services Systems (MIEMSS), conducted a feasibility study course in advanced life support for two groups of students attending the ships officers' liquid natural gas (LNG) course at the Calhoon MEBA Engineering School in Baltimore, Maryland. The course was more advanced than basic CPR instruction and was designed to determine if officers on merchant ships could be trained with a minimum of effort to understand and operate the medical equipment and perform other necessary life-supporting functions that comprise emergency cardiac treatment. This 12-hour course consisted of a series of lectures on the physical and electrical anatomy of the heart, and recognition of life-threatening arrhythmias (disturbances or absence of rhythm in the heartbeat) due to heart disease and other causes such as accidental electrocution. It also included basic interpretation of electrocardiograms and the use of the ECG/defibrillator for correcting arrhythmias. The administration of drugs as part of advanced life-supporting measures was also discussed. The students involved were masters, mates, engineers and radio officers assigned to ships of the El Paso Marine Company and the Energy Transportation Corporation, two companies which have initiated major efforts in the transportation of LNG in U.S. flag vessels.

This advanced course was received with great enthusiasm by the students, who displayed exceptional aptitude. When working as a ship's team and conferring together, the students achieved the best results in a wide variety of simulated casualties. However, working separately, each individual still was able to perform more than adequately. The 12-hour study was pronounced a qualified success; the instructors feel that with approximately 30 hours of training in paramedic procedures and advanced cardiac care techniques, many lives could be saved that are lost at present aboard ships at sea.

MIEMSS instructor Lou Jordan shows LNG students how to install an intravenous lifeline as part of Advanced Life Support. Left to Right: Capt. James L. Stilwell, El Paso Southern; C/M William R. Daniels, El Paso Arzew; 3rd Mate Della Anholt, El Paso Southern; 1st A/E Richard C. Brown; 3rd A/E William J. Gorham. Back to Camera: 2 A/E Leo T. Carey, S.S. Ultrasea; Capt. Daniel Y. MacElrevey, El Paso Arzew. Photo Credit: MIEMSS.

Dr. R. Adams Cowley, Director of the Maryland Institute of Emergency Medical Services Systems, and Dr. John Stafford, Director of EMS Systems programs, have been very generous in providing the instructors to train the 58 LNG students. They have also discussed the feasibility of developing a satellite communication system utilizing the U.S. Public Health Service Hospital in Baltimore, Maryland, thus extending the services of that facility to ships at sea all over the world.

Many practical, legal and technical obstacles still remain to be overcome before use of the emergency medical equipment and paramedical techniques described in this article ever become widespread. However, the problem is not going to diminish with time; if anything, it will grow. Scientific interest in more fully developing these concepts is high, and progress is being made.[8] Certainly, the officer personnel of U.S. flag vessels have indicated a great willingness to be trained in advanced emergency cardiac treatment and to expend the effort required to become proficient in the use of ECG/defibrillation equipment. They realize all too well that they, personally, may be called upon at sea to help preserve a life threatened by a heart attack. No one wants to stand by helplessly, when with proper training and equipment he can take an active role in saving the life of a shipmate.

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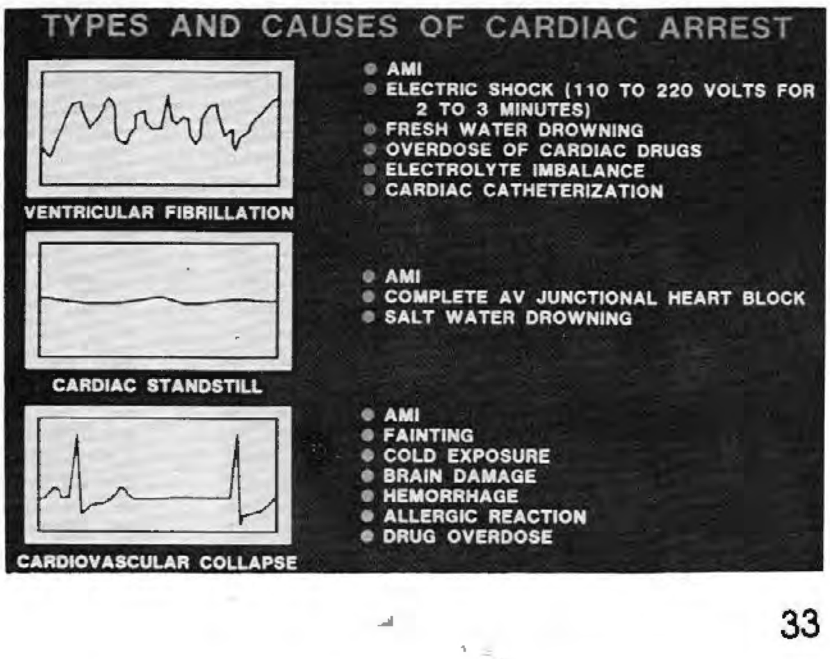
[8] "Feasibility Study for the Development and Use of the Satellite Communications System to Provide Shipboard Emergency Medical Service," NMRC-KP-155 (Kings Point, NY: National Maritime Research Center, 1976).

