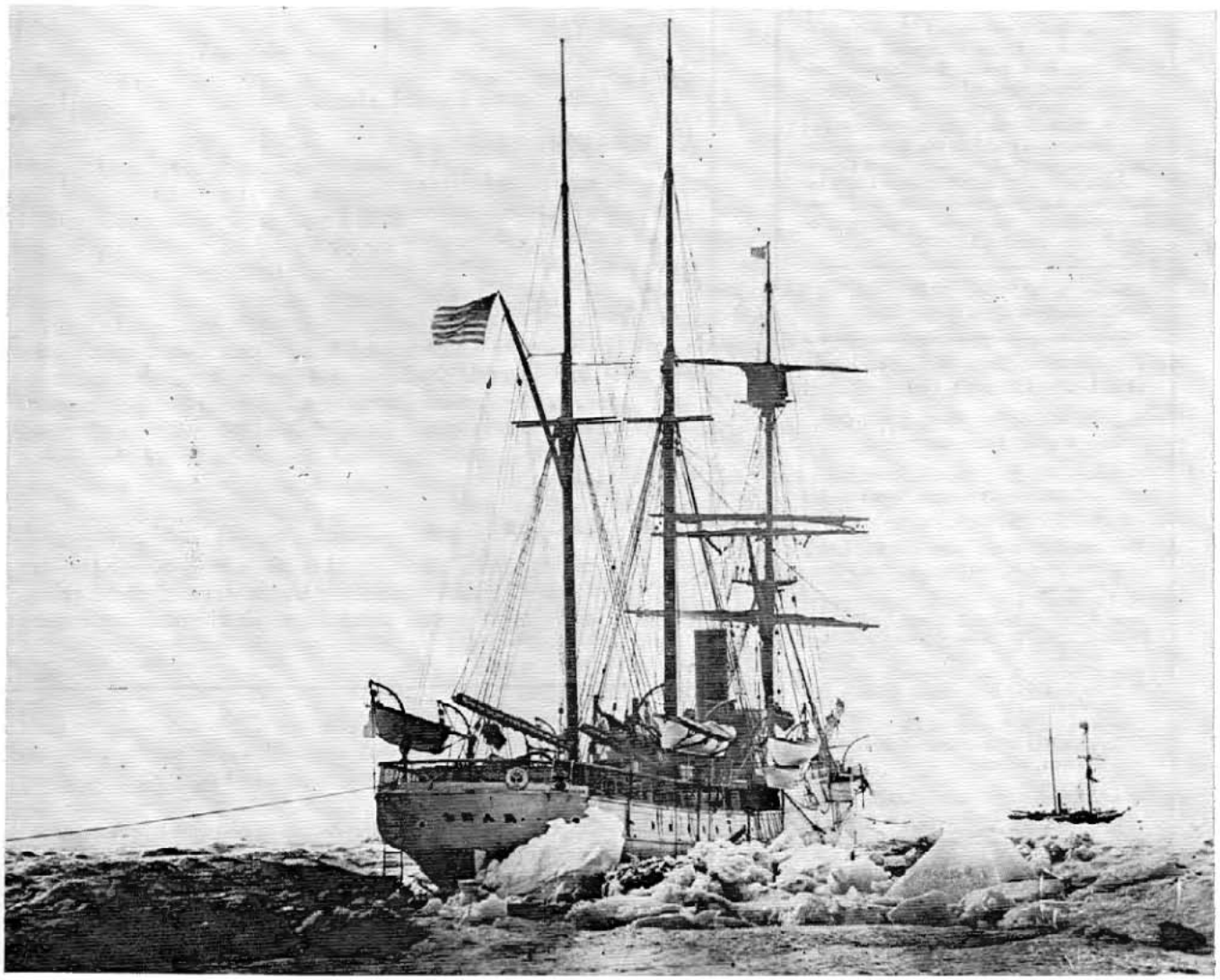
PROCEEDINGS
OF THE MARINE SAFETY COUNCIL



DEPARTMENT OF TRANSPORTATION UNITED STATES COAST GUARD

Vol. 33, No. 8 CG-129 August 1976

PROCEEDINGS

OF THE MARINE SAFETY COUNCIL

Published monthly by the Commandant, USCG, in the interest of safety at sea under the auspices of the Marine Safety Council. Special permission for republication, either in whole or in part, with the exception of copyrighted articles or artwork, is not required provided credit is given to the Proceedings of the Marine Safety Council. All inquiries and requests for subscriptions should be addressed to Commandant (G–CMC), U.S. Coast Guard, Washington, D.C. 20590. Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget, March 12, 1974.

CONTENTS

FEATURES

DEPARTMENTS

FRONT COVER

The Barkentine *Bear* served in the Coast Guard from 1885 to 1929. She was the first vessel the service used as an icebreaker. Her first assignment sent her to the Pribilof Islands off Bristol Bay, Alaska on April 21, 1886, with the Cutters *Corwin* and *Rush* to search for the crew of the Bark *Amethyst.*

BACK COVER

Crewmen from the trapped whalers were rescued by a dramatic overland expedition which covered more than 1,600 miles of frozen waste to reach the starving men.

DIST. (SDL No. 103)
A: acde(2); fghklmntuv(1)
B: n(40); c(16); e(5); f(4); ghj(3); r(2); bkipq(1)
C: egmp(1)
D: i(5); adgklm(1)
E: mn(1)
F: kp(1)
Lists TCG–06, CG–13, CG–20

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

maritime sidelights

POSTER

The International Lifesaving Appliance Manufacturers' Association in conjunction with international bodies and authorities has produced a simplified ship's lifeboat launching drill poster, aimed at familiarizing all persons at sea with safe lifesaving techniques.

The poster is designed with emergency situations in mind and is simplified for quick easy reference. It has been produced in color on a tough, self-adhesive, water resistant material to encourage immediate display in a prominent position on any clean dry surface. To promote a quick recall, the drill is linked to a simple five finger graphic display which should also aid in overcoming language difficulties.

