PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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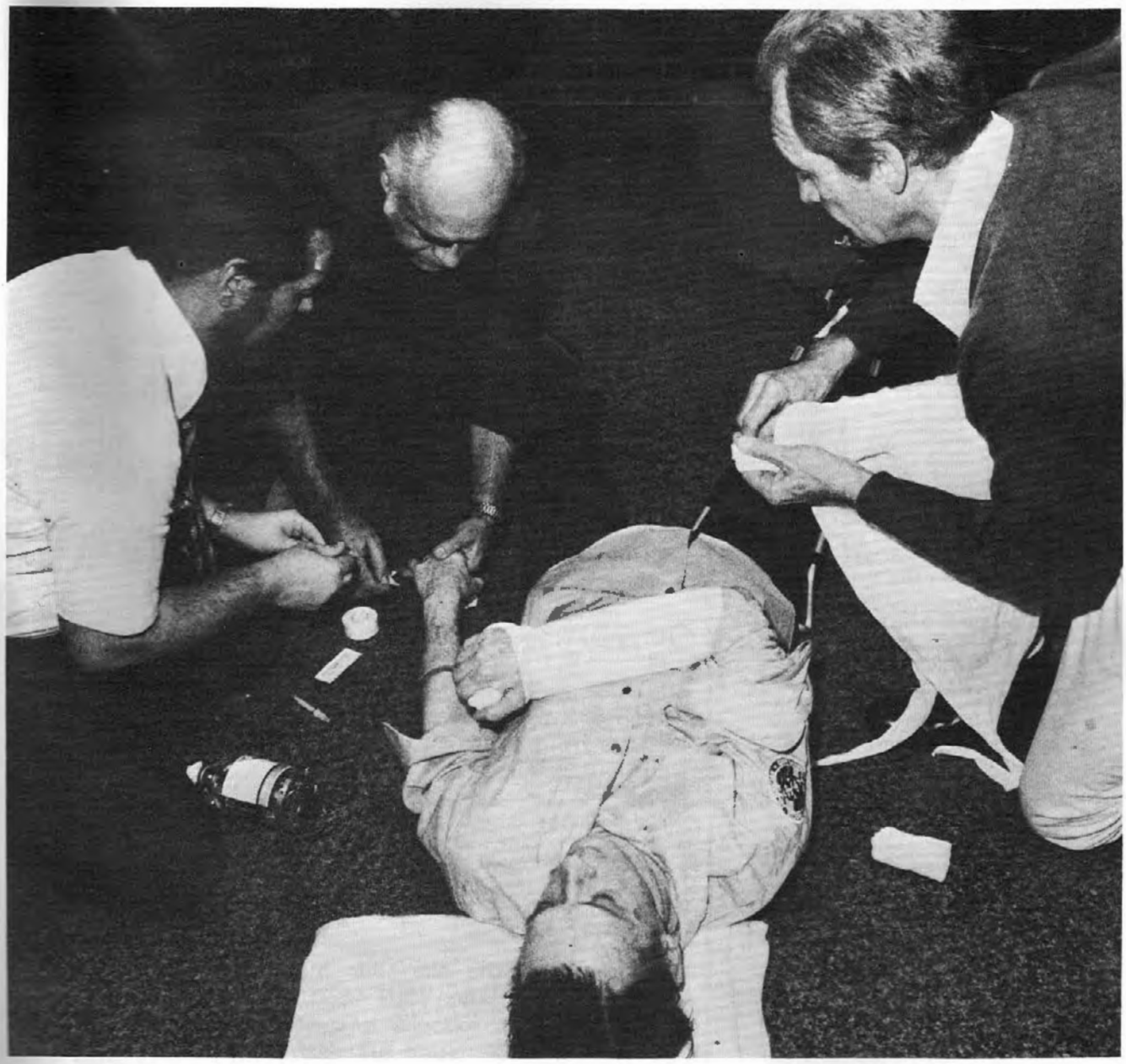

U.S. Department of Transportation
U.S. Coast Guard

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PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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Students of the Maritime Institute of Technology and Graduate Studies (MITAGS) react to a simulated casualty in the school's newest course, Emergency Medical Training. Upon successful completion of the class, these men will be nationally certified emergency medical technicians. MITAGS, founded in 1967 by the International Organization of Masters, Mates and Pilots, is currently undergoing extensive expansion. Find out more beginning on page 104.

maritime sidelights

NEW ANTI-EXPOSURE COVERALL APPROVED

An anti-exposure coverall has recently been approved by the Coast Guard as a Type V special purpose exposure PFD. This coverall is designed to provide extra hypothermia protection but is not an approved replacement for an "exposure suit." The suit was approved as Type V recreational and Type V commercial PFD. Because of its slow donning time in the recreational field, the coverall is an approved replacement for a required Type III PFD only when worn. Therefore, appropriate PFD's are still required on board if the coverall is not worn for the entire time afloat. In the commercial environment the suit is an acceptable substitute for a work vest, thus is only an additional item of equipment and not a replacement for the required PFD.

This is the first Coast Guard approved PFD of its kind, with others now pending. Established guidelines for approval and requirements for additional labeling are available. For further information, contact Ensign Steven Weiss or Mr. Wehr (G-MMT-3), U.S. Coast Guard Headquarters, Washington, DC 20593; (202)426-1444.

MAY 22 NATIONAL MARITIME DAY

President Carter has issued a proclamation designating May 22 as National Maritime Day, 1980. The occasion is celebrated each year to honor the men and women of all sectors of the maritime industry.

"Throughout the history of the United States, trade and shipping have made a vital contribution to the Nation's growth and economic vitality," the President said. "Today, the American Merchant Marine continues to aid the development of American enterprise and to foster the well-being of all American citizens by linking U.S. industries, farms and markets with our overseas trading partners.

"In addition, our Merchant Marine has shown valor and dedication in providing logistic support to United States military forces in times of national emergency."
(Reprinted from the AWO Weekly Letter of April 5, 1980)

VTS HOUSTON NEWLETTER

The Coast Guard Vessel Traffic Service in Houston plans to begin publishing its own newsletter soon and is developing a mailing list for this and other VTS related material. Those desiring to be placed on the list are requested to write Commanding Officer, Coast Guard VTS, Houston/Galveston, P.O. Box 501, Galena Park, TX 77547, or call (713) 674-8488 during regular business hours.
(Reprinted from the USCG Marine Safety Newsletter, Houston)

SHIPBOARD MEDICINE COURSE

In 1978 the IOMM&P established a one month Shipboard Medicine Course for their members at the Maritime Institute of Technology and Graduate Studies (MITAGS) near Baltimore.

Masters and Mates graduating from this course become nationally certified as Emergency Medical Technicians. Many of the Deck Officers serving on Lykes vessels have taken advantage of this opportunity. As a result, medical care on their ships has improved as shown by a recent happening.

Captain William H. Weiss, a recent graduate of the MITAGS course, Mr. James A. Powell (Chief Mate) and Mr. Kirk A. Peel (1st Asst. Engr.) on the SS CHARLES LYKES maintained the life of a crewmember over a two day period until air evacuation to a shore based hospital became possible. During that time they had to deal with several episodes when the heart stopped and an apparent blockage to breathing developed. Cardiopulmonary resuscitation, therefore, had to be used more than once.