ABOUT THE AUTHORS

Lieutenant Commander John Lindak is Chief of the Hazard Evaluation Branch of the Cargo and Hazardous Materials Division at Coast Guard Headquarters. Commander Lindak graduated from the Coast Guard Academy in 1963 and served on board the cutters MCCOLLOCH and EASTWIND. He holds a Master of Science degree in chemical engineering from the University of Maryland. Upon completion of a tour in the Office of Research and Development at Headquarters, he served as engineering officer of the cutter HAMILTON during 1974-1975. Subsequent to this sea duty, he was assigned to the Marine Safety Office in Boston, Massachusetts.

Lieutenant Preston Harrison, USNR (Ret.), chief engineer--steam vessels, unlimited horsepower, graduated from the U.S. Maritime School in Sheepshead Bay, New York in January 1945. He has served aboard ships in all engineering capacities including chief engineer, and was also a machinery inspector ashore for Moore-McCormack Lines. During the Korean conflict, he served 5 1/2 years in active duty as an engineering officer on the USS PRICHETT DD561 and EOD/SWD officer with the Mine Force Pacific Fleet. His last Navy duty was as executive officer of the USS LOYALTY MSO457 in 1957. For the past 11 years he has been an instructor at the Calhoon MEBA Engineering School in Baltimore, Maryland. In 1969, the marine section of the National Safety Council awarded him its General Chairman's Award for a paper he presented on "Teaching Safety to Cadet Engineers."



Note: References to specific equipment manufacturers are for example only and are not intended to indicate Coast Guard endorsement.

Tanker Casualties and Pollution Prevention: ABANDON SHIP OR ACTION STATIONS?

by Commander Hugh D. Williams, USCG

(The opinions expressed in this article are solely those of the author and do not necessarily reflect those of the U.S. Coast Guard.)

INTRODUCTION

Vessel casualties are generally unforeseen occurrences which require immediate action to minimize damage, prevent the loss of the vessel and save the crew. In the case of loaded tankers, "damage control" becomes more complex, for actions must also be taken to preclude or reduce the loss of cargo, i.e., pollution prevention.

The essential elements for all damage control or vessel salvage operations are: (1) a preplanned course of action or contingency plan, (2) necessary support equipment and (3) knowledgeable and capable mariners dedicated to saving the vessel and cargo if humanly possible. The constitution of the contingency plan, support equipment and personnel will vary depending upon the progression and extent of the salvage operation. The plan might be a complex commercial salvage plan. The equipment might include massive anchors, ground tackle and several tugs. The personnel might be internationally reknowned salvage experts with years of salvage master and naval architecture experience. But that comes later! The purpose of this article is to stress that the front line or primary elements for ship salvage and pollution prevention must be on board, i.e., THE VESSEL'S CREW MUST ITSELF TAKE INITIAL ACTION! Contingency planning and equipment are addressed in this article specifically. The third ingredient--knowledgeable, capable and motivated mariners--will follow if the proper priority is placed on the former elements.

CONTINGENCY PLANNING

It would be interesting to listen to a tanker wardroom discussion on the topic of oil pollution prevention following a ship casualty. For example, a "soft" grounding forward could be assumed. The first item for discussion could be damage assessment. How could a small tank rupture be discovered? One answer might be to look over the side for oil. Another answer might be an ullage check in the cargo control room or through the tank ullage opening (widening oil mark on the ladder?), or a check of the sanitary system (oil drawn into the seawater suction would first appear in the captain's toilet). Next, methods to stop or reduce the leakage could be discussed. Sealing all the tank openings, i.e., vents, ullage, Butterworth plates, inert gas lines, tank tops, valve stem packing glands, steam smothering lines and so forth might be suggested.

