PROCEEDINGS

OF THE MERCHANT MARINE COUNCIL

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PROCEEDINGS

OF THE

MERCHANT MARINE COUNCIL

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Ship Safety Achievement Citation

Rear Adm. C. P. Murphy, Chief of Merchant Marine Safety, U.S. Coast Guard, presents Citation, on behalf of American Merchant Marine Institute and Marine Section, National Safety Council, to Capt. C. W. Tolfsby, Master of Humble Oil & Refining Co. tankship Esso Lexington.

The American-flag tankship *Esso Lexington* of Humble Oil & Refining Co., has received the ship safety achievement citation of merit, jointly conferred by the marine section of the National Safety Council and the American Merchant Marine Institute.

Rear Adm. Charles P. Murphy, USCG, Chief, Office of Merchant Marine Safety, U.S. Coast Guard, made the presentation to the *Esso Lexington's* master, Capt. Christian W. Tolfsby, on behalf of the donor organizations. In making the presentation Admiral Murphy stressed the fact that this successful rescue highlights the effectiveness of directing continuous attention to the maintenance of safety equipment, and to the training of crews in its use.

The basis for the honor was laid March 14, 1966, when the big tanker was southbound off the Florida coast, 17 miles northwest of West End, Grand Bahama Island. A small private aircraft, which had become lost and had run out of gas, crashed into the sea off the ship's starboard bow, sinking almost at once. As Captain Tolfsby brought his vessel to a stop, one man could be discerned in the water. A motor lifeboat was quickly launched, under command of Mate T. A. Johnson.

The day was rainy and squally with poor visibility. Because of this and the 8-foot seas, the men in the lifeboat were unable to see the survivor. However, by skillful walkie-talkie direction from the *Esso Lexington,* they were guided directly to him, pulled him from the water, and had him aboard the tanker only 32 minutes after the ditching.

The citation, testifying "to a feat of safety and seamanship in the highest tradition of American seafaring," is the first in a series of safety awards presented annually by the marine section and the Institute to passenger ships, freighters, tankers, Military Sea Transportation Service vessels, and other craft. ⚓

Office of Merchant Marine Safety Changes

Captain Harry L. Morgan

Captain William Rea III

Summer 1967 will see a wholesale shift in top merchant marine safety officers at Coast Guard Headquarters. Captain R. Y. Edwards, Deputy Chief of the office has been promoted to the rank of Rear Admiral and has assumed the direction of the new office of Public and International Affairs at Headquarters. He has been relieved by Captain Harry L. Morgan. Admiral Edwards will remain with the Merchant Marine Council as Alternate Chairman.

Captain William C. Foster, former Chief of the Merchant Vessel Inspection Division, has assumed new duties with the National Transportation Safety Board. He has been relieved by Captain William F. Rea III.

Captain Andrew J. Grogard, former Chief of the Merchant Vessel Personnel Division, has retired. Captain Garth H. Read is the new chief of this division.

Mr. Robert O. McDonald came to the Coast Guard from the Customs Bureau to head the new Vessel Documentation Division. ⚓

Captain Harry L. Morgan has been assigned as Deputy Chief, Office of Merchant Marine Safety. He is a 1939 graduate of the U.S. Coast Guard Academy.

Captain Morgan has over two decades experience in the marine inspection field ranging from Marine inspector in Honolulu, and Marine industry training with Sun and Atlantic Oil Companies to Officer in Charge, Marine Inspection, Seattle, and Senior Merchant Marine Detail Officer, Europe.

In June 1963, Captain Morgan served as Chief, Administrative Management Division, and later was appointed Special Assistant to the Assistant Commandant, and to the Chief of Staff to work as a member of a Task Force creating the new Department of Transportation. He was awarded the LEGION OF MERIT for exceptionally meritorious conduct in the performance of outstanding service from February to October 1966 as the staff director of a Coast Guard Task Force to help develop

Captain Garth H. Read

Mr. Robert O. McDonald

the legislative plan to establish the Department of Transportation.

In January 1967, Captain Morgan assumed the duties of Special Assistant to the Assistant Secretary for Administration, Department of Transportation, where he served until his present position. ⚓

Captain William Rea III has been assigned to Headquarters as Chief, Merchant Vessel Inspection Division.

He is a 1942 graduate of the U.S. Coast Guard Academy.

Captain Rea's marine inspection service began at Norfolk in 1943 where he was a deck inspector. During 1948 he completed a year of industry training with the Texaco Company. He was later at New Orleans as Senior Investigating Officer.

In 1960 Captain Rea was assigned to Headquarters as Branch Chief of the Merchant Vessel Inspection Division, and in 1963 he was Acting Chief, Merchant Vessel Inspection Division.

In July 1964, Captain Rea was assigned as Officer in Charge of Marine Inspection New York, where he served until his present position. ⚓

Captain Garth H. Read has been assigned to Headquarters as Chief, Merchant Vessel Personnel Division.

He is a 1943 graduate of the U.S. Coast Guard Academy.

Captain Read's Merchant Marine inspection service covers some 15 years. He was a marine inspector at Cleveland between 1953 and 1959, completing a year of marine industry training with the Lake Carriers' Association during this period. He returned to Cleveland in 1965 as Officer in Charge, Marine Inspection and Captain of the Port, after serving for 5 years as Chief of Personnel in the Coast Guard's 8th District in New Orleans.

Captain Read comes to headquarters from his Cleveland duties. ⚓

Mr. Robert O. McDonald was recently designated Chief of the new Merchant Vessel Documentation Division at Coast Guard Headquarters. Both the new office and Mr. McDonald came to the Coast Guard as the result of transfer of Bureau of Customs documentation functions to the Coast Guard.

Mr. McDonald is a graduate of West Virginia University and holds a law degree from Washington and Lee University. He joined the Bureau of Customs in 1952, becoming head of the Vessel Documentation Branch in the Division of Marine and Transportation Rulings in 1963. In 1966 Mr. McDonald was promoted to Deputy Director of the division. He came to the Coast Guard in February. ⚓

From an address before the 1966 Tanker Conference of the American Petroleum Institute

THE CONCEPT OF marine chemists is certainly not new to the tanker industry. Marine chemists were created by the American Petroleum Institute and the American Bureau of Shipping back in 1922—some 45 years ago. That first effort arose from industry's concern over its excessive tanker losses from fire and explosion during repairs. It was decided that tank atmospheres could be tested most accurately by chemists.