The Master's skills acquired through the Shipboard Medicine Course at MITAGS and the knowledge of the two assisting officers undoubtedly contributed to the eventual safe evacuation of the crewmember. Without this background, the result might well have been a disaster.

We congratulate the officers involved in this outstanding treatment effort, and especially Captain Weiss for spending one month of his time taking the Shipboard Medicine Course.
(Reprinted from the Lykes Lines Safety Bulletin, issue no. 267, April 1980. For further information on MITAGS courses, see page 104.)

1981 OIL SPILL CONFERENCE

The seventh biennial Conference on the Prevention, Behavior, Control and Cleanup of Oil Spills will be held on March 2-5, 1981, at the Atlanta Hilton, Atlanta, Georgia. More than 1,500 delegates and exhibitors from all over the world are expected to attend. Sponsors of the international conference are the American Petroleum Institute, the U.S. Environmental Protection Agency, and the U.S. Coast Guard.

Technical, scientific, and socio-economic-legal papers for presentation at the conference are invited. The 115 papers selected will be chosen from abstracts submitted by June 2, 1980. These abstracts must he in English, 200 to 250 words, and information being reported on must not be already described in any other open technical or scientific publication. Authors will be notified of selection by July 28, 1980.

The conference will stress spill prevention, development of new techniques for use in inland, coastal, deepwater and Arctic oil spill control operations, and spill liability and damage assessment. Papers are particularly sought in clean-up operations, cooperatives, training techniques, monitoring,

Continued on next page.....

new prevention and control techniques, new equipment developments, case histories of specific spills, oil transfer practices, offshore platform operations, deepwater port operations, dispersants, fate and effects of oil, natural resource damage assessment, and national and international socio-economic-legal aspects.

Submit abstracts **no later than June 2, 1980** to:

CDR Ted Leigh (G-DMT/54)
U.S. Coast Guard Headquarters
Washington, DC 20593
(202) 426-2700

SEVENTH OCEAN ENERGY CONFERENCE

Captain Jacques Cousteau, noted oceanographer and environmentalist, Governor George Ariyoshi of Hawaii, and Congressman Don Fuqua of Florida, chairman of the House Committee on Science and Technology, will speak at the Seventh Ocean Energy Conference to be held June 2-5 at the Shoreham Hotel in Washington, DC.

Captain Cousteau will speak at the June 3 banquet where he will present his perspective on ocean energy. Governor Ariyoshi, the keynote speaker at the luncheon on June 3, will sum up his state's substantial activities in ocean energy. Congressman Fuqua will open the conference with a discussion of legislation pending to establish U.S. policy and goals regarding the development of ocean energy.

More than 800 persons from all over the world are expected to attend the conference, which has the theme "Ocean Energy - A Time of Opportunity, A Time for Action." The conference will explore all aspects of the conversion of energy from ocean thermal gradients (OTEC), waves, currents and salinity gradients. Highlights of the four-day conference include:

Presentation of more than 70 papers on the status of ocean energy development, including highlights of OTEC demonstration systems, Mini-OTEC and OTEC-1, and international programs.

An executive seminar, providing an intensive, senior-level presentation of key ocean energy technical and program issues and goals.

Plenary session with a broad overview of U.S. and international ocean energy programs.

Plenary workshops with working group reports on needed actions to meet conference goals.

An expanded exhibits program demonstrating the capabilities of the ocean energy industry.

Gibbs & Cox, Inc., naval architects and marine engineers, have organized the conference on behalf of the Ocean Systems Branch of the U.S. Department of Energy. For further information, contact Mr. Robert Scott, Gibbs & Cox, Inc., 2341 Jefferson Davis Highway, Arlington, VA 22202.

GREEN BUOYS TESTED

Are green buoys more visible than black ones? Mariners cruising off Miami, Florida and in the Savannah River in Georgia will be able to help the Coast Guard find the answer.

As a part of a nationwide test, one black buoy in the Miami Main Channel (lighted buoy #3) and one black buoy at Bloody Point Range at the entrance to the Savannah River (lighted bell buoy #7) have been replaced with similar green buoys.

Miami Main Channel lighted buoy #3 is located one mile east from Government Cut, the entrance to Miami Harbor. It is 8 feet in diameter, 26 feet long, weighs 13,000 pounds, and is held in place by an 8,500-pound sinker. Bloody Point Range lighted bell buoy #7 is located 16 miles east of Savannah and has the same measurements of the Miami buoy.

The Coast Guard said that green daymarks are in use now on beacons in the U.S. and have received wide acceptance. Green buoys have been in use for some time outside of North America and, in fact, have been recommended by the International Association of Lighthouse Authorities for Europe and other countries.

If you sail the areas noted, compare the two colors and send comments in writing to the Commander (oan), 7th District, 51 SW 1st Ave., Miami, FL 33130.

(Reprinted from the Commandant's Bulletin, *issue 13-80)*

The publication load for the month of April was exceptionally light. Aside from local rulemaking efforts (drawbridge regulations and safety zones), only seven projects were published. These included two final rules, one interim final rule and four proposed rules.

On 2 April 1980 the final rules on CGD 76-033A, Exposure Suits for Great Lakes Vessels, and the interim final rules on CGD 79-081A, Evaluation Programs for Licensing and Certification of Foreign Tank Vessel Personnel were published. The third final rule was not published until 21 March, when Tank Vent Piping for Great Lakes Vessels (CGD 79-083) appeared.

Four proposed rules were also published. The first of these, CGD 80-02, revised 46 CFR parts 30 and 151 and was published on 7 April 1980. The second proposed rule, Special Service Load Lines Vessel Operations During Hurricane Season (CGD 79-142), was published on 21 April 1980. The final proposed rules published on 1 May 1980 both pertained to the Outer Continental Shelf. These were CGD 78-160, Outer Continental Shelf Activities Regulations, and CGD 79-152, the Rules for Tank Vessels Transferring Outer Continental Shelf Oil.

Continued on next page.....

KEYNOTES.....

The Tanker Safety and Pollution Prevention Regulations have been removed from the Keynotes section. The final rules on this package have all been published with the exception of CGD 77-058(b)(c)(d), Segregated Ballast and Tank Cleaning Regulations, scheduled to appear in June of this year.

There are no new regulatory efforts underway this month and no public hearings are scheduled in May or June.

Any questions regarding regulatory dockets or companies and individuals wishing to speak at public hearings should notify Capt. P. J. Danahy (G-CMC/24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20593; (202)426-1477.

* * *

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS
CGD 74-44, 74-44a

These regulations will redefine and establish qualifying criteria for the certifying of individuals engaged in the carriage and transfer of dangerous cargoes in bulk.

It has been found that most pollution incidents are the result of personnel error; consequently, the minimum qualifications of persons involved in handling polluting substances should be specified.

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New notices of proposed rulemaking (NPRM's) which were anticipated in June have been delayed and are now scheduled for publication in April of this year under new Coast Guard docket numbers 79-116 and 79-116a.

REVISION OF ELECTRICAL REGULATIONS
CGD 74-125(A)

This regulation will constitute a general revision and updating of the electrieal regulations to conform with latest technology. It will include steering requirements for vessels other than tank vessels.