Alternatively, someone might suggest that the holed tank's main suction (fill/discharge) valve be opened simultaneously with a corresponding valve in a slack loaded or empty tank. It might be concluded that both methods could reduce leaking by vacuum or diversion of cargo, respectively, with the potential to enhance diversion by using a cargo pump. If a pump is used it might be concluded that the pumping should continue until sea water is pumped, indicating a water bottom in the ruptured tank, a stabilized situation. The possibility that two tanks are ruptured could also be considered, leading to a decision that all ullages should be checked on all forward tanks. Piping damage as a result of the grounding would be a logical extension of a multiple hole type case. If so, the consensus might be that the tank(s) must be "buttoned up" until portable, over-the-top pumps can be inserted to remove cargo. The types and locations on board of all portable pumps could then be described by the chief mate and chief engineer.

A record of this wardroom discussion would be a pollution prevention contingency plan for the postulated casualty--a "soft" forward grounding. This record could be added to the ship's emergency operations manual, or equivalent, which would describe damage control techniques, fire fighting, emergency communications, etc. Subsequent monthly or bi-weekly wardroom discussions could address "hard" groundings forward or aft, structural failures, and other casualties which could lead to pollution, with a view toward preventing or minimizing the quantity discharged.

As each casualty scenario is examined and discussed, it will become apparent that two conclusions can be drawn: (1) a detailed knowledge of the vessel's piping system and cargo loading plan, coupled with rapid action can avert much pollution and (2) no tanker should sail without some minimum over-the-top, portable, salvage pumping capability.

The first conclusion costs nothing and needs no further elaboration. The second, the pumps, necessitates an investment which will require some justification.

THE CASE FOR PUMPS

Following a tanker casualty which results in a tank rupture, two short-term action phases exist. The first is immediate and involves use of undamaged fixed piping and/or pumps to drain off or transfer cargo and initially stabilize the tank. The second phase involves the transfer of additional cargo from the ruptured tank to preclude any possibility of future pollution as a result of trim or list changes to alter the vessel's status and the eductive effect of water circulation caused by either a current or motion when the vessel gets underway. The second phase must commence quickly if a viscous cargo is involved, due to the rapid cooling of the cargo in a ruptured tank (the heating coils are ou the tank bottom which is open to the sea).

Transfer of the cargo must be done by portable pumps, inserted through the tank tops either through the trunk or preferably a Butterworth opening with due regard for the hazards of the cargo (toxicity, flammability, etc.). The discharge hose can be placed into partially filled tanks until they are "pressed-up" and then into empty ballast tanks. Obviously, the vessel's trim and stability must be considered when cargo is transferred, especially under a grounding condition. The buoyancy provided by the ruptured tank is lost while the tank is open at the bottom and top. Any cargo transferred from this tank is additional ballast. In a bow grounding situation, the cargo should be pumped aft as far as possible. Pumping should continue up to the next high tide. Then the tank should be sealed, air pressurized to restore the tank's buoyancy (hopefully without blowing cargo through the bottom hole), and the vessel backed off. This most common type of salvage operation should be within the capability of all tanker crews, without assistance other than radio telephone advice from expert salvors. Following refloat, divers can make a damage assessment and temporary repairs before getting underway.

The pumps envisioned for such use are readily available, including the necessary hydraulic power units. Each tanker could be equipped with one or more electrically driven hydraulic pumps, arranged such that the vessel's main or emergency generators could supply the power. The hydraulic pumps would provide high pressure hydraulic fluid through fixed piping runs to quick connect supply and return fittings at each set of tanks. One or more hydraulically driven portable submersible pumps could be stowed on the main deck level with camloc equipped cargo discharge hose sections and lengths of hydraulic hose, ready for rapid hookup and insertion into a tank. Such pumps could also be used to dewater a flooded pumproom or engineroom, or by slinging overboard, to provide additional seawater to augment the fire pumps. One wonders whether the ARGO MERCHANT incident might have ended differently if one or two good salvage pumps for dewatering had been on board versus bringing them all the way from Elizabeth City, North Carolina.

An investment of approximately $50,000 per vessel would provide one power unit and two submersible pumps. Companies such as FRAMO (see illustration) offer a choice of several types of such equipment specifically designed for this purpose.

(Cont'd next page)...............................

The 237,000-ton VLCC SHOWA MARU, grounded near Singapore in January 1975. The tanker NEPTUNE, the first of many lightering vessels, prepares to come alongside. In grounding situations as this, pumps must be transported halfway around the world: transportation costs often exceed the initial cost of shipboard pump installation.

CONCLUSION

A suggested minimum tanker "salvage package," consisting of emergency cargo transfer pollution prevention procedures and a basic salvage pumping equipment inventory, should be developed as recommended tanker operating procedures; or, better yet, as an amendment to the results of the 1978 International Conference on Tanker Safety and Pollution Prevention. Under the auspices of IMCO, marine insurance industry representatives, tanker owners and national maritime safety representatives could debate the details. Insurance discounts for fully equipped vessels which not only carry the minimum equipment but also conduct drills for proficiency would provide the necessary incentive. Discounts are allowed on automobile insurance for shock absorbing bumpers and air bag restraints; why can't the marine insurance companies follow this example?