Properly launched and handled, the modern lifeboat is a very powerful means of survival, carrying ample reserves of integral buoyancy which will completely support a crew. It is fully equipped with food and equipment to aid survival and rescue. The lifeboat offers the opportunity for the crew to keep together and avoid full submersion in the water. It is in the users' interest to ensure that they familiarize themselves with the types of equipment available on their vessel and to remember, as far as possible, to keep dry, warm, and in control.

This poster has already been widely distributed and it is intended that all new equipment will include a copy. The poster is provisionally available in English, French, and Norwegian, with other languages under consideration. Further details may be obtained by writing:

The Secretary
International LAMA
19 The Riding
Steyning
Sussex BN4 3PX England

FLASHBACKS!

Recently a tank vessel experienced a pipeline flashback during dockside repairs in conjunction with examination by a marine chemist. The vessel had a signed gas-free certificate which stated that No. 6 and No. 8 center cargo tanks were considered gas-free, safe for man and safe for fire.

The proximate cause of this casualty was determined to be a flashback through the cargo piping from a welder's torch in No. 8 center cargo tank into No. 6 center tank. The 14-inch high-suction valve in No. 6 center tank was opened for inspection by the gas chemist. When this gate valve was opened a small quantity of oily slop dropped into the tank. All hot work in the adjacent area was immediately halted by the chemist. Extra blowers were placed in No. 6 center cargo tank and three crewmembers were sent to the tank to clean up the residue and dry the bottom of the tank where the leak occurred. The flashback occurred near the completion of the cleaning operation. The flashback was generated from hot work being done on a dresser coupling on the cargo line in No. 8 center cargo tank. Work in that tank had not been stopped due to a lack of communication between the workmen and the gas chemist. It is theorized that the extra blowers located in the No. 6 center cargo tank created a positive pressure within the tank and also within the cargo line since the high-suction valve was open. This forced fumes down the cargo line into No. 8 center tank where the fumes were ignited by the hot work being done. The flash propagated through the cargo line back to No. 6 center cargo tank, igniting some rags in the vicinity.

Fortunately this incident resulted in no injuries to crewmen or workers. No structural damage was sustained by the vessel. However, this incident had a potential for being very serious.

It is hoped that this short account will sufficiently emphasize the dangers of working on a vessel in a partially gas-free condition since both gas-free and non-gas-free tanks are usually interconnected via cargo pipelines that can serve as conductors for vapor and/or fire. Care should always be exercised when opening valves or pipelines, especially those leading to or from non-gas-free tanks, since even gas-free pipelines may contain small amounts of cargo residue and vapors. In these cases hot work should only be undertaken under the direct supervision of the gas chemist. A continuing education program both for seamen and shoreside workers to alert them to these hazards will not only make for better working conditions but protect life and property as well.

HATCHES

On January 1, 1976, the seagoing barge *Caribbean* was moored port side to a refinery dock in Ensenada, Puerto Rico, loading a cargo of sugar. The tug *M. Moran* was moored alongside the starboard bow waiting for the loading to be completed. Two crewmen from the tug were assisting in the loading operations.

About noon the four individuals engaged in the loading operation finished their lunch aboard the tug and

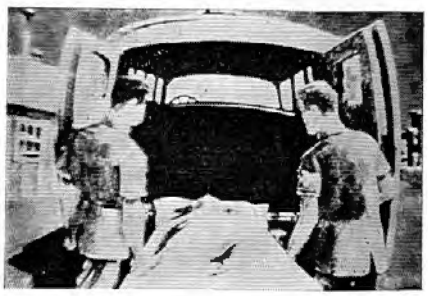
(*Continued on page 149*)

TANK SAFETY

by LTJG TOM PERRY, USCG

This article was adapted from a paper which was presented at the 42d Annual Safety Conference of the Virginia Safety Association, Inc., in Norfolk, Va., on 6 May 1976.

The aim of safety is, ". . . elimination of sorrow, distress, and great economic waste which travels in the wake of accidents, most of which are preventable." These words, taken from the Safety Conference program, demand attention. One thought which passed through my mind as I read the statement was that a life lost in an accident is always a tragedy that few persons are prepared to accept.



A little over a year ago, the Coast Guard lost a marine inspector who had entered an oxygen-deficient cargo tank during a routine examination. As you may know, the Coast Guard is a relatively small organization and if one does not know someone personally—at least one has heard of him. The death of this officer touched all of us. None of us ever expects such an accident to happen to ourselves or to our fellow workers. A fine man and a valuable resource to the Coast Guard died . . . accidentally . . . Avoidably!

Another marine inspector examining a chemical slop barge last year had entered and examined several tanks in a routine manner. During the examination, the inspector became nauseous and experienced a partial loss of vision. He had bumped into a ladder and bulkhead before he realized that his vision was failing. He was able to escape from the tank and after a week under medical observation was found to have no permanent physical impairments. I think you'll agree that he is probably a very lucky man to be alive today.

These two incidents involved Coast Guard officers. Similar incidents have occurred with shipyard workers, with ship's officers and crew, and with marine chemists. The point I am making should be obvious. An occupational hazard does not discriminate. The hazard can affect any unwary or careless individuals, be they safety expert or welder, marine inspector or marine chemist. It is the common threat imposed by a hazard that makes safety a universal principal.

I would like to describe to you how the Coast Guard is dealing with one particular hazard, specifically, the hazard associated with entering cargo tanks and other enclosed spaces. Throughout this paper a reference to a tank is, in fact, a reference to all cargo tanks and enclosed spaces.

The Coast Guard faces the problem of tank entries on three fronts.

1. We must insure the safety of our own personnel onboard our own vessels and at our shore units.

2. We must insure the safety of our marine inspectors who are required to examine documented vessels of the merchant fleet, a job requiring frequent tank entries.

3. The Coast Guard is responsible for the administration of occupational safety and health standards for persons over when it exercises regulatory control, namely the U.S. Merchant Marine.