This revision is occurring because industrial standards for electrical engineering have changed in the past few years, and the regulations must be brought up to date to reflect current industry practices.

An initial NPRM was published on 27 June, 1977 (42 FR 32700). A supplemental NPRM was published as CGD 74-125A on 3 March, 1980 (Part VII).

NEW TANK BARGE CONSTRUCTION
CGD 75-083
UPGRADE OF EXISTING TANK BARGE CONSTRUCTION
CGD 75-083a

This action is comprised of two regulatory projects centered on tank barge construction standards. These projects were the result of a Presidential initiative of 17 March 1977, directing a study of the tank barge pollution problem. One project will address new barge construction while the other will pertain to existing barges. Regulatory documents for both will be published at the same time and joint public hearings have been held.

In July 1977, the Coast Guard began a reexamination of the tank barge construction standards. It was determined that new construction would be treated separately from existing barges. An advance notice of proposed rulemaking (ANPRM) was then issued to gather additional data and assess impacts related to existing barges.

The new NPRM on tank harge construction, withdrawing the prior NPRM and the ANPRM for existing tank harges, was published as part VI of the 14 June 1979 Federal Register (44 FR 34440 and 44 FR 34443, respectively).

Public hearings were held on the dockets as follows: 2 August 1979, Washington, DC; 15 August 1979, Seattle, WA; 23 August 1979, New Orleans, LA; 5 September 1979, Washington, DC; and 7 September 1979, St. Louis, MO. The comments given at the hearings have been incorporated in the docket.

On Thursday, 8 November 1979 a Federal Register notice extended the comment period on the project. This extension was based on the continued public interest and ran to 1 December 1979.

A Supplementary Notice was published as Part III of the 13 March 1980 Federal Register (44 FR 16438). This notice informs the public of a deferment in the rulemaking process for these dockets. The comments received have raised significant questions concerning these proposals. It was decided that the entire tank barge pollution problem warranted a carefully considered study by a recognized independent body. The National Academy of Sciences/-National Research Council will conduct the study. Part of the study, a two day workshop, was held on 15 and 16 April 1980. The study will be completed by the end of January 1981. The Coast Guard will defer any further rulemaking on these proposals until completion of the study and the dates in the proposals of 14 June 1979 are no longer valid. If the Coast Guard should pursue further action on these proposals, a new time table will have to be developed.

Anyone wishing to obtain copies of the rulemaking may do so by contacting Capt. P. J. Danahy, Marine Safety Council (address is given in the introduction to the Keynotes section).

POLLUTION PREVENTION, VESSELS AND OIL TRANSFER REGULATIONS
CGD 75-124a

This regulation would reduce accidental or intentional discharge of oil or oily wastes during vessel operations.

The basis of this regulation is threefold. First, there is the need to reduce the number and incidence of oil spills. Second, this regulation will help to clarify the existing rules. Finally, this regulation covers the additional requirement for oil-water separators under the 1973 International Convention for the Prevention of Pollution from Ships.

An NPRM was published on 27 June 1977 (42 FR 32670) and a supplemental NPRM was published 27 October 1977 (42 FR 56625). Due to substantive changes in the regulation, a new NPRM is scheduled for April 1980.

Continued on next page.....

KEYNOTES.....

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS GCD 77-058(b), (c) and (d)

This four-part regulation was initiated when President Carter directed the Secretary of Transportation to issue new rules for oil tanker standards, which were to include segregated ballast on all tankers and double bottoms on all new tankers which call at American ports. The provisions of these proposed regulations have been changed by the February 1978 Intergovernmental Maritime Consultative Organization (IMCO) Conference to include Crude Oil Washing (COW) and Clean Ballast Tanks (CBT).

The NPRM was published 16 May 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM was issued on 12 February 1979 (44 FR 8984). Public hearings were then held in March in Washington, DC and San Francisco, CA; 265 comments were received on the docket and analyzed. The final rules are scheduled to appear in June 1980.

CONSTRUCTION AND EQUIPMENT EXISTING SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES CGD 77-069

These regulations would amend the current ones to include the substantive requirements of the "Code for Existing Ships Carrying Liquefied Gases in Bulk," adopted by the Intergovernmental Maritime Consultative Organization (IMCO). The use of liquefied gas has increased, as have the problems associated with it. Due to its unique properties and the dangers associated with them, new regulations are being drafted. The environmental impact statement and regulatory analysis were completed in February 1979 and an ANPRM on these regulations is anticipated in September 1980.

LICENSING OF PILOTS CGD 77-084

This regulation takes into account the problems caused by increased ship size and unusual maneuvering characteristics. The proposal would require recency of service for each route upon which a pilot is authorized to serve, licensing with tonnage limitations commensurate with pilot experience, and consideration of ship-handling simulator training for pilots of very large vessels. A regulatory analysis and work plan were completed in October 1978. An NPRM is expected in May 1980.

REVISION OF 46 CFR 157.20-5 DIVISION INTO THREE WATCH REGULATION CGD 78-037

This revision would have required an adjustment in vessel manning requirements, to bring them in line with current legislation. It would change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 will not be published, as the docket has been withdrawn.

TANK VESSEL OPERATIONS REGULATIONS, PUGET SOUND CGD 78-041

This regulation governs the operation of tank vessels in the Puget Sound area. It was initiated to reduce the possibility of environmental harm resulting from oil spills in Puget Sound. This is to be accomplished by governing the operation of tankers and reducing the risk of collision or grounding.

Former Secretary of Transportation Brock Adams signed a 180-day Interim Rule on 14 March 1978 prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in the Federal Register of 23 March 1978 (43 FR 12257). An ANPRM was published 27 March 1978 (43 FR 12840). An extension of the interim rule was published in the Federal Register in order to allow the Coast Guard adequate time to complete this rulemaking.

The public hearings scheduled 11 and 12 June in Seattle, Washington, 13 June in Mt. Vernon, Washington, and 14 June in Port Angeles, Washington have been completed and all the comments received have been entered in the docket files for consideration. The extension of the interim navigation rule was published 21 June 1979 (44 FR 36174). This extension was effective 1 July and will be in effect until the Coast Guard prints notice of its cancellation. Copies of documents or the transcripts of the hearings may be obtained by writing to the Marine Safety Council. A final rule on the docket is currently expected in December 1981.

EIGHT-HOUR DAY VOLUNTARY OVERTIME CGD 78-146

This docket is a review of the Eight Hour Day, Voluntary Overtime regulation in 46 CFR 157.20-10, which states that no licensed officer should be required to be on duty more than eight hours per day except in extraordinary circumstances. Existing regulations, however, do not address overtime or consider any possible "fatigue factor." Recent Coast Guard studies have shown that this factor has a profound effect on reaction time and judgement, therefore the regulatory project has been withdrawn.

PERSONNEL JOB SAFETY REQUIREMENTS FOR FIXED INSTALLATIONS ON THE OUTER CONTINENTAL SHELF CGD 79-077

This regulation is concerned with the health and safety requirements for installations engaged in oil field exploration and development. This action was mandated by pending Outer Continental Shelf legislation. It will provide more comprehensive protection for personnel employed in vessels and installations in the oil trade. The work plan received by the Marine Safety Council (MSC) in early July calls for an NPRM in March 1980.