The too-familiar picture of tanker crews gathered on the fantail, awaiting evacuation as their grounded vessel floods or spews its cargo on the sea, must change. Crews must be trained, equipped and motivated to take action, pending assistance from government and commercial salvage forces. Tha old adage that one is less likely to be criticized for taking action versus inaction has never been truer--action stations!

Members of the Coast Guard's National Strike Force prepare to pump cargo from the SHOWA MARU's damaged cargo tanks using their portable, hydraulic driven, submersible transfer pumps. The men and equipment were brought from as far as North Carolina; other pumps were transported from Virginia.

ABOUT THE AUTHOR

Commander Hugh D. Williams, U.S. Coast Guard, is presently serving as an international maritime policy analyst in the Office of the Secretary of Transportation. He is a former Commanding Officer of the Atlantic Strike Team component of the Coast Guard's National (Pollution) Strike Force, engaged in providing assistance in spills of oil and hazardous substances.

Commander Williams has also served in Merchant Marine Safety billets and was trained as a military diver. He is a registered professional engineer and has authored several papers on vessel safety and pollution prevention.

in response . . .

The following letter was received in response to Commander Williams' article on the previous page. Comments from Proceedings readers are, likewise, encouraged and may be printed in whole or in part.

I consider the article, "Tanker Casualties and Pollution Prevention: Abandon Ship or Action Stations?," by Commander Hugh Williams, to be well written and comprehensive in depth and scope, particularly in the areas of personnel motivation, contingency planning, and support equipment.

The need is great for contingency plans for ship's officers. Ship's officers have the capability to internalize contingency plans which will ensure responsive action to preplanned methods of containing cargo spillage. Also, contingency plans provide the working tools for ship's officers which create an awareness of talents and capabilities available which can be applied at time of casualty to reduce or eliminate cargo loss.

Unfortunately, tanker industry management personnel for owners and operators have shown a lack of awareness regarding this great need to establish contingency plans for their tankers.

If Shell Asiatic had a contingency plan for the guidance of the master of the METULLA, the cargo loss would have been reduced 90 percent and the ship would not have been a total loss.

If Onassis had a contingency plan for the guidance of the master of the OLYMPIC GAMES, the cargo loss would have been reduced 95 percent.

If Marine Transport Lines had a contingency plan for the guidance of the master of the RICHARD C. SAUER, the cargo loss would have been reduced 90 percent.

A contingency plan would have saved the ARGO MERCHANT with 50 percent of her cargo still intact.

A contingency plan would have saved the AMOCO CADIZ with 70 percent of her cargo.

Unfortunately, the pattern of losses continues without any improvement and there will be no improvement until the tanker industry institutes contingency plans. Hopefully, on a voluntary basis; otherwise, on a regulated basis.

The most urgent need is to motivate tanker owners and operators. Unfortunately, the lack of awareness and initiative prevails even with tanker companies which have suffered recent losses.

Captain J. A. Englebrecht
President
Integrity Shipping Company
Philadelphia, Pennsylvania

FRAMO model TK4 portable, hydraulic driven, submersible pump being inserted into a tank. This pump compares closely with those used extensively by the USCG National Strike Force.

KEYNOTES (Cont'd from page 23)...

CERTIFICATES OF INSPECTION
(CGD 77-014)

This final rule, effective on January 25, 1979, amends the vessel inspection regulations and reflects changes in the types of Certificates of Inspection issued by the Officer in Charge, Marine Inspection, to different classes of vessels upon completion of an inspection.

In recent years the Coast Guard has expanded its role in the inspection of merchant vessels, both United States and foreign. As a result the Coast Guard issues new forms of Certificates of Inspection that were not previously issued.

There are also certificates that were issued to foreign vessels that are no longer used due to either obsoleteness or replacement.

Nautical Queries

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

DECK

1. When instructing a crewmember concerning the right way to lift a weight, you would instruct him to

A. arch the back to add strength to the muscles.
B. bend his knees and lift with his legs.
C. bend his back and stoop.
D. bend his back and stoop with arms straight.

2. Defective packages of military explosives may be recoopered

A. in the hold of the vessel.
B. on deck, by authority of the Master.
C. on deck, by authority of the Captain of the Port.
D. only at a shore facility.