After indoctrination in ship construction and shipyard procedure, the first 25 chemists were certified by A.B.S. for marine testing work. At that same time, the Marine Section of the National Fire Protection Association was in the process of developing a Marine Fire Protection Standard entitled, "Regulations for the Prevention of Fire Aboard Vessels." Through the efforts of A.P.I., the American Bureau, and the Steamboat Inspection Service, who were active in both groups, the N.F.P.A. Marine Section also developed a standard for the protection of vessels from gas hazards. The Gas Hazards addition was attached to the basic standard as "Appendix A" and served as a guide to the chemists in their marine testing work.

Neither the first marine chemists, nor their operating standards, were particularly impressive by present-day requirements. For example, standard testing procedure consisted of inserting a burning splinter into a sample of the tank's atmosphere. If no explosion or flareup occurred, the tank was considered safe for hot work.

Marine Gas Hazards Program

Captain K. M. Savage, Marine Representative

National Fire Protection Association

Although this first testing method was somewhat better than nothing at all, it did have its weak spots. In an old American Bureau file, I found a letter of complaint from a shipyard worker. He stated that he had smelled gas in a tank and disagreed with the chemist's statement that the compartment was safe. The chemist returned to the compartment and pulled out a box of matches to prove his point. The yard worker complained that, although he shouted and ran for the ladder, most of his hair was lost in the ensuing flash.

Marine chemists, instrumentation, and the N.F.P.A. Gas Hazards Standard progressed together during the years that followed. A series of accidents in the late 1950's however, gave considerable concern to the U.S. Coast Guard and the U.S. Department of Labor. During the course of their investigations, these government agencies could find little or no information on the location, activities, or practices of marine chemists. Their warning that lack of industry supervision could lead to further Federal regulation provided the incentive for our present Gas Hazards Program. The fact that it is now supervised by the National Fire Protection Association came about through the mutual agreement of all interested groups, including the American Bureau itself.

I have mentioned "the Marine Industry" several times in connection with our Gas Hazards Program. That term probably should be defined a little more clearly. There can be no doubt that tank ship operators, through the American Petroleum Institute, provided the impetus and principal backing for our project. Many other organizations and associations, however, have contributed to our efforts, morally and materially. In addition to the American Petroleum Institute, our project is sponsored by the American Institute of Marine Underwriters, the American Merchant Marine Institute, the American Waterways Operators, the Lake Carriers' Association, the Pacific American Tank Ship Association, the Ship Builders' Council of America, and the U.S. Salvage Association. The American Bureau of Shipping has also lent its full support, although they are no longer associated actively with the project. Regional organizations, such as the Pacific American Steamship Association and the Pacific Maritime Association have given us their assistance. Cooperation of the National Safety Council and other safety groups has also been very helpful. Therefore, when I speak of the "marine industry," I am in fact referring to every group interested in water transportation.

The marine industry's Gas Hazards Program is a very simple one. It consists essentially of working with and administering the activities of all marine chemists to make sure they have the highest possible professional qualifications and provide the highest possible professional services. To carry out the details of the program, the N.F.P.A. acquired a Marine Representative, myself, with a job description that can generally be described as follows:

1. Handle administrative details of the program, with particular reference to the certification of marine chemists, assisted and advised by a five-man qualification board.
2. Disseminate technical information and developments of significance to marine chemists.
3. Maintain personal contact with marine chemists, ship operators, repairers, regulatory agencies, and other interested groups.
4. Provide staff assistance to the N.F.P.A. Sectional Committee on Gas Hazards and assist in the correlation of N.F.P.A. activity in the field of marine fire prevention.

Executive supervision of the program is controlled by an industry group known as the Marine Field Service Committee, composed of representatives of the sponsoring organizations. They advise the N.F.P.A. General Manager on the overall policies of the project, and authorize the program's budget. Under the General Manager's supervision, the Marine Representative is aided and assisted by the committee responsible for the Gas Hazards Standard and by a technical advisory group known as the Marine Chemists' Qualification Board.

Such a program obviously requires a modest financial expenditure. Although the initial funding was made through donations by industry trade associations, the program was designed to be self-supporting. Contributions, based on the number of chemists' certificates issued, are collected and held by the American Merchant Marine Institute. After a major revision a year ago and several minor adjustments in the collection procedures, the project is now completely solvent and self-supporting.

The activities of our program have so far not been as clear cut as envisioned in its original concept, although they do tend to fall into the four general categories of: administrative, consultative, advisory, and supervisory.

Our administrative work is primarily concerned with the certification of new marine chemist applicants and the recertification of marine chemists whose 5-year certificates are due to expire. A considerable amount of time is spent in explaining the requirements for certification to prospective applicants, since no two seem to have the same questions or problems. In most cases, however, they are in some way concerned with one of two principal minimum requirements of college level courses in quantitative analysis, qualitative analysis, and organic chemistry and the minimum of 300 hours of supervised training aboard ship.

The qualifications of almost all applicants are marginal in at least one area. In those cases, our five-man Qualification Board advises of the additional training or education it considers necessary for certification. Where this additional preparation consists of further shipboard training, we are often able to arrange for the applicant to work with an active marine chemist to complete the necessary training period. Marine chemists have, without exception, given their full cooperation in the training of new applicants.

Independent marine chemists tend to be a group of free-thinking, versatile entrepreneurs. Most have several other fields of interest, some quite removed from the marine industry. For example, we presently have one temporarily employed as an engineer advisor to the Chinese National Government in Formosa. Another just returned from the Arctic where he periodically does research and instruction work in glaceology. Keeping track of these changing interests, occupations, and relocations is a challenge in itself. A complete record is maintained on every marine chemist throughout his active career. Upon retirement, the essential information is maintained in a historical file. With a few exceptions, we have a record for every man who has been certified during the past 44 years.

Personal contact and discussion is probably the backbone of our program. Seasonal trips are scheduled to all parts of the country to maintain at least annual contact with all marine chemists. Through this personal contact, new developments can be discussed in detail, questions can be answered completely, and problems can be resolved before they become serious. Vessel operators and repairers also have questions which must be answered if the project is to be successful.

The uncommitted, industry-oriented position of the N.F.P.A. was a particular asset in our early talks with small ship repairing companies. Most of these little yards and repair shops are too small and understaffed to participate in industry's association work. As a group, however, they do a sizable portion of the minor conversion and voyage repair work. The fact that our program proposed to assist them as well as marine chemists accounted for many responses that considerably exceeded our expectations. Most of these small yards have given their complete cooperation since the project's inception.