Our marine inspectors are exposed to tank entry hazards on a daily basis. Regrettably, it took the tragic death of a marine inspector for the Coast Guard to tighten up its safety program and redouble its efforts to make an inherently hazardous task safe. Bearing in mind that the concept of safety is universal, the principals of safety applied by the Coast Guard can readily be applied to any other facet of the maritime industry.

What are the hazards involved with entering a cargo tank or other enclosed space? I think we all have

a pretty good idea of what these hazards are, but let's review them quickly just the same.

1. The tank or space may not contain a sufficient supply of oxygen to support life.

2. The tank or space may contain a high concentration of toxic chemical vapors which can render a person unconscious and dead in a short period of time.

3. The tank or space may contain relatively low concentrations of chemical vapors which may have a long term cumulative affect on a person's health and life, if exposed on a routine or regular basis.

4. Just to make sure we've got you coming and going, many chemical vapors present fire and explosion hazards in addition to their health hazards.

5. Heat, noise, presence of tripping hazards, presence of corrosive materials, and improper lighting are other miscellaneous hazards to be considered in tank entries.

As we all know, the first step of solving a problem is understanding the problem and defining it. We have just done that. We have described the hazards associated with cargo tank and enclosed space entries.

The Coast Guard's program relies heavily on an effective and comprehensive training and indoctrination program to protect its personnel from tank entry hazards. I don't think the importance of raising the individual's awareness as to the nature and seriousness of the hazards can be overemphasized. I believe this principle applies to all safety hazards—not just tank entry hazards. The overall safety of any operation is dependent upon each individual's awareness of the hazards and the consequences of his actions, and the acceptance of his personal responsibility to being safety conscious. At this point I'll describe in depth each of the four hazards that I have listed.

A human being needs a certain amount of oxygen to survive. The exact amount varies from individual to individual. The air we breathe contains approximately 21% oxygen, certainly sufficient for all living creatures to survive and thrive. Sixteen percent oxygen (at sea level) is generally considered the lowest acceptable concentration of oxygen for most people to live with. This is certainly not safe for all persons.

An atmosphere containing 16–18% oxygen should be regarded as marginal. Indeed, a marine chemist would never certify a tank "Safe for Man" without at least 18% oxygen in the tank atmosphere. Such variables as the weather conditions, the person's activity in the enclosed space, age, weight, state of health and smoking habits may well determine the individual's ability to work and survive in an oxygen deficient atmosphere.

The space may become oxygen deficient in several ways. The oxygen may become diluted or displaced by gases or vapors of volatile materials, or the oxygen may be consumed by chemical or biological reaction processes. Certain cargoes or residues of cargoes such as scrap iron, fresh fruit, molasses, and various vegetable drying oils absorb oxygen. Rusting is another oxygen consuming process. A recent practice that we have experienced is so-called "torching." A candle is left burning in a closed space to deliberately use up the oxygen to inhibit rusting. The result: an oxygen deficient tank.

Oxygen may be displaced in a tank in several ways. If an argon hose, used in argon arc welding, is not properly secured, it may leak a sufficient amount of argon during the night or weekend to displace enough oxygen in the tank to render it unsafe for persons entering. On September 18, 1975, in Pascagoula, Miss., four lives were lost as a result of just such an incident. A leak from an argon purge line left in a tank overnight displaced a sufficient amount of oxygen in the tank to make it unsafe for manned entry. The welder entered the next morning and was overcome. Three persons died subsequently in rescue attempts. Carbon dioxide and nitrogen can also displace the oxygen in a tank, rendering it unsafe for entry.

Let's discuss the second tank entry hazard, the acute toxicity of high concentrations of certain chemicals and tank coatings.

Almost any chemical or physical agent in a high enough concentration can be hazardous to your health. Certain chemicals encountered in industry can be extremely toxic and may easily kill the careless or unsuspecting worker. The chemical shipping industry is most susceptible to high chemical vapor concentrations. Most chemicals shipped in bulk exhibit toxic properties.

Acute toxicity problems are not not limited to persons directly involved in the movement and transfer of chemical cargo. Ships or barges in for repair may have lingering vapors which could kill an unsuspecting worker. On the other hand, shipbuilders may use various solvents which in high concentrations cause serious harm.

The "serious harm" need not be death or unconsciousness. Chemical vapors which make a person groggy or "drunk" may render the person highly susceptible to serious injuries due to trips or falls. Some chemicals can make a person sick without really affecting the nervous system.

Benzene is a very commonly shipped commodity which is highly toxic. On August 26, 1970, two young deck hands lost their lives aboard the 100-foot tug MV *Marilyn M II*. Without supervision or further instruction they were told to enter a tank and strip a small puddle of benzene from the bottom. They were found 90 minutes later on the tank bottom, dead.

On March 1, 1972, one man was overcome by benzene vapors and died while cleaning the No. 3 starboard cargo tank aboard tank barge B–29.

On November 17, 1972, an oversight in lining up the cargo tank valves aboard the SS *William T. Steele* resulted in benzene spillage and the subsequent deaths of the Chief Mate, the Master, and the Second Mate. The Master and Second Mate lost their lives in an attempt to rescue the Chief mate from the cargo tank. This type of multiple tank entry deaths is not uncommon.

Painting in enclosed spaces without adequate ventilation and respiratory protection is an objectionable practice. Toluene and certain ketones used as solvents and thinners can have a narcotic effect on the painter. The painter is liable to become nauseous, develop a headache, and may ultimately become unconscious and die.

Welding in an enclosed space should always be treated with great respect. Ozone and nitrogen oxides are produced during heli-arc and argon arc welding. Ozone is a lung injurant and exposure to as little as 20 parts per million ozone could be lethal within a few hours. If ozone is present with about an eqnal amount of nitrogen dioxide its toxicity increases. Nitrogen dioxide is another lung injurant which has poor warning properties so that a sufficient amount may be inhaled without great discomfort to produce lung edema, which is an accumulation of fluid in the lungs.