SHIPBOARD NOISE ABATEMENT STANDARDS CGD 79-134

These standards will establish acceptable sound levels for each of

Continued on next page.....

the various vessel compartments based on the latest technology. The standards will differentiate acceptable sound levels for both existing vessels and new vessels, acceptable methods of compliance, and will establish a hearing conservation program.

During the development of these standards, the U.S. Naval Ocean Systems Center (NOSC), San Diego, California was contracted by the Coast Guard to evaluate sound levels aboard several U.S. merchant vessels, to study the data obtained, and then to define the extent of the noise problem. Based on this data and other information available, they were asked to recommend a set of noise levels to be used in the control and/or elimination of the shipboard noise problem for the proposed standards.

This study has been completed. Copies are available through the National Technical Information Service (NTIS), Springfield, Virginia 22161; request NOSC technical documents numbers 243, 254, 257, 267 and 405.

PERSONNEL AND MANNING STANDARDS FOR FOREIGN VESSELS CGD 79-081(A)

This regulation, deemed necessary to reduce the probability of oil spills, would establish minimum manning levels for foreign tank vessels operating in U.S. navigable waters. It would also establish procedures for the verification of training, qualification and watchkeeping standards. Interim final rules were published on 7 April 1977 (45 FR 23425).

PERSONNEL SAFETY AND HEALTH REQUIREMENTS FOR INDUSTRIAL VESSELS CGD 80-15

Similar to 79-077, thia regulation covers the vessels engaged in exploration, supply and support on the Outer Continental Shelf (OCS). Mandated by pending OCS legislation, this project covers the growing fleet of vessels which perform the variety of industrial functions involved in the exploration and development of offshore resources. The regulations, designed to provide a more comprehensive personnel protection, are scheduled for an advanced notice of proposed rulemaking (ANPRM) in October 1980.

* * *

A complete listing of all Coast Guard proposed regulations, both "significant" and "non-significant," appeared in the Thursday, February 22, 1980 Federal Register (45 FR 13312).

THE COAST GUARD HAS NO PUBLIC HEARINGS SCHEDULED AT THIS TIME FOR MAY OR JUNE.

NOTE: The April Keynotes contained an error in the introductory paragraph. CGD 79-066, COLREGS Demarcation Line, Boston Harbor, was published in the Federal Register of 10 March 1980, page 15175, not in the 6 March issue as noted.

The R.E.O. Looks at Radar

By W. H. Lindsay

The opinions or assertions contained herein are the private ones of the author and are not to be construed as official or reflecting the views of the Commandant or the Coast Guard at large.

You are master of a vessel proceeding to sea and have just dropped the pilot. Visibility is bad and the forecast is for worse. The brand new 10cm radar that the company just paid $20,000 for has just gone blank. The 3cm is giving a poor presentation of the close-by rocky coastline and seems to be getting worse. You call your radio operator (RO/REO), electronics technician (ET), whatever, to the bridge. He advises you that the high voltage supply to the picture tube on the 10cm has failed and you have no spare. He can tune the 3cm, but should do so soon while he still has targets, but he wants to stop the antenna on target to do so. Poor visibility and no radar! The U.S. Coast Guard says the vessel shall not sail without an operating radar, but neither the Coast Guard or FCC does other than specify the bands on which radars may operate. Would you by now agree that it is high time that some sort of performance and/or reliability standard be developed for a navigational aid as vital as radar? The author of this little complaint, as the RO/REO/ET you called to the bridge, would like to get in his two cents worth before the Coast Guard, FCC or whoever, sets the standards, does so, and effectively freezes input.

ENVIRONMENTAL TESTING

Many radars that work fine under laboratory or factory conditions supplied by public utility power lines, become totally unreliable after a short time in a shipboard environment. When the company buys that new radar, you hope that it will fail rarely, if at all. In order to be reasonably sure of this, it should be subjected to several cycles of over and under voltage and line frequency variations at least double that which could be expected in the worse case where they would be installed.

All major components should be subject to appropriate vibration, temperature, and humidity tests. The indicator, T/R unit, power supply if separate, and any other items external to major units should be cycled on and off an appropriate number of times, subjected to high and low temperature, high humidity, and vibration.

While you hope your new radar will never fail, experience tells you otherwise. When that time comes and it does fail, the simpler the radar is the sooner it will be back in service. The simple radar has fewer things to go wrong to begin with, hence, other things being equal, it is more reliable, as well as possibly cheaper. No matter how sophisticated a radar is, no matter how convenient some additional features such as "north up," EBM (electronic bearing marker), AFC (automatic frequency control), etc. are, it is useless if not operating. If you must have these extra features, most of them with the exception of AFC, can be found in a separate indicator, switchable between your basic relative motion radars. There is at least one good anti-collision indicator with all these features, and more, presently on the market which is sold independently from the radars from which it will get its information.

SERVICEABILITY

When that inevitable failure does occur, its correction at sea will be much faster and easier if some thought has been given beforehand to serviceability. Five things are vital.

a. *Accessibility.* All electronic components are subject to possible failure. If the component in question is hidden behind another subassembly, which in turn is behind a hinged instrument panel, which is in turn behind a bolted access door, in-circuit proof of whether or not that particular component is at fault is going to be more cumbersome than if it was out front. Electronic servicing was greatly advanced by the advent of the printed circuit board. Yet some designers negate the inherent better serviceability of the printed board by permanently soldering them in with short leads encased in a welded enclosure where they are completely inaccessible. Shielding doesn't have to be designed like a bank vault to be effective. To the greatest extent possible circuit boards and other units should be removable on a plug-in basis.

b. *Service information,* i.e., the technical manual and schematic. No ship-owner should ever buy a radar that does not include complete service information in the language of the technician who must service it. Schematics should be large and well printed. There is currently on the market a radar whose service manual is woefully incomplete and erroneous, and whose schematics have been so reduced in size and poorly printed as to be totally unreadable. Where it is necessary to put schematics on more than one page, the connections from one schematic to the other should be clearly identified, or be accompanied by an easily followed interconnection diagram. There should be layout drawings to clearly identify major and minor components.

Detailed drawings of front-end components should clearly show construction and operation of such items as crystal mixers, probes, etc. Printed circuit board drawings should be liberally supplied with voltage readings, and wave forms, especially at test points. These should be numerous and clearly identified. In general, a multiplicity of test points is preferable to a few built in meter positions.

c. *Spare parts stock on board.* Many manufacturers today are designing their 10 and 3cm radars to be exactly alike except for necessary differences in front-end parts. There is much to be said for this. Except for front-end items, only one set of spares need be carried. There is an argument for going even further and having both radars identical 10cm or 3cm units. In this case only one set of spares is required, and in addition it should be possible to design them so that all major subassemblies are interchangeable. It would not take a great deal of ingenuity in these circumstances to create at least one operating radar out of two radars malfunctioning in different sections.

d. *Need for tools and instruments.* Your ET/RO cannot work effectively without a minimum of these. Most of the items should already be aboard. Deserving mention are any special tools such as klystron, tuning tools, crystal, wrenches, etc. These should be duplicated in case of loss. A good VOM and a basic oscilloscope are essential.

e. *Factory training.* It is a prerequisite that your shipboard RO/ET, etc., has had a basic background in electronics servicing, with at least one good general course in radar. In addition there must be some familiarization on the particular set you have aboard. Assuming a relatively simple, well designed radar with a good manual, and schematics as outlined above, a really good RO can do much toward familarizing himself just by reading the manual and going through the equipment with a meter and scope while it is still in good operating order.