Whenever possible, the field trips are arranged to coincide with regional industry conferences. That arrangement serves a dual purpose of encouraging marine chemists to take a more active interest in other aspects of the industry's operation. During the past year, for example, marine chemists have been represented at every major industry conference in the country and have presented papers at several.

Regular contact with the Federal regulatory agencies is also an important part of our operation. Both the Coast Guard and the Department of Labor have lent their full support to our efforts by naming marine chemists and the N.F.P.A. Standard in their regulations, by enforcing their requirements for necessary tests and certificates, and by checking the recommendations on those certificates that have been issued. These informal meetings give them the opportunity to discuss questions or criticism submitted by their field offices. They give us the opportunity to explain a chemist's activities or correct a substandard condition without delay. In total, they assure the government that industry is fulfilling its supervisory obligation and that marine chemists are carrying out their role in water transportation safety.

One of the prime functions of our project is to furnish marine chemists with information on new developments within the industry. It is disseminated in several ways, depending on the nature of the information and the scope of its interest. Items of general interest are included or attached to our house organ, called the "Marine Chemists' Log." The Log is published bimonthly, depending on the information material and office time available. Our mailing list for this bulletin is in excess of 1,200 and includes all phases of the industry in this country as well as several foreign yards and operators. Information of a more parochial nature is sent out, either in letter or bulletin form, to the chemists and other groups having a particular interest in the subject matter. Some technical data, par-

ticularly purchased or donated publications, is forwarded to marine chemists only, due to supply limitations. Additional copies are normally available, however, to anyone having a specific interest.

Dissemination of information from the industry to marine chemists should by no means be considered a one-way street. It is also possible for our Gas Hazards Project to furnish industry with information and suggestions, either directly from individual marine chemists, or through our affiliation with the National Fire Protection Association. As a group, marine chemists possess a remarkable amount of information directly and indirectly associated with the marine industry as well as in a wide variety of other fields. Although such information is presently only available through our office, the next issue of the MARINE CHEMISTS' DIRECTORY will include their various other technical specialties. The N.F.P.A. has made available its facilities to assist both marine chemists and industry. In addition to its various publications, the Association's approximately 120 technical committees are available upon request to assist in solving any fire problems confronting the maritime industry.

Another fringe benefit of the program is the immediate availability of information on accidents. Chemists have always been required to submit a report of any casualty they have been involved in. They still are. In addition, however, we now ask for an informal report of accidents in which they are not involved. Their interest and confidence in our project has developed to a point that the unofficial details of any casualty in the country can usually be obtained in a matter of minutes through a telephone call to the local chemist.

Supervision of the group is both necessary and desirable. It is based on only one rule, however, that all business relationships be conducted on highest professional and ethical plane. Each certificate must reflect a complete professional inspection and evaluation of the space involved, together with any recommendations or suggestions that the chemist considers appropriate. Universal compliance will probably never be achieved. Considerable improvement has been made, however, principally by virtue of the enthusiasm of the marine chemists themselves. There is no reason to believe this progress will not continue in the future.

One of the few requirements made of marine chemists is their monthly submission of a report of their marine activities or copies of the certificates they have issued. Such reports give an indication of the amount of a chemist's marine work and the companies that are using his services. They also include information on any accidents that have occurred, near accidents, or unusual problems that have been encountered. By periodically reviewing the certificate

(*Continued on page 149*)

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Know Your Line

Frank J. Haas
Columbian Rope Company

From a Marine Section, National Safety Congress Paper

ROPE IS PROBABLY the most important tension member on board a ship, tug, or barge. Many times a man's life depends on a line.

Previous to 15 years ago all lines aboard ships were made of natural fibers, the most common of which was manila. This was a general purpose rope that was used in practically all applications. With the introduction of synthetic ropes these conditions changed. It was soon found, though, that each synthetic rope had its own peculiar characteristics and in many cases could only be used for a specific job.

Nylon in those days had about twice the strength of manila and was some 15 to 20 percent lighter than manila. It was soon found that Nylon had a very high elongation and elasticity and could not be used for close work because of this stretch. Its big advantage seemed to be in ocean towing where, because of its great elasticity, it had a very high impact resistance. This meant that it could absorb shocks without parting.

Dacron then entered the picture a few years later. Dacron is probably the best all-around synthetic fiber for cordage. Its characteristics are the closest to manila of any of the other synthetics. However, due to its relatively high cost and weight it was not accepted readily. Dacron does not stretch as much as Nylon and, at the lower percentages of its tensile strength, it has less stretch than manila. It is not elastic; in other words, when Dacron is stretched out it doesn't return to its original length as does Nylon. Because of this property it is excellent for close work, for example, alongside towing.

Next came polyethylene. This filament is very light. It has a specific gravity of 0.95 and will float. However, because of the extremely slippery surface it was quite difficult to handle.

Polypropylene then entered the picture. The use of polypropylene was aided by the oil companies because this polymer was made from their product. Polypropylene has a higher coefficient than polyethylene, consequently, it was easier to grab and handle than the polyethylene. Its strength is about one and a half times that of manila and it weighs only two-thirds as much.

But here, too, developed a problem. All the polyolefines, that is, both polyethylene and polypropylene, have a comparatively low melting point, namely, 240° for polyethylene and 330° for polypropylene. When this line was used as working line, it was found that the polypropylene would actually melt when a strain was applied to the line and it would "stick" to the bitt or cleat that it was attached to. This meant that its use would probably be confined chiefly to mooring lines or other applications where heat would not be generated.

It was while investigating one of the complaints of polypropylene sticking that it occurred to me, that if we could combine the higher melting point Dacron with the light polypropylene, we might have a line that would be a good general purpose rope, and be a cheap substitute for Dacron. I set out designing this line about eight or nine years ago and tested several variations and combinations of construction and fibers.

After all tests were concluded, a synthetic which is a combination of Dacron and polypropylene gave the best results. In this construction, the outer yarns in each strand were made up of polypropylene filaments covered by Dacron, then the entire inside of the rope was polypropylene. In this way any external contact the rope would have would be against the Dacron and any abrasion action between strands would be Dacron on Dacron. This combination proved very successful. After this line has been in service for a short period of time the Dacron fuzzes on the surface giving it a rough feel. This makes for better gripping qualities and an insulation between the polypropylene and an external surface.

Recently we have developed another composite which uses a larger percentage of Dacron on the cover over polyethylene fibers. We have found over the years that polyethylene seems to be a little bit more compatible with Dacron than does polypropylene.