Welding of certain metal surfaces can have lethal consequences. For example, the heating of cadmium-plated metals produces highly toxic fumes that can kill in several minutes. Certain welding rods may have a highly toxic coating which necessitates protective measures.

Halogenated hydrocarbons are often used as degreasing agents, fire extinguishing agents, fumigants, and refrigerants. These chemicals have acute and chronic toxicity hazards. On exposure to high concentrations, the most common symptoms are nausea, vomiting, diarrhea, headache, and unconciousness. If unconsciousness occurs it may be followed by sudden death due to fibrillation of the heart or respiratory failure. After exposure to amounts which are large but not sufficient to produce sudden death, there may be severe kidney and liver damage eventually leading to death. The most common halogenated hydrocarbons arranged in order of increasingly acute toxicity are methyl chloride, ethyl chloride, ethylene dichloride, ethyl bromide, carbon tetrachloride, dichloroethane, methyl chloroform, trichloroethylene, methyl bromide, tetrachloroethylene, pentachloroethylene, and tetrachloroethane. Tetrachloroethane, which is an excellent solvent for a number of paints and lacquers has no particular warning signs or symptoms and can produce extremely severe poisonings from continuous exposure to fairly low concentrations. An acute exposure to the more narcotic of these compounds may result in unconsciousness for surprisingly long periods with eventual recovery. Unconsciousness for 8 weeks has been reported in a case of methyl bromide poisoning. Methyl bromide is a widely used fire extinguishing agent. Methyl chloroform, trichloroethane, trichloroethylene, perchloroethylene, and carbon tetrachloride are widely used degreasing agents. Carbon tetrachloride, which is gradually being removed from the market, can cause very sudden unconsciousness, probably due to the effect of carbon tetrachloride on the heart which speeds up enormously and then goes into disorganized twitching with no effective beat at all.

Without discussing other acutely toxic chemicals, suffice it to say that many others exist. Let's now consider the third tank entry hazard: chronic exposures.

The guide (and the *law* for that matter) to exposure limits for the various chemicals is the American Conference of Governmental Indus-

trial Hygienists' "Theshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment." The TLV limits listed in this publication are generally recognized by industrial hygienists as levels safe for most persons being exposed for 8 hours a day, 40 hours a week. Some of the chemicals have ceiling levels listed for brief excursions above the TLV. These should never be exceeded. For the other chemicals, excursion factors apply. These apply for brief excursions up to 15 minutes. These factors, and formulas for their use, are available in the above-mentioned TLV Guide.

Chronic toxicity hazards, regrettably, seem to be of only a casual interest to most workers. The hazard is real and serious, but like a time-released cold-capsule the effect is delayed. Regular exposure to concentrations above TLV values may lead to an array of physical disorders leading eventually to disability and death.

Benzene exposure, which can be acutely toxic in high concentrations, can also lead to various blood disorders and occasionally leukemia. Most of the halogenated hydrocarbons can lead to chronic disorders of the liver, kidneys, and nervous system. Fluorinated hydrocarbons are generally safer than the chlorinated and brominated hydrocarbons. Welding operations also offer chronic toxicity hazards. Certain metals' fumes have a cumulative adverse effect on a person's health.

If a ship is in the Coast Guard Yard for overhauling, asbestos will be ripped out and replaced with ceramic or fiberglass insulation. Breathing of asbestos fibers may lead to asbestosis, a fancy name for a lung disease that will kill you. The ripping out process leads to high levels of asbestos which are difficult to control. Ventilation and respiratory protection is essential for these operations.

Sandblasting, if not properly controlled will lead to a build up of silica in the lungs causing silicosis, another fancy name for a deadly lung disease. The hazard can be greatly reduced by using a sand-like material called "black beauty" which does not contain silica. Respiratory protection and ventilation, again, are a must.

It is important to adhere to exposure limits to protect your overall lifetime health. We'll shortly be talking about good working practices and procedures to follow for operations within cargo tanks and enclosed spaces.

We'll first briefly discuss the fourth significant tank entry hazard, namely the fire and explosion hazard, which commands a high respect among shipyard workers.

In addition to the oxygen deficient hazard and the chronic and acute toxicity hazards associated with tank entry, the fire and explosion hazard looms as an additional hazard for most chemicals. Any spark- or fire-producing activities must be completely avoided until the tank or space is certified "Safe for Fire" by a marine chemist.

How can the hazards associated with tank entry and enclosed space entries be reduced to make such entries essentially safe? The answer lies in an effective and comprehensive training program which completely describes the hazard and procedures to be adhered to before an entry is attemped. A brief safety meeting should be held just prior to a tank entry, detailing the specific hazards and precautions for the particular operation. Drills and training are important. The supervisor should ensure that each person is instructed in the proper wearing, use, and maintenance of protective respiratory equipment. Rescue and emergency drills should be held periodically. These drills will provide for efficiently executed rescues if the time ever comes.

For all four hazards, effective ventilation is the first step towards reducing hazards. Ventilation will remove the hazard by replacing it with fresh air. The means of assuring that this is accomplished is by instrument testing which requires a marine chemist under certain circumstances.

Before any hot work is begun, a marine chemist must certify the tank, "Safe for Fire." If a person is to enter the tank without respiratory protection, then the tank must also be certified "Safe for Man" by testing for sufficient oxygen content and acceptable concentrations of toxic vapors (concentrations below TLV's).

All tank entries made into spaces which have not been tested or which have been tested and found to contain an unsafe atmosphere must be made while wearing personal protective equipment. Of paramount importance is the wearing of suitable respiratory protection. A self-contained breathing apparatus is a must. This type of respirator is designed to give respiratory protection in any emergency situation where the concentration of toxic chemicals is unknown.

Generally a tank should be entered only if:

1. it contains at least 18% oxygen;
2. it is sufficiently free of toxic vapors;
3. it is maintained under forced ventilation;
4. it is certified "Safe for Man" by a marine chemist. Always examine the certificate carefully for qualifications or special instructions.