3. If an alien stowaway is discovered aboard your vessel, his name must be placed on the

A. crew list.
B. alien crew list.
C. passenger list.
D. separate passenger list marked stowaways.

4. A polyconic projection is based on a

A. plane tangent at one point.
B. cylinder tangent at one parallel.
C. cone tangent at one parallel.
D. series of cones tangent at selected parallels.

5. When there are small differences between the heights of two successive high tides or two successive low tides, the tides are called

A. diurnal.
B. semi-diurnal.
C. solar.
D. mixed.

ENGINEER

1. When a disk-like centrifugal purifier is operated as a separator, priming of the bowl with fresh water is necessary before any oil is admitted to the purifier. If the bowl is not primed, the

A. oil has a tendency to emulsify in the bowl.
B. oil will be lost through the water discharge ports.
C. purifier will act as a clarifier at the discharge ring.
D. oil solids will be deposited only at the intermediate top disk.

2. Cams used to activate mechanically operated air starting valves on four-stroke cycle diesel engines should have which valve lift profile?

A. Abrupt lift with a short open period, and abrupt valve seating.
B. Gradual lift with a short fully open period, and accelerated valve closing.
C. Abrupt lift giving full valve opening for a long period, with gradual valve seating.
D. Gradual lift giving full valve opening for a long period, with a gradual valve seating.

3. Water hammer in steam lines can be best prevented by

A. keeping lines drained and insulated.
B. replacing all 90° elbows with capped tees.
C. throttling the steam supply valve.
D. keeping steam temperature below the saturation point.

4. Persistent knocking in one cylinder of a diesel engine could be caused by

A. faulty combustion in that cylinder.
B. low load on that cylinder.
C. sluggish piston ring action.
D. excessive piston cooling.

5. What percentage of oxygen in the atmosphere is required to maintain a steady flame in a flame safety lamp?

A. 3%
B. 7%
C. 10%
D. 16%

ANSWERS

Deck
1. B, 2. C, 3. D, 4. D, 5. B

Engineer
1. B, 2. C, 3. A, 4. A, 5. D

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office or marine inspection office of U.S. Coast Guard. Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all federal regulations are published in the Federal Register, printed daily except Saturday, Sunday, and holidays.) Following the title of each publication in the table below are the date of the most recent edition and the dates of the Federal Registers affecting each.

The Federal Register may be obtained by subscription ($5 per month or $50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington D.C. 20402.

	CG No.	TITLE OF PUBLICATION
	101-1	Specimen Examinations for Merchant Marine Deck Officers (2d and 3d Mate) (4-1-77).
	101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (4-1-76).
	108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). F.R. 7-21-72, 12-1-72, 6-18-75.
	115	Marine Engineering Regulations (8-1-77). F.R. 9-26-77, 12-4-78.
	123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-28-78). F.R. 8-17-77, 9-12-77, 10-25-77, 12-19-77, 1-11-79
	169	Navigation Rules - International - Inland (5-1-77). F.R. 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
	172	Rules of the Road - Great Lakes (7-1-72). F.R. 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
	174	A Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
*	176	Load Line Regulations (2-1-71). F.R. 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76.
	182-1	Specimen Examinations for Merchant Marine Engineer Licenses (2d and 3d Assistant) (2-1-78).
	182-2	" " " " " " " (First Assistant) (3-1-78).
	182-3	" " " " " " " (Chief Engineer) (3-1-78).
	184	Rules of the Road - Western Rivers (8-1-72). F.R. 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
	190	Equipment Lists (5-1-75). F.R. 5-7-75, 6-2-75, 6-25-75, 7-22-75, 7-24-75, 8-1-75, 8-20-75, 9-23-75, 10-8-75, 11-21-75, 12-11-75, 12-15-75, 2-5-76, 2-23-76, 3-18-76, 4-5-76, 5-6-76, 6-10-76, 6-21-76, 6-24-76, 9-2-76, 9-13-76, 9-16-76, 10-12-76, 11-1-76, 11-4-76, 11-11-76, 12-2-76, 12-23-77, 4-4-77, 4-11-77, 4-21-77, 5-19-77, 5-26-77, 6-9-77.
	191	Rules and Regulations for Licensing and Certification of Merchant Marine Personnel (11-1-76). F.R. 3-3-77, 8-8-77.
	227	Laws Governing Marine Inspection (7-1-75).
*	239	Security of Vessels and Waterfront Facilities (5-1-74). F.R. 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77. 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78, 11-16-78, 1-22-79
	257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). F.R. 9-26-77, 9-29-77, 12-19-77.
	258	Rules and Regulations for Uninspected Vessels (4-1-77); Ch-1, 3-17-78). F.R. 9-26-77.
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