Our technicians are still experimenting with new fibers and variations in the present available materials. For instance, we have a few lines being tested with expanded polypropylene and with yarns made from polypropylene film. Both of these show some promise of improvement over the plain extruded filament.

About 6 or 7 years ago, the Columbian Rope Company introduced plaited rope into this country. It had been used quite extensively by foreign manufacturers but the United States was quite slow in accepting its advantages over the conventional three-strand construction. Plaited rope is made from eight strands combined in such a way that there are two pairs of left hand strands turning to the right and two pairs of right turn strands turning to the left. This construction eliminated the old problem of rope hockling when used on a winch or gypsy head. Having the turns in the rope neutralized, the rope does not have a tendency to turn when a force is applied to it, nor in the case of synthetics where a free end is involved, such as in lifting an object with a crane, the turn will not run out of the rope and cause a hockle when the strain is released.

Plaited rope is not a general purpose line. Its use is chiefly where hockling is a problem in three-strand rope. There are several shipping companies using it for mooring lines where the lines are fed out through chocks on the port or starboard side of a ship and controlled by a common two-capstan winch. One side will take turn out of the line, the other side will put turn in. As long as the deckhand is conscientious and reverses the lines periodically, the three-strand rope will do a satisfactory job. However, this is not always the case nor is it convenient to do. So after a period of time, we find that one line is full of kinks and the other side is full of hockles and soon has to be discarded.

We recommended a safe working load for the different types of rope. This safe working load is the tensile strength of the rope divided by the factor of safety. The recommended working load for manila is 20 percent of the tensile strength. Nylon—11 percent; Dacron—11 percent; Polypropylene—17 percent and the composite ropes—17 percent. This difference in the factor of safety is to prevent users from substituting synthetic ropes for manila on strictly a strength basis. We have found over the years that if synthetics are substituted for manila on strictly a strength basis using a factor of safety of five for both, the synthetic ropes will not give satisfactory service.

As an example, suppose a ship is using 8-inch manila for some application and decides to switch over to Nylon. Eight-inch manila has a breaking strength of 52,000 pounds. If one goes to 4½-inches Nylon having a breaking strength of 56,500 pounds—he is cutting his size almost in half. Now any slight amount of chafing on the 4½-inch line would be more detrimental to the surface of this line than the same amount of chafing on the 8-inch manila. For this reason chiefly, we would recommend the 6-inch Nylon to do the work of an 8-inch manila, even though its strength is nearly double that of manila.

There are several suggestions that we recommend for the safe use and proper care of synthetic ropes.

1. Bending radius for all lines whether natural or synthetic should be not less than four times the diameter of the rope. This applies to chocks, bitts, and sheaves. Using a smaller radius over a long period will crack the fibers and loss of strength will result.

2. Friction causes more failures in working lines than any other. Heat generated by friction will often be great enough to melt or fuse polyolefin filaments, causing a skin on the rope surface. This condition can be dangerous, as the line often sticks to the metal surface then suddenly gives way. Nylon and Dacron must also be handled with care, especially on moving flat capstans and rendering on bitts. With new synthetics, use at least six full turns on a capstan. As the rope wears in, the turns can be gradually decreased. Keep slippage of line on the capstan at a minimum.

3. Abrasion resistance is usually a factor of the hardness of the rope used, in both natural and synthetic fibers. The hard-lay rope will stand up better in use; however, some of the ease of handling and splicing characteristics must be sacrificed. Manufacturers' medium lay will usually give satisfactory service. In extreme cases where abrasion cannot be avoided, a hard or extra-hard lay should be used.

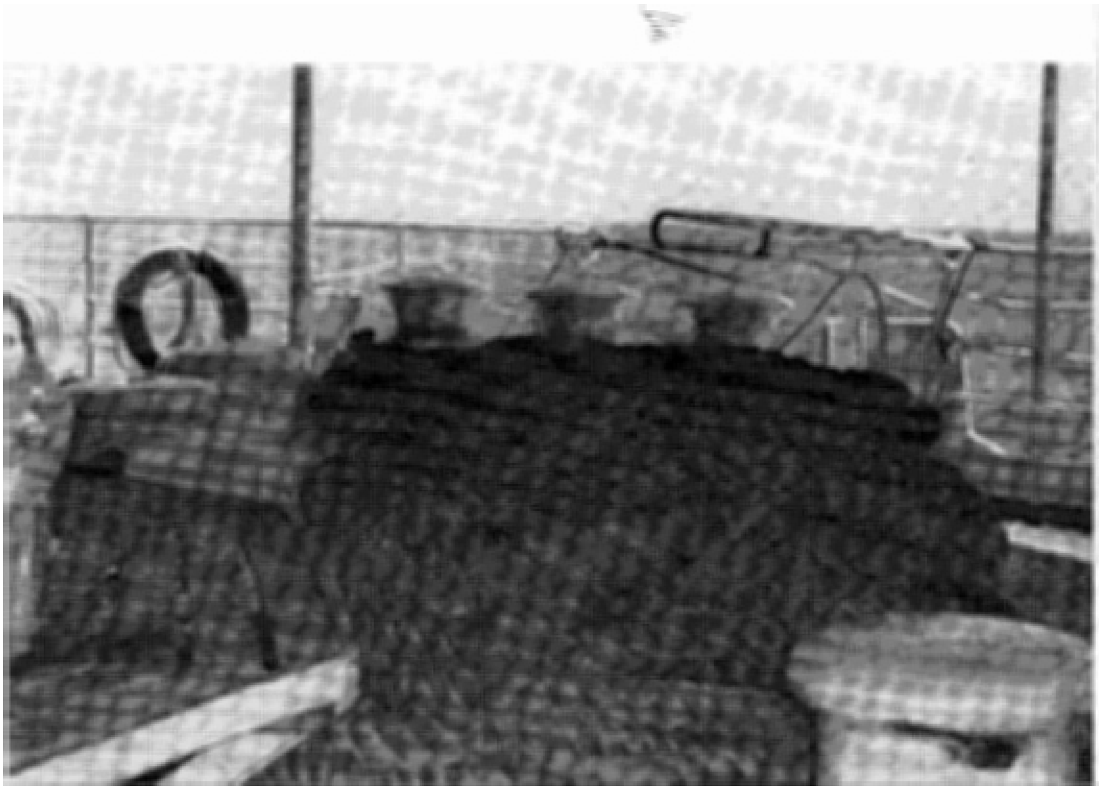
4. Nylon, because of its great elasticity far excels all other materials in the characteristic of impact resistance or energy absorption. Assuming manila is one, Nylon would be 8.6, Dacron 4.0, Polypropylene 5.2. This high energy absorption quality can be dangerous. When a synthetic line reaches its elastic limit and parts, it will "snap back" and sometimes cause serious damage and personal injury. Avoid standing in direct line of pull.