If a tank must be otherwise entered, then a safety harness and lifeline should be attached to the person entering the space. The person entering must of course be protected with a self-contained breathing apparatus. A system of communications or signals must be established between the

(*Continued on page 151*)

COAST GUARD RULEMAKING

(Status as of 1 July 1976)

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
BOATING SAFETY							
Lifesaving devices on white water canoes & kayaks (CGD 74-159) comment period extended 6-12-75	2- 4-75		7-15-75	X			
Boats and associated equipment (CGD 75-110)	9-19-75		11- 5-75			3-18-76 Corrected 3-25-76	9-15-76
Standards for flotation (CGD 75-168)	4-29-76		7-30-76				
Safe loading and flotation standards (CGD 75-176)	5- 6-76		6-21-76	X			
Low- and non-powered boat capacity (CGD 74-268)	6-24-76		8-24-76				
BRIDGE REGULATIONS							
Fox River, WI (CGD 75-035)	2- 6-75		3- 7-75	X			
Mystic River, MA (CGD 75-053)	3-27-75		4-29-75	X			
West Palm Beach Canal, FL (CGD 75-070)	3-27-75		4-29-75	X			
Clearwater Pass, FL (CGD 74-299)	8-12-75		9-12-75	X			
Norwalk River, CT (CGD 75-216)	11-21-75		12-31-75	X			
St. Lucie River, FL (CGD 72-168)	11-21-75		12-31-75			6-10-76	7-12-76
Tacoma Harbor, WA (CGD 75-195)	11-21-75		12-31-75			5- 3-75	6- 7-76
Lake Champlain, VT (CGE 75-222)	12- 8-75		1- 9-76	X			
Dutch Kills, NY (CGD 75-231)	12-22-75		2- 5-76			4- 1-76	5- 3-76
Shrewsbury, NJ (CGD 75-241)	2- 2-76		2-20-76			6-24-76	7-29-76
Missouri R. IA (CGD 75-244)	2-26-76		3-12-76	X			
Mitchell River, MA (CGD 76-014)	2-19-76		4- 5-76	X			
Old Brazos River, TX (CGD 76-024)	3-11-76		4-12-76	X			
Housatonic River, CT (CGD 76-034)	3-15-76		4-20-76	X			
Menominee River, WI (CGD 76-069)	4-22-76		5-25-76				
Bayou Teche & Bayou Plaquemine, Brule, LA (CGD 76-093)	5-27-76		6-29-76				
Bayou Boeuf, LA (CGD 76-068)	6-14-76		7-20-76				
Bayou Lafourche, LA (CGD 76-077)	6-14-76		7-20-76				
Sabine Lake, TX (CGD 76-112)	6-24-76		7-26-76				
Clear Creek, TX (CGD 76-111)	6-24-76		7-30-76				
MARINE ENVIRONMENT AND SYSTEMS (GENERAL)							
Pipelines, lights to be displayed (CGD 73-216)	9-19-74 Corrected 10-18-74	10-21-74	11- 4-74	X			
Visual identification of tank barges (CGD 75-093)	2- 5-76 Corrected 2-23-76		3-16-76	X			
Anchorages, Port of New York (CGD 74-194)	3- 1-76		4-15-76	X			
Anchorages, Boston Harbor, MA (CGD 76-40)	3-29-76		5-14-76	X			
Navigation safety regulations (CGD 74-77)	5- 6-76 Corrected 5-13-76	6-11-76 Wash. 6-17-76 San Fran.	8- 6-76				
Tug assistance (CGD 76-025); Advance notice	5- 6-76 Corrected 5-13-76		8- 6-76				
Minimum net bottom clearance (CGD 76-051); Advance notice	5- 6-76 Corrected 5-13-76		8- 6-76				

Coast Guard Rulemaking—Continued

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
MARINE ENVIRONMENT AND SYSTEMS (GENERAL)—Continued							
Regulated navigation areas, Apra Outer Harbor, Guam (CGD 74-281)	5-17-76	.....	6-16-76	X	.....	.....	.....
Anchorages, Puget Sound area, WA (CGD 76-039)	6-10-76	.....	7-26-76	....	.....	.....	.....
New Orleans Vessel Traffic Service (CGD 75-112)	6-17-76	.....	8- 2-76	....	.....	.....	.....
Anchorage, Scituate Harbor, MA (CGD 74-193)	6-21-76	.....	8- 5-76	....	.....	.....	.....
MERCHANT MARINE SAFETY (GENERAL)							
Bulk Dangerous Cargoes, Inspection of Barges (CGD 73-271)	3-11-74	4-15-74	4-30-74	X	.....	.....	.....
First Aid Certificates (CGD 73-272)	4- 2-74	.....	6-15-74	X	.....	.....	.....
	Supp. Notice 12- 1-75	.....	1-16-76	X	.....	.....	.....
Carriage of Solid Hazardous Materials in Bulk (CGD 74-13)	5-15-74	7-16-74	8-31-74	....	.....	6-10-76	6-30-76
Manning of nautical school ships (CGD 74-201)	1-21-75	.....	3- 6-75	....	.....	5-13-76	6-14-76
Metal boring, shavings, turnings, and cuttings (CGD 75-133)	8- 1-75	.....	9-15-75	X	.....	.....	.....
Marine occupational safety and health standards (CGD 75-101); Advance notice; comment deadline extended 12-11-75	8-11-75	.....	1-15-76	X	.....	.....	.....
Tank vessels; air compressors, cargo handling room bilges (CGD 75-017)	8-13-75	.....	9-29-75	X	.....	.....	.....
Vessel inspection regulations (CGD 75-074)	9-16-75	.....	10-31-75	X	.....	.....	.....
Fire hydrants and hose (CGD 74-60)	9-23-75	.....	11-10-75	X	.....	.....	.....
Electrical cable splicing (CGD 74-305)	10- 8-75	.....	11-24-75	....	.....	6-24-76	7-26-76
Fire and boat drills on passenger vessels (CGD 75-009)	12-17-75	.....	1-26-76	....	.....	4- 1-76	5- 1-76
Structural fire protection (CGD 75-032)	12-22-75	.....	2- 5-76	....	.....	4-29-76	5-31-76
Unmanned barges carrying certain bulk dangerous cargoes (CGD 75-226)	3-15-76	.....	4-29-76	X	.....	.....	.....
Elevators and dumbwaiters, ANSI Code (CGD 75-001)	4- 5-76	.....	5-21-76	X	.....	.....	.....
Noncombustible materials for merchant vessels (CGD 74-129)	4- 5-76	.....	5-21-76	X	.....	.....	.....
Vapor recovery systems in cargo transfer operations (CGD 75-208); Advance notice	4- 5-76	.....	6-21-76	X	.....	.....	.....
Towing vessel stability (CGD 76-018); Advance notice	4-12-76	.....	7- 1-76	....	.....	.....	.....
Tank vessels carrying oil in international trade (CGD 75-240)	4-15-76	5-20-76	6-12-76	X	.....	.....	.....
Measurement of vessels (CGD 75-078)	4-22-76	.....	6- 7-76	X	.....	.....	.....
Segregated ballast, certain existing tank vessels (CGD 76-075)	5-13-76	.....	6-30-76	X	.....	.....	.....
Lifesaving equipment for Great Lakes vessels (CGD 76-033); Advance notice	6- 7-76	.....	9- 7-76	....	.....	.....	.....
Bulk dangerous or extremely flammable liquid cargoes (CGD 73-096)	6-24-76	8- 3-76	8-20-76	....	.....	.....	.....