Much can be learned by an informal briefing by a cooperative shoreside factory authorized serviceman and by working with him whenever he is called. Much better, but not generally available, would be periodic short factory sponsored training courses at the major sign-on ports. It is the author's opinion that the shipping industry should persuade the manufacturers to do this. I repeat, this presuposes a good general background in radar. The factory cannot be expected to impart basic knowledge.

IMPROVING RELIABILITY AND SERVICEABILITY

Having covered the radar in general, let's take a quick trip through the equipment from antenna to PPI viewing scope and see what we can do to improve reliability and serviceability. Due to the fact that the front-end of the receiver cannot be tuned without targets, it is highly desirable to have sufficient control over the antenna drive so as to be able to "aim" the antenna on targets. This is not possible on all the radars on the market today. The antenna drive unit should of course be mechanically rugged to withstand heavy wind loading, and on some ships, severe vibration at the masthead. It should be impervious to moisture, particularly wind driven salt spray. Environmental testing should be done to insure this. The wearable parts, especially the drive components, should be easily replaceable. Access plates should be on retainer chains. These parts have been known to blow away.

This is the place to mention a couple of items that are the responsibility of the naval architects and shipyards, specifically the location of the antenna and the design of the antenna platform itself.

All service on the antenna is done under difficult conditions. If the service personnel are not subject to stack gas, then they are buffeted by strong winds. There should be some sort of tool and parts receptacle welded to the platform or mast convenient to the antenna pedestal to prevent tools and parts from being blown away. The platform itself should be sturdy, and as wide and as easily accessible as reasonably possible, and should completely encircle the antenna pedestal. a safety cut-off switch should be, and usually is, provided on the access mast. Some sort of breathing tube, or other provision to prevent breathing stack gas would be desirable. It should be borne in mind that no personnel should ever be placed directly in front of a live radiating antenna. Severe eye injury or other physiological damage could occur.

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RADAR.....

There are vessels on which the antenna has been installed on the foremast, presumably to avoid radar blind spots caused by masts and rigging. If the indicator viewing scope (PPI) presentation is that much improved, then of course such a location is justified. However, it should be recognized that this complicates reliability and service problems since the transmitter/receiver (T/R) unit must be located no further than the associated mast house to avoid losses in long wave guide runs. With the T/R unit located several hundred feet from, and several decks below the indicator unit in the wheelhouse, this means a lot of running back and forth when doing any type of service job, especially a tuning job on the receiver. In addition, the location in the mast house usually means the T/R unit is exposed to more dirt and humidity than if it were on the bridge. It would be generally more desirable if a radar mast atop the wheelhouse could be built tall enough to give the radar scanner a clear view over any other structures on the ship. From the antenna the signal travels both ways through a wave guide or other transmission line to the T/R unit. This wave guide should be kept as short and as free from bends as possible. Long horizontal runs should be avoided. the whole wave guide run should drain from top to bottom with a drain hole to prevent accumulation of moisture.

The T/R unit should be shock mounted. Automatic frequency control (AFC) is today considered a dubious advantage, and in some modern radars has been replaced by manual control. While the location of the T/R unit is to an extent governed by where the wave guide enters the house and available space in the compartment concerned, it still should be located so that it is convenient to get at and so that it has ample room around the access door. there should be a place to tie the door back out of the way, or other positive provision made to keep the door from slamming shut as the vessel rolls.

TESTING EQUIPMENT

If the particular radar being considered includes an echo box option it should be purchased, as at sea where there are no targets it is about the only way that any indication of radar operation may be gained. The manufacturers should also consider adding any other indicators of radar performance such as standing wave ratio (SWR) meters, receiver noise level indicators, etc., that can economically be included.

From the T/R unit the signal goes to the radar indicator which includes the plan position indicator (PPI) viewing screen and associated display controls and circuits. This unit should be shock mounted. The location of the indicator will be governed primarily by its convenience for the navigating personnel who will use it and its relation to other equipment on the bridge. After satisfying these primary considerations, the next items would be the same convenience of service accessibility mentioned in connection with the T/R unit. Lastly, the closer the indicator is to the T/R unit the better. It will make for shorter cable runs as well as more convenient servicing.

Considerable simplification of the basic radar indicator unit could be accomplished by elimination of the "true bearing" or "north up" presentation, leaving this feature to the more sophisticated anti-collision indicator. By so doing, it could be possible to eliminate the control transformer, differential generator and servo amplifier from the basic indicator.

While the author does not presume to instruct the manufacturer's engineers in details of radar design, he would none the less appreciate reasonable consideration of the problems faced by those of us who have to maintain the equipment when the ship is underway. If this ltle essay does anything at all to accomplish this, it will have succeeded in its purpose.

(Reprinted courtesy of Safety at Sea, *January 1980)*

About the Author

William H. Lindsay

W. H. Lindsay attended the New Mexico Institute, Washington State University, and the Technical Institute for Marine Electronics. He spent eight years as a mining company electrician and two years in electronic manufacturing.

Mr. Lindsay has spent the last 30 years as R/O and REO on numerous freighters, tankers and passenger ships, and is presently working aboard the S/S KEYSTONE CANYON. He is a member of the American Radio Association.

Lessons from Casualties

In June 1979 five men died due to lack of oxygen in a ballast tank of a lifting barge undergoing cold work repairs and maintenance. The barge was moored in Curacau Harbor, Netherlands, Antilles when the accident happened. While the results of a formal inquiry have not yet been published, the following initial information has been obtained from the local marine chemist.

At approximately 0900, a workman opened the access fitting the starboard side ballast tank, located just forward of the after peak tank. He then, for reasons unknown, entered the tank and immediately collapsed, falling to the bottom of the tank. The ballast tank is 20 feet high and contained water to a depth of 2 feet on the day of the casualty. A second workman nearby quickly descended into the tank, attemptin a rescue. He too collapsed and fell to the tank bottom, unconscious. Next, three divers who had just completed cleaning the barge's external underwater hull and had climbed back to the main deck, arrived at the access to the ballast tank. One by one they entered the tank, without oxygen breathing equipment, and were overcome immediately. The master of a work vessel in the vicinity of the barge noticed the commotion and came aboard the barge. He observed the five men floating unconscious in the water at the bottom of the ballast tank. Without entering the tank, he withdrew to raise the alarm. An emergency team from the local fire department, properly equipped with breathing apparatus, soon arrived and brought the casualties out of the tank. All efforts to revive the five men were unsuccessful.