5. Natural fibers are weakened by mildew and rot. There have been several treatments impregnated in ropes during their manufacture. Most of them are copper compounds and have proven very satisfactory as long as they last, however, they all wash out in water after prolonged use and it is very difficult to replace the treatments. Synthetic ropes do not rot and the mildew that attaches itself to them is not detrimental.

6. All ropes whether natural or synthetic are lubricated in the manufacturing process. Do not attempt to add lubrication as you will in all probability do more harm than good.

7. Synthetics are spliced in the same manner as manila except use at least four full tucks instead of three. It is often advisable to add two-thirds and a one-third tuck to taper the splice to insure greater strength. Thimbles should be used in eye splices wherever possible.

8. Manila rope must be stored in a cool dry room with plenty of ventilation to avoid dry rot and mildew.



Synthetic, while not subject to dry rot and mildew, should be stored at moderate temperatures away from steam pipes and direct sunlight. Store all lines in a box, or cover with a top with ventilation to keep temperature at a minimum.

9. Chafing will occur with surface contact either on itself or an external fitting such as bitt, cleat, chock or block or fair-leader. Care must be taken to keep all surfaces smooth and paint- and rust-free. Nicks should be filed down or ground smooth. Special care must be taken where wire rope was used previously. Wherever possible, use a wire rope or chain pendant so that the fiber rope is completely outboard. Avoid all sharp edges and bends and see that the bending radius is not less than four times the diameter of the rope. Chafing gear should be used wherever possible. Discarded firehose laid on the line before splicing has proved satisfactory for this.

10. It is often very difficult to detect damage to a manila rope. If there is no dry rot present, spread the strands and check for strand abrasion in the core of the rope. Try to test the fiber strength by comparing it with the fiber from a new rope. On larger ropes, cut out one inside yarn, remove turn, and test the individual fibers for strength, comparing it with a fiber from a new rope.

An experienced rope handler can determine much by general appearance. It is much more difficult to determine internal damage in synthetic ropes. Look over the line carefully for surface cuts and chafed places. Glazing or fuzzing on the surface ordinarily does not have an appreciable effect on the strength of the rope. Often this fuzziness acts as cushion to help to prevent further chafing and abrasion. Cut off a 1-foot piece and count the number of broken yarns. This, divided by the total number of yarns in the rope will give an approximate percentage of the strength left.

11. Ordinarily pear- or round-shaped thimbles are usually satisfactory for manila. Due to the greater strength and stretch of synthetics, special heavy-duty reinforced thimbles should be used. There are several manufacturers making special synthetic rope thimbles. It is advisable to use thimbles that have guides or lugs on the outside to hold the rope in place. As a synthetic rope stretches, the eye will elongate and the thimble will have a tendency to "pop" out. Pear-shaped thimbles should be seized in the eye on both sides and the double rope at the thimble vertex. This seizing should be done under tension if possible. ⚓

UNWITTINGLY UNSAFE

At least once in a lifetime, a person will unwittingly continue to work on a job under unsafe conditions and using improper equipment in order to save a few minutes or just get the job out of the way. Unfortunately, it is ONLY ONCE for some individuals as indicated by the following casualty which occurred on board a tank vessel while at sea.

The vessel departed port after discharging a cargo of gasoline and lubricating oil from most of the tanks. No. 6 across had contained a wood preserver oil and been discharged 3 days earlier in another port. The remaining cargo consisted of toluene in Nos. 2 and 3 across and a "Spray Oil" in No. 5 center. Some of No. 7 and No. 8 tanks were ballasted and all other tanks remained empty.

Tank cleaning operations were then begun by the Chief Mate and three crewmembers. The No. 6 tanks across were not inerted by flue gas but were machine cleaned. Immediately upon completion of cleaning, they were ventilated by the use of a steam-propelled blower. Subsequent to the gas freeing and ventilation of the tanks, these same crewmembers began changing blank flanges in the cargo piping in these tanks preparatory to loading new cargo. When this work in No. 6 center was completed, the blanks in the stripping line, which had been removed prior to tank cleaning, were reinserted.

Although it was time for the Chief Mate who was supervising the work to take the bridge watch, the Master told him to finish up and that he (Master) would take the mate's watch until the work was completed. The Chief Mate reported that the main and crossover blanks had been tested and were tight but that one of the blanks in the stripping line was still leaking. When the stripping line flange was first broken, water began leaking out. However, later, toluene leaked to the extent that the fumes bothered the men in the tank, and they stood under the blower until the fumes cleared somewhat. The line was again tightened, tested, and found to be still leaking. The flange was then unbolted, a new gasket was installed and the flange was finally successfully tightened and tested. The surviving crewmember later stated that toluene was "pouring" from the flange during the entire operation.

Upon completion of the work, the Chief Mate and two crewmembers began picking up the tools while a third crewmember left the tank immediately as toluene had contacted his skin and was causing irritation. While this man was walking aft, he heard a "whoosh" and turned to see a flame shooting out of No. 6 center tank. The flame lasted only a few seconds. The crew responded quickly to the general alarm. Firehoses were let out and the deck foam system was activated and sprayed into the tank. Water was played on the deck to cool it down, and airhoses were let down the ullage standpipe to ventilate the tank. A seaman using a fresh-air breathing apparatus entered the tank and in checking the three bodies, found no sign of life.

Subsequent investigation revealed that toluene from Nos. 2 and 3 had probably gravitated through the stripper line as the result of faulty or improperly secured valves. This is possible since depending upon where blank flanges are employed in the suction line, it is possible to use the pumps in various combinations of segregation. It is also possible to have the forward and after main and stripping lines interconnected.

The subsequent investigation also revealed that a portable extension light had been used in the tank while the flange work was being accomplished. Pieces of glass found in the tank were identified as being from the vapor globe and from the light bulb. Close scrutiny of the broken glass revealed that the inner side of the vapor globe and the outer surface of the bulb showed the greatest concentration of smoke smudge.