NOTE: This table which will be continued in future issues of the Proceedings is designed to provide the maritime public with better information on the status of changes to the Code of Federal Regulations made under authority granted the Coast Guard. Only those proposals which have appeared in the Federal Register as Notices of Proposed Rulemaking will be recorded. Proposed changes which have not been placed formally before the public will not be included.

Marine Safety Council Membership

Anthony Francis Fugaro was born on November 24, 1927, at New York City, and was graduated from Bishop Loughlin Memorial High School, Brooklyn, N.Y., in 1945. He was graduated from the U.S. Coast Guard Academy, New London, Conn., with a Bachelor of Science Degree in Marine Engineering and with a commission of Ensign on June 3, 1949.

After the Academy he served 5 years of continuous sea duty, first in the USCGC *Casco* out of Boston, Mass., on ocean station patrol and search and rescue, followed by duty as Operations Officer and later Executive Officer in the buoy tender *Bramble* out of San Juan, P.R., then as Executive Officer in the buoy tender *Conifer,* working out of Morehead City, N.C.

From July 1954 to May 1956, he commanded Ship Training Detachment No. 1 at New York City, then commanded the Captain of the Port Office at Jacksonville, Fla., for 2 years.

From April until August of 1958, he was assigned as a student at the Merchant Marine Safety Indoctrination School at the Coast Guard Academy, after which he was assigned as Investigating Officer and Hull Inspector at the Coast Guard Marine Inspection Office at New Orleans, La. In May 1960, he was stationed at London, England, as Merchant Marine Detail Officer. While in that post he also acted as advisor to the U.S. delegation to the International Whaling Conference convened in London during the years 1960 to 1963.

After returning to the States in July 1963, he commanded the buoy tender *Woodbine,* which serviced aids to navigation and provided icebreaking assistance on the Great Lakes while operating out of Grand Haven, Mich. Beginning in June 1965, he served for 4 years as Administrative Aide to the Commandant of the Coast Guard in Washington, D.C. For meritorious achievement while in that post, he was awarded the Coast Guard Commendation Medal.

From August 1969 to September 1971, he commanded the Captain of the Port Office and the Marine Inspection Office at Tampa, Fla. For service while there he was awarded a Gold Star in lieu of a second Coast Guard Commendation Medal and a Unit Commendation. He was cited for meritorious service while acting as on-scene commander during the grounding of the M/T *Delian Appollon* in February 1970, which resulted in a large oil spill in Tampa Bay. Owing to then-Captain Fugaro's coordination of local, county, state, and federal efforts to contain the oil, a greater disaster was averted.

He served his next assignment of 1 year as Captain of the Port and Group Commander at Sault Ste. Marie, Mich. He received a letter for performance as Task Group Commander for operation "Taconite" during the 1971–72 winter navigation season on the Great Lakes involving assistance to more than 300 vessels. This operation was the main Coast Guard effort in support of the program to extend the navigation season on the Great Lakes.

In August 1972, he was assigned as a student at the Industrial College of the Armed Forces, Washington, D.C., where he earned the designation of Distinguished Graduate a year later. In August 1973, he returned to Headquarters to serve first as Chief, Planning and Special Projects Branch in the Office of Merchant Marine Safety until June 1974, when he was reassigned to the post of Deputy Chief, Office of Boating Safety. For meritorious service in the latter duty, he was awarded another Gold Star in lieu of a third Coast Guard Commendation Medal. Meanwhile, in off-duty hours he earned a Master of Science Degree in Administration from George Washington University in 1973.

In July 1975, he was designated Deputy Chief of Staff of the Coast Guard. For outstanding performance of duty in that post he was presented the Meritorious Service Medal in June 1976.

By nomination of the President on January 19, 1976, and the approval of the Senate on May 3, Captain Fugaro was appointed to the permanent rank of Rear Admiral effective as of July 1, 1976. With that promotion he was reassigned to the flag ranking post of Chief, Office of Marine Environment and Systems, his present duty.

Rear Admiral Fugaro's wife is the former Marcia Jeanette Trawick of Eufaula, Ala. They have one son who is a pre-med student at Stanford University. Their present home is at Bethesda, Md. ⚓

maritime sidelights

(*Continued from page 141*)

reboarded the barge to continue cleaning and closing the hatches as they were topped off. One of the crew went forward to complete some routine maintenance while the other three went to No. 5 hatch to prepare it for closing. Prior to closing a hatch, normal procedure is to clean the excess product off the coamings to ensure a watertight seal.