Subsequent tests showed that the ballast tank atmosphere contained only 4 percent oxygen by volume. As discussed in a previous article (*Proceedings* Vol. 36, No. 4, May 1979, p. 91), an atmosphere containing only 6 percent oxygen by volume will cause unconsciousness within a few seconds, followed by convulsions and immediate death. Therefore, once each of the five victims lowered himself far enough into the ballast tank to breathe the depleted oxygen environment, he probably lost consciousness and fell. Death could have occurred as a result of the fall from the ladder, asphyxia, or drowning in the two feet of water in the tank bottom. The conclusion of the above referenced *Proceedings* article is worth repeating:

"Accidents due to oxygen depletion in confined spaces can occur aboard any vessel, from the largest tanker down to the smallest fishing boat. Age, experience, or even training does not grant immunity from this type of casualty. Confined space entry accidents frequently result in death for both the person originally entering the space and for the well-intentioned but untrained and unequipped rescuers. These deaths are avoidable, yet they occur with a tragic regularity.

"Personnel entering enclosed spaces must be instructed in the recognition of possible hazards and also in proper entry procedures. Tank entry procedures must be well-defined, well-understood, and strictly followed. Providing sufficient training and equipment for back-up personnel is also a must. Finally, frequent repetition of this training/instruction will serve to reinforce awareness of the hazards of oxygen-depleted spaces.

"STOP—THINK—PREPARE before entering any enclosed space. A minute of preparation might save your life, and the lives of those who could die trying to save you in the event of an accident."

THE MARITIME INSTITUTE OF TECHNOLOGY AND GRADUATE STUDIES

Simulation training—it's the alpha and omega of the Maritime Institute of Technology and Graduate Studies (MITAGS). Once a pioneer in the development and use of simulators for marine training, MITAGS continues to lead the way in a field which has gained worldwide popularity.

Under the direction of a man with 27-plus years of simulation experience, the school makes extensive use of simulators in training deck officers to make rapid, accurate decisions when faced with potentially dangerous or emergency situations. Obviously, learning from mistakes is not a suitable means of gaining experience aboard today's outsized vessels—if the wrong decision is made, one may not survive to do it right the next time!

MITAGS was officially founded in 1967 by the International Organization of Masters, Mates and Pilots (IOMM&P) and its contract companies in response to a deck officer shortage during the Vietnam conflict. The IOMM&P created for its members a license advancement program called the Masters, Mates and Pilots Advancement Training Education and Safety Program (MATES for short). The MATES program was first offered at the Texas Maritime Academy. Later, the program was moved to Houston, then, Baltimore; and finally to its present site, Linthicum Heights, Maryland, in 1970. Over the years, the scope of the program expanded to meet the demands of an increasingly complex marine technology. As the purpose of the program broadened, it evolved into a full curriculum and the name was changed, accordingly, to the Maritime Institute of Technology and Graduate Studies.

At present, the 50-acre school facility has two buildings. The academic building includes adminstrative and faculty offices, simulator rooms, a media resources center, and classrooms. The resident building houses a cafeteria, recreation area, health club, and spacious, private student accommodations. Married officers are encouraged to bring along their families during their stay at MITAGS. All school-related expenses are covered by IOMM&P contracted companies.

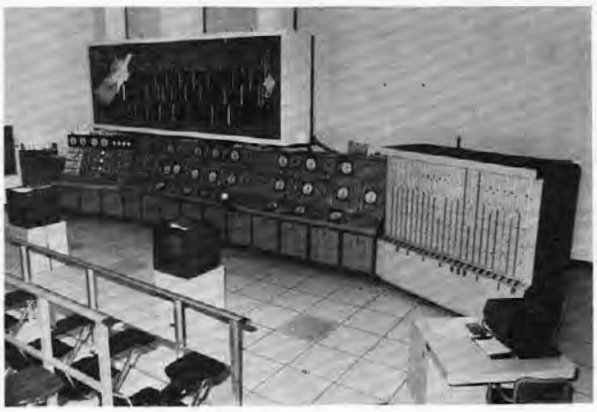
About 100 students, mostly licensed deck officers who are members of the IOMM&P union, are enrolled in MITAGS at any given time. Some non-members are permitted to attend on an *ad hoc* basis, such as officers of the U.S. Coast Guard and foreign deck officers, particularly those from developing nations. Simulation training has proven to be especially

effective with the type of students attending MITAGS. These experienced professionals are task-oriented and perform well when given practical, realistic exercises rather than excessive academics.

The primary purpose of MITAGS is to enable licensed deck officers to enhance professional skills. The MITAGS curriculum is patterned according to student needs. Courses are not based upon hypothetical situations, but upon real-life on-the-job problems. Since MITAGS students are already professionals, they are well qualified to critique the classes offered at the school and each student is given the opportunity to do so. New courses are developed in part as a result of their comments and suggestions. The MITAGS curriculum is divided into several major areas of maritime study; courses are modified from time to time to reflect the constantly changing marine technology. Most courses are one month long.

The **Marine Cargo Operations** course is available for both experienced tankermen and deck officers who desire to sail on tankers. Cargo transfer operations aboard both tanker and dry cargo vessels are practiced on a simulator patterned after an 80,000 DWT tanker, the most sophisticated liquid cargo simulator currently in existence. The course opens with a review of the basic components of tank vessels, progresses to practical operational aspects of the modern tank vessel, and includes in-depth examination and familiarization with the operation and maintenance of cargo pumps. Officers are taught safety, firefighting, chemical hazards, tank entry, cargo characteristics, and pollution control. All class members receive firefighting training at the MARAD Firefighting School in Earle, New Jersey, which qualifies them for a U.S. Coast Guard firefighting certificate. The course also covers Coast Guard regulations for the installation and operation of crude oil washing, inert gas systems, and tank cleaning. The end result of the Marine Cargo Operations Course is to prepare deck officers to assume cargo transfer officer responsibility aboard modern tank vessels.

Liquid Cargo Operations Simulator



Admiralty Law and Ship's Business are covered in a 4-week class exploring the legalities associated with vessel operation, the jurisdiction of various federal regulatory agencies, and general ship's management. Deck officers enrolled in this class are led step by step through the procedures of a typical civil suit for damages; they study marine insurance and cargo damage claims, hazardous materials regulations, and rules of the road. The Coast Guard's role in investigation of collisions is discussed, as well as license prosecution proceedings that may result from such an investigation. The final week of class is spent visiting ongoing trials to promote familiarity with courtroom procedures. This course was established to aid deck officers in learning the potential legal liabilities attendant to the operation of a vessel.

All-Weather Navigation Simulator

The MITAGS **All-Weather Navigation Course** uses a specially developed technique known as situation recognition. Once students have shown satisfactory on-scope plotting ability, they are given situations which are unsolvable using conventional on-scope plotting procedures and are taught to resolve them using situation recognition. This technique allows a radar observer to directly read the radar scope and to quickly predict the effect of a change in his ship's course or speed on any target's CPA. This class utilizes the largest radar simulator in the world, which will be even larger after renovation this spring. Each student must spend at least 16 hours of practice in the simulator during his first week of class, to build up speed and develop accuracy, increasing to a minimum of 35 hours the last two weeks. Exercises become more and more complex as the student progresses, incorporating trial maneuvers, determination of collision risk and random factors. Students are also given the opportunity to become familiar with the most modern collision avoidance systems currently available. Upon completion of this course, navigation officers should be prepared to handle all situations which might be encountered in restricted visibility.

Continued on next page.....