In reviewing all the facts and circumstances in this case it was concluded that toluene had gravitated from the forward tanks through faulty or improperly secured valves. This leakage, in addition to the large spill when the stripper line blanks were being changed, permitted the accumulation of an explosive mixture of toluene fumes in the lower part of the tank. The source of ignition, in all probability, was an extension light which was accidently dropped as the men were preparing to leave the tank. The impact broke the vapor globe and bulb exposing the filament to the explosive mixture.

Portable extension lights have played their part in explosions and fires in the past. On September 22, 1962, a tankbarge while being gas-freed preparatory to hot work in connection with hull repairs, exploded and caught fire. As a consequence, three men were killed and the barge was extensively damaged. The Marine Board of Investigation concluded "that the most proximate cause is tied in to the shoddy type of portable extension light used." The investigation revealed many other unsafe practices and procedures which were commented upon in the "Commandant's Action" published in the February 1964 issue of the *Proceedings of the Merchant Marine Council.*

"Illumination may be obtained in any compartment by the use of approved explosion-proof, self-contained, battery-fed lamps. Otherwise, no portable electrical equipment of any type shall be used in bulk cargo tanks, fuel oil tanks, cargo pumprooms, or enclosed spaces immediately above or adjacent to bulk cargo tanks unless all the following conditions are met:

(a) The compartment itself is gas-free;

(b) The compartments adjacent and the compartments diagonally adjacent are either: (1) gas-free, (2) inerted, (3) filled with water; (4) contain grade E liquid and are closed and secured or (5) are spaces in which flammable vapors and gases normally are not expected to accumulate; and

(c) All other compartments of the vessel in which flammable vapors and gases may normally be expected to accumulate are closed and secured.

Additionally the Coast Guard prepared and promulgated in 1965 a Chemical Data Guide, CG-388 for the guidance of Coast Guard personnel and other individuals whose duties may require decisions involving bulk chemical shipments. Had this guide been available to the vessel the Master and Chief Mate might have known that toluene is colorless and has negligible solubility in water. They also might have known that the flashpoint, the temperature in degrees Fahrenheit at which the liquid will give off enough flammable vapors to ignite, was 45, and that the vapors are more toxic than those of petroleum and should be avoided. They might have also been aware of the health hazards involved including toxic characteristics, symptons, and exposure procedures.

In the final analysis it is the individuals who are directly involved who must be aware of the materials they are working with and the dangers involved. They must begin a job by using the proper equipment and the proper procedures and continue to work under unquestionably SAFE conditions. ⚓

IT CAN'T HAPPEN TO ME

"It can't happen to me," thought the "First" as he put a quick edge on a drill. Safety goggles were available but it was only a 10-second job.

"It will only take a minute," thought the mate as he started the windlass to take the slack out of a head line, "no need to get help."

"Electricity is my business, so it can't be dangerous for me," thought the electrician who failed to lock out a circuit before disconnecting a blower motor.

"I am in a hurry, haven't got time to check," thought Joe as he got into the bosun's chair already rigged to a gantline.

"This tank has been open for a while and should be OK," thought the port engineer as he went down through the manhole to check the strainer.

Why is it that normally cautious men who know better and are sincerely trying to do their job to the best of their ability will have such lapses? Why will they take such a risk with their own life, or possibly the lives of their shipmates who may have to rescue them, when a few simple checks or the precaution of wearing the proper protective equipment is so quick and simple? Are they in such a hurry? Do they really believe accidents can't happen to them? What is their reasoning? We wish we knew. So many serious accidents can be avoided by the exercise of fundamental precautions that are known to every seagoing professional.

Hardly a month passes but someone passes out in a tank or pumproom; when some electrician is badly shocked because an unlocked circuit is energized; when some engineer is scalded because steam lines were not drained and the valves wired shut; or some seaman is injured when an improperly rigged piece of equipment carries away. It would almost seem as if some men do not care whether they injure themselves or not.

But how about those who have had a bad accident? Note how carefully a one-eyed sailor protects his remaining eye. Ask the man who has lost a finger what it felt like until they finally got him into the hospital and eased the pain with proper drugs and medication. Watch the awkward way a stiff legged A.B. limps around when the weather is cold.

Think a little about this and realize that if you take chances, this can happen to you. And you will never be quite the same again. ⚓

Robert H. Smith, U.S. P. & I. Agency

DECK

Q. Upon which component of the earth's magnetic force is the directive power of a compass dependent?

A. The directive power of a compass is dependent upon the horizontal component of the earth's total magnetic force, which is greatest at the magnetic equator; therefore, its directive force is greatest near the magnetic equator and least at or near the poles.

Q. The earth being regarded as a magnet, which is usually termed the blue and which the red magnetic pole?

A. The South magnetic pole of the earth is termed the red pole and the North magnetic pole the blue.

Q. How would you correct westerly quadrantal deviation on a SE heading?

A. Westerly quadrantal deviation on a southeasterly heading is corrected as follows:

If there are no spheres on the binnacle—Place spheres athwartships.

If there are spheres at the athwartships position—Move spheres toward compass or use larger spheres.

If there are spheres in a fore and aft position—Move spheres outward or remove.

Q. How would you correct easterly quadrantal deviation on a NW heading?

A. Easterly quadrantal deviation on a northwesterly heading is corrected as follows:

If there are no spheres on the binnacle—Place spheres fore and aft.

If there are spheres at the athwartships position—Move spheres outward or remove.

If there are spheres at the fore and aft position—Move spheres toward compass or use larger spheres.

Q. (a) What is the required factor of safety for lifeboat falls?

(b) A manufacturer states that the breaking strength of his 3-inch-circumference manila rope is 9,000 pounds. If you used this rope as a single whip cargo fall, what is the safe working load, using a factor of safety of *seven* (7)?

A. (a) Six (6).

(b) $\frac{9{,}000}{7} = 1{,}286$ pounds.

ENGINE

Q. Describe briefly the operation of an overspeed control governor on a main propulsion turbine.

A. The overspeed control valve is usually held open against spring pressure by oil at constant pressure supplied by the lubricating oil service pumps. This oil is supplied to the operating cylinder through a pilot valve which, when actuated by the governor, will shut off the oil flow and drain the operating cylinder allowing the spring pressure to close the overspeed control valve. The pilot valve may be actuated hydraulically by a small centrifugal oil pump directly connected to the turbine shaft or by mechanically connected speed governor weights.

Q. (a) What is a cross-compound turbine?

(b) List some advantages of a cross-compound turbine.

A. (a) A cross-compound turbine is a form of compound turbine in which the steam passes through two separate high and low pressure casings or turbines, each turbine driving separate pinions of a reduction gear.