One of the three men entered the interior of the hatch and commenced leveling and spreading the sugar. The second man began cleaning the hatch coamings along the open athwartship area. The third man commenced cleaning the port and starboard coamings, having to crawl under the hatch covers on each side to reach the coamings. After completing the port side, he moved around to the starboard side unobserved, and began cleaning the coaming under No. 5 starboard hatch cover.

About 1245 the No. 5 hatch cover was energized. The cover had closed only about 2 feet when the operator heard a shout to stop. Running to the starboard corner of the hatch the crewmen found the workman caught between the coaming and the hatch cover with his head down. They were unable to free the trapped man so they obtained a hydraulic jack from the tug and raised the hatch cover, but their rescue efforts were too late, the trapped man was dead.

'72 COLREGS

The Convention on the International Regulations for Preventing Collisions at Sea, 1972, has recently met the terms necessary to begin the 12-month countdown for its entry into force. Specifically, as of 14 July 1976, the requisite number of nations have ratified the document, and the Inter-Governmental Maritime Consultative Organization (IMCO) has established 15 July 1977 as the date the 1972 Collision Regulations ('72 COLREGS) will enter into force for vessels navigating on the high seas.

Mariners are reminded that entry into force of the '72 COLREGS will be only for vessels whose flag states have ratified the Convention. To date, the nations which have ratified represent just over 65% of the world fleet of merchant vessels of over 100 gross tons. Thus, as of this writing, approximately one-third of the world's merchant fleet is not yet bound to comply with the '72 COLREGS. This figure is, of course, subject to change by 15 July 1977.

The United States has not yet ratified the Convention, but anticipates doing so prior to the 15 July 1977 entry into force. U.S. mariners on the high seas should be prepared to comply with the '72 COLREGS on that date. Should U.S. ratification not occur prior to the entry into force of the '72 COLREGS, then U.S. mariners on the high seas must continue to comply with the 1960 International Rules until the date that U.S. ratification occurs.

The Coast Guard is currently in the process of revising CG–169, Rules of the Road International–Inland, to reflect the '72 COLREGS. This new edition should be available sometime after 1 January 1977.

The flag states that have ratified the '72 COLREGS, as of 14 July 1976, are:

Belgium
Brazil
Bulgaria
Canada
Denmark
France
East Germany
West Germany
Ghana
Greece
Iceland
India
Liberia
Netherlands
Nigeria
Norway
Romania
Spain
Sweden
Switzerland
Syria
Russia
Great Britain (incl. Hong Kong)
Yugoslavia

Heritage

The *Bear* was built in Greenock, Scotland, in 1874 and served for 10 years as a whaler before being purchased by the U.S. Navy in 1884 to participate in the Greeley Relief Expedition. She was 200 feet in length and 32 feet wide with a draft of 18 feet 2 inches. The *Bear* displaced 703 tons net and was a barkentine equipped with auxiliary steam power. Under sail she could make 8 knots, under steam she could do better than 9 knots. Two years after the Greely expedition the *Bear* was sailed around the horn and turned over to the Revenue Marine in San Francisco for outfitting and assignment to the arctic patrol. Her new Captain was not certain that the *Bear* was suited for the arctic patrol because of her deep draft. But the intrepid vessel soon proved herself ideally suited to the harsh conditions of the Far North. Her massive beams and heavy oak frames matched with her reinforced bow and Australian iron-bark sheathing made her a hardy "sourdough." In her career she made 42 arctic trips averaging 16,000 miles per trip and became such a familiar sight that she was nicknamed "Healy's Puk Oomiack" (Healy's fire canoe) in honor of her first captain in the arctic patrol.

In 1926 the *Bear* was condemned and decommissioned and eventually sold to the city of Oakland where she served for several years as a floating maritime museum. But the gracious lady of the north was not to end her career of service here. In 1933, despite her condemnation, she was selected by Admiral Byrd for use during his antarctic exploration. In 1941 the *Bear* was returned to active duty patroling the northernmost reaches of the Atlantic. It was a proud day indeed when she sailed into Boston Harbor with the Norwegian freighter *Busko*. The *Busko* had been seized while setting up secret Nazi radio transmitting stations.

In 1944 the *Bear* was decommissioned and placed up for sale. Several years later, while being towed from Nova Scotia to Philadelphia, she encountered a violent storm and sank, her long days of service were finally at an end.

During her days in the arctic patrol the *Bear* engaged in one of the most famous rescue operations ever undertaken. In the autumn of 1887 the *Bear* returned to Seattle from arctic patrol. The waterfront was buzzing with talk of a major disaster in the making. Eight ships of the whaling fleet, with nearly 300 men aboard, were traped in the ice near Point Barrow and would be forced to winter over. Unless relief was able to reach them they would starve before the ice broke up and freed them.

President McKinley ordered the *Bear* to make ready, secure a volunteer crew, return north, and provide aid to the stranded whalers. The entire crew of the *Bear* volunteered. Within 3 weeks the *Bear* was refitted and underway. The *Bear* sailed north until she encountered solid ice in Nelson Sound. The expedition turned south and landed a party at Cape Vancouver.

The party consisting of 1st Lieutenant D. H. Jarvis, 2nd Lieutenant E. P. Bertholf, and Surgeon S. J. Call set out on a trek which would take them 1,600 miles across the frozen continent. Their plan was to gather a herd of reindeer along the way from

native herdsmen and then drive the herd to Point Barrow. The party proceeded by deer sled, dog sled, and foot through the worst possible conditions. The temperature hung near −20° F and often fell to −70°. Lt. Jarvis' diary gives an idea of the ordeal: "The blizzard was still on when we started this morning and grew worse as we went along. As though to make amends for his performance yesterday, my deer kept up alongside Mikkel's (a herder) sled and we two soon were far ahead of the others and were greatly relieved when we picked up the village of Opiktillik—at least the deer led us there, for it was beyond us to find the way in the blinding snow. It was now blowing so hard that we could scarcely stand. In an hour the others came along. They had been compelled to pick their way on foot, one of the natives going ahead on his hands and knees. It was hard to think of losing the day, for we had made only 5 miles, but it was impossible to go on in that wind, so we crowded into an already overfilled native hut and tried to wait patiently for the storm to let up."