The **Electronic Navigation** course introduces officers to the theory and operation of the major radio navigation systems used for merchant ship navigation throughout the world. The hands-on training in this class familiarizes deck officers with all types of radio navigation equipment currently in use, so that they can use all makes with confidence. LORAN-C, Decca, OMEGA, Transit Satellite and radio beacons are compared and their performance measured against typical navigational requirements. By employing the actual equipment used aboard ship, realistic conditions of signal availability, signal noise, and manmade interference can be experienced by students.

The **Ship's Control Systems** course is a kind of "mini-engineering" course for deck officers, covering the operation and control of the main propulsion system, the electrical generating system, the steering system, and other vital engineering systems of a ship. This course promotes understanding and better communication between deck and engineering officers, as the deck officer learns to appreciate the engineer's responsibilities and realizes how engineering problems affect his decision-making while on watch on the bridge. A computer controlled trainer, which includes an actual automated bridge console and an engineroom console destined to be original equipment for the Exxon San Francisco class vessel, is employed as a teaching aid for the class. With this, the students can readily see the interrelations of the various engineering systems in the ship required to generate the propulsion and electrical power necessary to operate the ship. Instructors insert numerous engineering breakdowns into this simulated engineering plant so that officers will realize the effect of typical malfunctions on the ship's systems and, therefore, the limitations placed on their ability to control the vessel during such situations.

The month-long **Gas Carrier** course has been designed to comply with U.S. Coast Guard regulations which require licensed deck officers who serve on LPG and LNG vessels to have a tankerman's endorsement. The course begins with the basics of LNG and LPG, including thermodynamic principles, the unique hazards of cryogenic cargoes, health and fire hazards,

Continued on next page.....

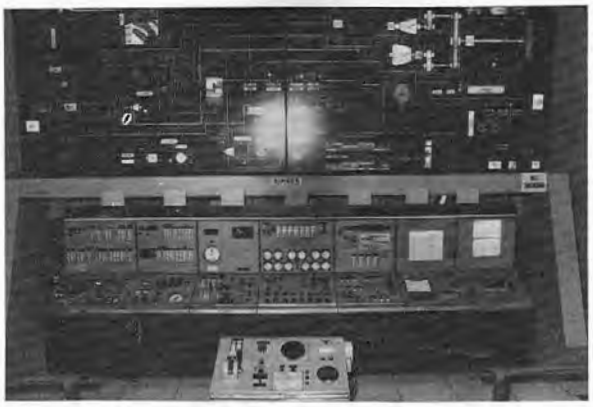
Electronic Navigation Workshop

and cargo spills on deck. Students examine the different types of modern gas carriers and their cargo handling systems. Time is spent on cargo control consoles and panels, alarm and signal transmission systems, and the rules and regulations applicable to liquid gas transport. During the final week of the course, students must exercise their training in troubleshooting and decision-making during simulated emergencies. At the conclusion of the Gas Carrier course, officers will have have practiced and documented about 20 cargo operations, including emergency procedures.

MITAGS' newest course was created in December 1979 in response to student concern over the lack of medical care at sea. The **Emergency Medical Training** course provides officers with extensive knowledge of emergency medical care, much advanced beyond standard first aid classes. The first two weeks of class consist of a basic EMT course, with national certification being awarded upon successful completion. This introduction to basic emergency care covers cardiopulmonary resuscitation (CPR), bleeding and bandaging, fractures, shock, and medical legal problems which might be encountered. The last two weeks of class progress through intermediate and advanced life support--intravenous therapy, communicable diseases, medical problems associated with the environment, burns, electrical and radiation hazards, triage, alcoholism, drug abuse and proper use of drugs in emergencies, and special shipboard medical problems. In addition, officers are taught the proper radio communication and helicopter techniques needed to facilitate emergency procedures.

MITAGS has come a long way since the inception of the MATES program 13 years ago, but the biggest changes are still ahead. The school is currently undergoing tremendous expansion; the new residence hall now under construction will double MITAGS' present student housing space. Most exciting, several new simulators are scheduled for installation during early 1981. The forthcoming Full Mission Ship Simulator is the result of five years of planning, and will be the only 360-degree seamless visual simulation in existence. This new simulator will have both day and night scene, with picture resolution of far-field objects matching the capability of the human eye. The innovative design of the Full Mission Ship Simulator includes a motion base, which provides realistic heavy weather effects for navigation purposes. It will be housed in a four-story building with a Nocturnal Simulator; each simulator measures 100 feet in diameter. An LNG Carrier Simulator is also under construction, which will provide realistic shore cargo transfer operations as well as LNG cargo handling systems. Finally, the school will have a large modern auditorium equipped to handle three-language translations during lectures.

In review, it becomes apparent that merchant deck officers must have proper training to keep up with the extensive changes occurring within the marine industry. The knowledge necessary to handle the sophisticated vessels of today can no longer be provided by experience alone. As marine technology continues to increase in complexity, programs like those at MITAGS become imperative, perhaps even mandatory, for professionals in the maritime world.



Ship's Control Systems Simulator

Hands-on training in ship's control systems.

For more detailed information on the IOMM&P Marine Institute of Technology and Graduate Studies, write to:

MITAGS
5700 Hammonds Ferry Road
Linthicum Heights, MD 21090
or call (301) 636-5700

This is the third in a series of articles on marine-related schools and organizations. The purpose of these articles is to familiarize readers with existing institutions, explaining exactly what they are and what they do, and who is eligible to join/attend.

If you would like to submit information on a particular school or organization, please write to: Commandant (G-CMC/24), U.S. Coast Guard Headquarters, Washington, DC 20593 or call (202)426-1477.

BE A SMART DUCK NOT A DEAD DUCK

Many good safety programs never get off the ground because no matter how well they are structured, they always seem to stress the negative aspects of safety. We may be told "wear your steel toe shoes or you'll break your toes," or "wear your life jacket on the barges or you'll drown." Although such statements point out valuable safety practices, it may be that they have less than maximum impact because of their negative overtones.

The Inland Waterways Safety & Health Association has instituted a safety program which stresses the positive aspects of working safely. Its effectiveness hinges on two things: first, it creates a sense of awareness in the wearing of proper safety equipment when working around water; second, it publicizes those who, because of a near miss with death, can be the most effective spokesmen for the safety program. The program is called the Smart Duck Club.

Sponsorship of the club is open to any maritime industry employer who requires the wearing of Coast Guard approved workvests by his employees when they are exposed to the danger of falling overboard. All sponsoring member companies receive a beautiful membership certificate to hang in their place of business. Additional sponsoring member certificates are also available to be placed upon company vessels.

Actual membership in the club is open to any employee who, recognizing the potential for danger on the job, wore a Coast Guard approved work vest and thereby avoided death by drowning during an accidental entry into the water.

The club has come a long way since its first two inductees received certificates at the Water Resources Congress in February 1973. To date, 135

Continued on next page.....