(b) (1) Reduction of casing and rotor size.

(2) More efficient staging.

(3) Smaller space requirements.

Q. Explain what is meant by a "stage" of a—

(a) Impulse turbine.

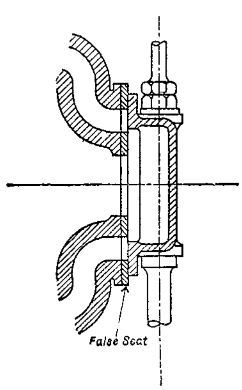
(b Reaction turbine.

A. (a) Any part of an impulse turbine in which only one drop in pressure takes place with generation of kinetic energy. It consists of one or more fixed nozzles discharging into one or more rows of moving blades. Pressure is the same at all points of the stage beyond the nozzle. Velocity increases through the nozzles and decreases in the moving blades.

(b) One row of fixed blades and the succeeding row of moving blades. Pressure drop in both fixed and moving blades.

D TYPE SLIDE VALVE

Q. Make a sketch of a D type slide valve shown in position against false seat and cylinder ports, the valve to be in mid-position with negative exhaust lap.



GAS HAZARDS

(*Continued from page 141*)

copies and sending our comments back to the chemist, we have found a steady improvement in both the content of the reports and the quality of the chemists' certificates.

The actual future of our program is as uncertain as that of the entire industry. Marine chemists are, of course, unanimously working to foster its development. It is supported by the entire industry and recognized by the government regulatory agencies. It is receiving cooperation from over 95 percent of all shipbuilders and repairers in the country and is economically self-sufficient. It should be available to serve the marine industry for as long as the need exists.

With the new developments in containerization, roll-on roll-off vessels, piggy-back barges, and the current interest in oceangoing superbarges, about the only thing we can be sure of is that our traditional concept of water transportation will soon be obsolete. In addition to their regular work, marine chemists are now preparing to meet that change. Their annual conference, this August, will feature such papers as "Reaction Toxicity," "Hyperventilation," "Instrumentation Development," and "Marine Polar Solvent Foam Systems".

One of the more recent fields the marine chemists have become involved in is the application of coatings to the interior of closed spaces. Vinyls, saran, epoxies, polysulfides, phenolic epoxies, and inorganic zinc coatings are now commonly applied. In addition to the flammable solvent employed with most of the coatings, there is also the problem of toxic poisoning of workmen either by inhalation, skin contact, or both. It has fallen to the marine chemist to keep these hazards under control through design and planning of air flows and by the maintenance of safe atmospheric conditions through continuous gas analyses.

The National Soya Bean Oil Processor's Council has recently issued tentative standards for cleaning barges which are to be used to carry soya bean oil. These standards require that, where the previous cargo of the barge has been leaded gasoline or chemicals, or petrochemicals of a toxic nature, the barge cleaner must obtain a certificate stating the barge is free of any toxic quantities of the previous cargo before it can be accepted for the carriage of soya bean oil. The certificate must be from a marine chemist.

Bulk chemicals are being transported by water in ever-increasing quantities. Many are either flammable or toxic to man, some with a cumulative effect. It is becoming one of the marine chemist's duties to test the equipment in which such materials have been carried for safe conditions, to evaluate hazards of carrying the chemicals, and to recommend effective controls. The necessary tests will require an increasing degree of skill as well as more sophisticated testing equipment.

It is in the area of bulk chemical transportation that marine chemists can probably render their greatest assistance in the future. Most chemical companies have their own trained personnel handling chemicals in their own plants. Vessel operators and repairers are seldom that fortunate. The hazards of flammability, toxicity, and reactivity, inherent in some of the newer chemicals require evaluation by professional technicians. In the fields of marine transportation and chemicals, there is no other comparable group of immediately available professional consultants.

Whatever evolves in this changing pattern of marine transportation, either from the standpoint of industry needs or regulatory requirements, the National Fire Protection Association working together with the industry, is eager to meet the needs and meet the challenges that lie ahead. We intend to be ready to provide the service you want—whenever you want it—wherever you want it. ⚓

AMENDMENTS TO REGULATIONS

Circulars

NVIC 0–67 Lists Circulars in Force

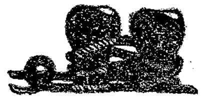
The annual listing of navigation and vessel inspection circulars in force has been made in Navigation and Vessel Inspection Circular O–67, is now available by writing Commandant (CHS) U.S. Coast Guard, Washington, D.C. 20591.

Stability Test Procedures Notes

Notes on preparations and procedures for stability tests have been prepared to provide specific guidelines for Coast Guard technical personnel and inspectors, shipyard personnel, and vessel owners, so that valid stability test results may be obtained with minimum cost.

On several occasions in recent years, stability tests conducted under Coast Guard supervision have been delayed, and have been unnecessarily costly, as a result of inadequate preparations. In these instances, the preparations did not minimize the many small indeterminate factors which can affect the test results. Even though small, these factors can be significant when compared to the relatively small heeling moment applied during the test.

Navigation and vessel inspection circular No. 1–67 containing these notes which amplify present regulations is now available by writing Commandant (CHS) U.S. Coast Guard, 1300 E Street NW., Washington, D.C. 20591.



STORES AND SUPPLIES

Articles of ships' stores and supplies certificated from May 1 to 31, 1967, inclusive, for use on board vessels in accordance with the provisions of Part 147 of the regulations governing "Explosives or Other Dangerous Articles on Board Vessels" are as follows:

CERTIFIED

Fuld Bros., Inc., 702 South Wolfe St., Baltimore, Md. 21231: Certificate No. 726, dated May 5, 1967, F. G. 13 SOLVENT DEGREASER.

Chemicals Division Olin, 745 Fifth Ave., New York, N.Y. 10022: Certificate No. 727, dated May 18, 1967, HTH DRY CHLORINE and POOL PURIFIER.

AFFIDAVITS

The following affidavits were accepted during the period from April 15, 1967, to May 15, 1967:

VALTEK, P.O. Box 209, Provo, Utah 84601, VALVES.

ACCEPTABLE HYDRAULIC COMPONENTS

Nonductile hydraulic components which have passed high impact shock tests, unless otherwise noted, the material is cast iron.