SMART DUCK.....

more members have been admitted into the club. The following is a breakdown of the total membership by industries:

Inland towing & fleeting	82
Chemical docks	13
Corps of Engineers	11
Dredging	7
Surveying	4
Barge & boat repair	9
Stevedoring	3
Midstream & fueling	2
Offshore towing & construction	2
Sand & gravel	1
U.S. Coast Guard	1
TOTAL	135

The members of the Inland Waterways Safety & Health Association and especially the club's two co-founders, Tony Accardo and Bill Fassler, are to be congratulated for development of this positive, results-oriented safety program for a very serious safety problem area. Of course, falls overboard are to be avoided if humanly possible, and it is therefore hoped that the Smart Duck Club membership remains small. But it is also hoped that every marine based company supports this worthwhile program within its operation, and that each person who is in danger of falling into the water while working is a prospective member because he wears a Coast Guard approved work vest. Make sure your employees can boast of being Smart Ducks and not dead ducks.

Further information regarding sponsoring membership for your company or employee memberships in the club can be obtained by writing the Inland Waterway Safety & Health Association, c/o Tony Accardo, 6149 Louisville Street, New Orleans, LA 70124.

The Smart Duck Club

As A Safety Minded Employee

JOSEPH MALLARD

is hearby registered in the Inland Waterway Safety and Health Association SMART DUCK CLUB, having earned his award by recognizing potential danger on the job and by having the foresight to wear a Coast Guard approved work vest which protected said employee from serious injury or possible death after falling in the water

Frank Fish
Company Representative

C. J. Accardo
Chairman, Smart Duck Club

XYZ BOAT COMPANY
Company

February 19, 1980
Date

Nautical Queries

The following items are examples of questions included in the Third Mate through Master deck examinations and the QMED examinations.

DECK

(1) The location of radio beacons is indicated on a chart by which of the following characteristics?

I. The abbreviation R Bn
II. The magenta circle around the location

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

(2) A buoy of the United States system having red and black horizontal bands would have a light characteristic of

A. group occulting.
B. interrupted quick flashing.
C. morse letter "A".
D. quick flashing.

(3) If a bearing taken to a known position of an object ashore is 320° by gyrocompass, and the charted bearing is 318° true, what course would you steer per gyrocompass to head directly toward the object?

A. 316°
B. 318.5°
C. 320°
D. 321.5°

(4) In the uniform cardinal system of buoyage, a buoy in the eastern quadrant from a danger could

A. be black and white horizontally striped.
B. be black and white vertically striped.
C. have a red top mark.
D. be any of the above.

(5) The equation of time is 12m 00s and the apparent sun is behind the mean sun. If you are 3° west of the central meridian of your time zone, what time will the apparent sun cross your meridian?

A. 1148
B. 1200
C. 1212
D. 1224

ENGINEER

(1) The emergency signal for fires is sounded on the ship's whistle and general alarm as

A. a continuous ringing for 10 seconds.
B. one short ring followed by one long ring.
C. two long rings of at least 20 seconds.
D. a continuous ringing until the fire is extinguished.

(2) If a person had received a severe electrical shock, but has fallen away from the electrical source and is still breathing, you should

A. give a stimulant to restore normal temperature.
B. keep the person lying down and warm.
C. apply cold compresses to any burned areas.
D. make the person stand up and walk around.

(3) Combustible gases or vapors can be safely detected with the

A. flame safety lamp.
B. combustible gas indicator.
C. halide torch.
D. orsat apparatus.

(4) If the fixed carbon dioxide fire extinguishing system for the paint locker suddenly discharges while you are in that compartment, you should immediately

A. drop to the deck to obtain oxygen.
B. leave that compartment for your own safety.
C. stop the ventilation and close the door.
D. look for the source of the fire.

(5) If the safety valve starts to whistle on an oxygen-breathing apparatus, the person wearing the OBA should

A. go out into the fresh air.
B. open the by-pass valve wide.
C. close the by-pass valve until the whistling stops.
D. reset the timer for an additional 10 minutes.

ANSWERS

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

Engineer
1. A; 2. B; 3. B; 4. B; 5. A

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office, marine inspection office or by writing: **Commandant (G-CMA/TP26), U.S. Coast Guard, Washington, DC 20593.** 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 Coast Guard authored federal regulations are published as final rules in the Federal Register on Mondays or Thursdays.) Following the title of each publication in the table below are the dates of the most recent editions and changes, if any.

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, DC 20402.

CG No. TITLE OF PUBLICATION

NOTE: This is a newly revised list; please check carefully for changes.

CG-101-1 Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
CG-101-2 Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
CG-108 Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75, 9-26-77.
CG-115 Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79, 2 19 80.
CG-123 Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 1-3-77, 8-18-77, 9-12-77, 9-26-77, 9-29-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 12-27-79, 1-31-80, 3 3 80.
CG-169 Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
CG-169-1 Colregs Demarcation Lines (7-15-77).
CG-172 Rules of the Road - Great Lakes (7-1-72). FR 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.
* CG-174 Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
CG-175 Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
** CG-176 Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76, 7-24-78.
CG-177 Yacht Admeasurement and Documentation (9-72).
CG-182-1 Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
CG-182-2 Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
CG-182-3 Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
CG-184 Rules of the Road--Western Rivers (8-1-72). FR 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.
* CG-190 Equipment Lists (8-1-77).
CG-191 Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 5-16-77, 8-8-77, 4-9-79, 12-6-79.
CG-227 Laws Governing Marine Inspection (7-1-75).
CG-239 Security of Vessels and Waterfront Facilities (5-1-74). FR 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, 1-25-79, 2-12-79, 11-5-79, 12-10-79, 1-31-80.
CG-242 International Conventions & Conferences on Marine Safety (6-51).
* CG-257 Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 1-31-77, 9-26-77, 9-29-77, 12-19-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79.
CG-258 Rules and Regulations for Uninspected Vessels (4-77). FR 9-26-77, 9-29-77, 6-14-79, 7-2-79, 12-17-79, 2-4-80, 2-19-80.
CG-259 Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
CG-268 Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.
CG-293 Miscellaneous Electrical Equipment List (6-73).
CG-323 Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 9-26-77, 10-25-77, 12-15-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79, 12-13-79, 2-19-80, 3-3-80.
CG-329 Fire Fighting Manual for Tank Vessels (1-1-74).
CG-388 Chemical Data Guide for Bulk Shipment by Water (1976).
CG-403 Great Lakes Pilotage Regulations (7-76).
CG-439 Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
CG-467 Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
CG-474 When You Enter That Cargo Tank (3-76).
OLD CG-478, Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety (3-80), now M16616.4.
CG-480 Oil Pollution Control for Tankermen (8-75).
CG-482 Benzene Safe Handling Practices (12-76).
CG-486 Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
CG-491 Safety for Small Passenger Vessels (8-77).
OLD CG-497, Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.
*** CG-515 Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13, 12-20. 1977--1-3, 5-16, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 9-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 8-10, 9-11, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 4-24, 5-3, 5-7, 5-31, 6-14, 6-21, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19, 12-3, 12-10, 12-27. 1980--1-10, 1-31, 2-4, 2-19, 3-10, 3-20, 3-24, 3-31.
CG-518 Marine Investigating Officer's Regulations Handbook (2-78). FR 2-16-78, 4-27-78, 5-25-78, 6-15-78, 9-25-78, 10-19-78, 11-20-78, 1-25-79, 7-19-79, 9-4-79, 1-10-80, 2-11-80.
CG-526 Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
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*Temporarily out of stock
**Under revision--CG-176 text can be found in Title 46 CFR Parts 41-69
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