Manufacturer	Valve type	Identity	Maximum allowable pressure (p.s.i.)
Denison Engineering Division, American Brake Shoe Co., Columbus, Ohio 43216.	Direct operating sequence valve, remote control.	RH–**9–*36–*	3, 000
Do	Direct operating unloading valve.	RJ–**3–*36–*	3, 000
Do	Direct operating sequence and check valve, remote control.	RC–**3–*36–*	3, 000
Do	Direct operating counterbalance valve.	RD–**3–*36–*	3, 000
Do	Check valve	DK–**3–582M	3, 000
Do	do	DK–**4–582M	5, 000
Do	4-way valve	DD24–50*–**	5, 000
Do	do	DD24–51*–**	5, 000
Do	do	DD24–52*–**	5, 000
Do	do	DD24–53*–**	5, 000
Do	do	DD24–58*–**	5, 000
Do	do	DD12–*0*–**	3, 000
Do	do	DD12–*1*–**	3, 000
Do	do	DD12–*2*–**	3, 000
Do	do	DD12–*3*–**	3, 000
Do	do	DD12–*8*–**	3, 000
Do	Single solenoid valve	DD04–343AK–X304	3, 000
Do	Double solenoid valve	DD04–353CK–X304	3, 000
Do	Multirange flow control valve.	VA*–**3–33*–**	5, 000
Do	Check valve	CV20–53*–**	3, 000
Do	Pilot operated check valve	CV12–333–**	3, 000
Do	Check valve	CV12–53*–**	3, 000
Do	Pilot operated check valve	CV24–333–**	3, 000
Do	Pilot operated 4-way valve	D1D04–T3–***	5, 000
Do	do	D1D04–U3–***	5, 000
Do	do	D1D04–W*–***	5, 000
Do	do	D1D04–33–***–**–**	5, 000
Do	do	D1D12–33–***–**–**	5, 000
Do	do	D1D24–35–***–**–**	5, 000
Do	Flow control valve	FC04–23–***–**	5, 000
Do	do	FC06–23–***–**	5, 000
Do	do	FC12–23–***–**	5, 000
Do	do	FC12–33–***–**	5, 000
Do	Remote control valve	RE04–1322	3, 000
Do	Relief, sequence unloading or reducing valve.	RR12–53*–**	5, 000
Do	do	RR24–5WN	5, 000
Do	do	RR24–531	5, 000
Do	do	RU12–53*–**	5, 000
Do	do	RV12–53*–**	5, 000
Continental Machines, Inc. Hydraulics Division Savage, Minn. 55378.	4-way	VS8M–1*–*–**	3, 000
Do	do	VS8M–2*–*–**	3, 000
Do	do	VS8M–3*–*–**	3, 000

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications of marine safety rules and regulations may be obtained from the nearest marine inspection office of the U.S. Coast Guard. Because changes to the rules and regulations are made from time to time, these publications, between revisions, must be kept current by the individual consulting the latest applicable Federal Register. (Official changes to all Federal rules and regulations are published in the Federal Register, printed daily except Sunday, Monday, and days following holidays.) The date of each Coast Guard publication in the table below is indicated in parentheses following its title. The dates of the Federal Registers affecting each publication are noted after the date of each edition.

The Federal Register may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Subscription rate is $1.50 per month or $15 per year, payable in advance. Individual copies may be purchased so long as they are available. The charge for individual copies of the Federal Register varies in proportion to the size of the issue but will be 15 cents unless otherwise noted in the table of changes below. Regulations for Dangerous Cargoes, 46 CFR 146 and 147 (Subchapter N), dated January 1, 1967, are now available from the Superintendent of Documents, price: $2.50.

CG No.	TITLE OF PUBLICATION
101	Specimen Examination for Merchant Marine Deck Officers (7–1–63).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (8–1–62).
115	Marine Engineering Regulations and Material Specifications (3–1–66). F.R. 12–6–66.
123	Rules and Regulations for Tank Vessels (5–2–66). F.R. 12–6–66.
129	Proceedings of the Merchant Marine Council (Monthly).
169	Rules of the Road—International—Inland (9–1–65). F.R. 12–8–65, 12–22–65, 2–5–66, 3–15–66, 7–30–66, 8–2–66, 9–7–66, 10–22–66.
172	Rules of the Road—Great Lakes (9–1–66).
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (3–2–64).
175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3–1–65).
176	Load Line Regulations (1–3–66). F.R. 12–6–66, 1–6–67.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
184	Rules of the Road—Western Rivers (9–1–66). F.R. 9–7–66.
190	Equipment Lists (8–1–66). F.R. 9–8–66, 11–18–66, 2–9–67.
191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (2–1–65). F.R. 2–13–65, 8–21–65, 3–17–66, 10–22–66, 12–6–66, 12–13–66.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (10–1–63). F.R. 11–5–64, 5–18–65.
220	Specimen Examination Questions for Licenses as Master, Mate, and Pilot of Central Western Rivers Vessels (4–1–57).
227	Laws Governing Marine Inspection (3–1–65).
239	Security of Vessels and Waterfront Facilities (3–1–67). F.R. 3–29–67.
249	Merchant Marine Council Public Hearing Agenda (Annually).
256	Rules and Regulations for Passenger Vessels (5–2–66). F.R. 12–6–66, 1–13–67, 4–25–67.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (1–3–66). F.R. 4–16–66, 12–6–66, 1–13–67.
258	Rules and Regulations for Uninspected Vessels (3–1–67.)
259	Electrical Engineering Regulations (3–1–67).
266	Rules and Regulations for Bulk Grain Cargoes (11–1–66).
268	Rules and Regulations for Manning of Vessels (2–1–63). F.R. 2–13–65, 8–21–65, 12–6–66.
270	Rules and Regulations for Marine Engineering Installations Contracted for Prior to July 1, 1935 (11–19–52). F.R. 12–5–53, 12–28–55, 6–20–59, 3–17–60, 9–8–65.
293	Miscellaneous Electrical Equipment List (4–1–66).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (10–1–59). F.R. 10–25–60, 11–3–61, 4–10–62, 4–24–63, 10–27–64, 8–9–66.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (1–3–66). F.R. 12–6–66, 1–13–67.
329	Fire Fighting Manual for Tank Vessels (4–1–58).

CHANGES PUBLISHED DURING APRIL 1967

The following have been modified by Federal Registers:
CG 256 Federal Register, April 25, 1967.

CHANGES PUBLISHED DURING MAY 1967 (NONE)

U.S. GOVERNMENT PRINTING OFFICE: 1967

LYKES SAFETY AWARD

S.S. *Tyson Lykes* crewmembers display certificates and plaques attesting to the vessel being the safest ship in the Lykes fleet in 1966.