On December 13 the party reached St. Michael trading station and refitted for the final drive to Point Barrow. Lt. Bertholf separated from the main party and took a shortcut across Seward Peninsula with flour and dry provisions while the remainder of the party continued to Cape Rodney to collect reindeer. At Cape Rodney, Jarvis was able to purchase 133 animals from local herdsmen. The local missionary W. J. Loop donated the mission's 292 reindeer and his services in helping to deliver the animals to the stranded vessels.

The herd was driven across Kotzebue Sound, where the herd was attacked by wolves and polar bears. The going was further slowed by a series of violent storms. Lt. Bertholf rendezvoused with the main party near Cape Blossom. On February 26, 3½ months after setting out, the party sighted the stranded ships.

The half-starved sailors could hardly believe that an overland party had managed to reach them. The crews of the whaling vessels were in poor condition. Lacking proper gear and disciplined leadership the men had degenerated into a disorganized mob. Jarvis quickly took command, organizing the men into work parties. Through his leadership the situation quickly improved. Early in the spring the *Bear* was able to break the vessels free.

The three men were awarded special gold medals by Congress for "heroic service rendered." ⚓

TANK SAFETY

(*Continued from page 145*)

person in the tank and the person tending the lifeline in the gas free location. Another person with personal protection equipment should be standing by in the gas free location to render assistance to the person in the tank if difficulties develop.

A filter respirator is good for protection from silica and asbestos fibers if ventilation is maintained and a sufficient supply of oxygen is available. A filter respirator does not provide oxygen. It merely filters the air that you breathe.

Some vapors may be absorbed by your skin or irritate it. Protect yourself with protective clothing. Be sure to remove the protective clothing upon leaving the space. Liquids impregnating shoes, gloves and other protective clothing items can do their evil work later.

Check all of your equipment prior to entering. Inspect the air hoses, face mask, straps, and cylinders. Faulty equipment can be worse than none at all. After exiting a tank, recheck your equipment, clean it, and perform any necessary maintenance. Properly stow the equipment.

Never attempt a rescue without notifying others to assist you and never attempt a rescue without wearing proper respiratory equipment and lifeline.

Many accidents result in multiple fatalities because a rescue is attempted without taking proper precautions.

Let's sum up what we've discussed and call it quits. The hazards associated with tank entry are:

1. Insufficient oxygen
2. High toxic concentrations of chemical vapors
3. Continued exposure to unsafe concentrations of chemical vapors
4. Fire and explosion

The precautions to take before attempting an entry:

1. Ventilation
2. Instrument testing
3. Marine chemist certificate
4. Respiratory protection
5. Training

Know your limitations and the limitations of your equipment. Do not try to accomplish more than you can, and don't overextend the capabilities of your equipment. Exercise caution while you're in the tank. If you become drowsy or nauseous or in any other way feel affected by vapors, *get out, pronto!* And, though it may sound obvious, never take off your equipment while in a tank.

Let's face it. Entering an enclosed space is serious business. The potential for disaster is ever present. Play it safe. The breath you save may be your own. ⚓

Nautical Queries

The following items are examples of questions which will be included in the new First Assistant and Chief Engineer and Chief Mate and Master multiple choice examinations.

Engineers

1. Heat damage to fuel injection nozzles can be avoided by preventing

A. long periods of engine overload.
B. excessive fuel oil temperature.
C. deposits of varnish and hard carbon on the nozzles
D. metallic contact between nozzles and cylinder heads.

2. The spring force required for proper valve operation in a diesel engine is determined by the

A. cam lobe contour.
B. valve spring length.
C. minimum firing pressure.
D. maximum firing pressure.

3. A pH factor of 14 in a diesel engine closed cooling system indicates

A. overtreatment of the water.
B. undertreatment of the water.
C. a slightly acid condition.
D. a slightly alkaline condition.

4. The port and helix metering pumps used in diesel fuel injection systems may be designed to produce a constant beginning and variable ending of fuel injection. In such pumps, the pump timing is

A. timed for port opening.
B. timed for port closing.
C. controlled by rack movement.
D. controlled by plunger stroke.

5. Which automatic boiler control should be tested prior to lighting off an automatically fired auxiliary boiler?

A. The automatic bottom blow valve
B. The low water level cutoff switch
C. The ignition transformer voltage output
D. The ignition system high tension lead autoswitch.

Deck

1. You intend to travel from position, latitude 31°–00′ N, longitude 81°–10′ west to position 42°–15′ north, longitude 8°–52′ west by great circle. Which of the following statement(s) is (are) correct?

I. The distance is 3,442 miles.
II. The lungitude of the vertex is 28°–26.1′ west.

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

2. The equation of time is 8m 40s and the apparent sun is ahead of the mean sun. If you are on the central meridian of your time zone, the apparent sun will cross your meridian at

A. 11–51–20 ZT.
B. 12–00–00 ZT.
C. 12–04–20 ZT.
D. 12–08–40 ZT.

3. Which statement(s) is (are) true about sea ice?

I. As it ages, it becomes less brittle.
II. It is weaker than fresh water ice of the same thickness.

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

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. any of the above.

5. The tendency of a flammable liquid to vaporize is indicated by its

A. ignition temperature.
B. flash point.
C. flammable range.
D. convection index.

Answers

Engineers
1. A 2. A 3. A 4. B 5. B
Deck
1. A. 2. A 3. B 4. C 5. B

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 Saturday, Sunday, and 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 will be furnished by mail to subscribers, free of postage, for $5.00 per month or $50 per year, payable in advance. The charge for individual copies is 75 cents for each issue, or 75 cents for each group of pages as actually bound. Remit check or money order, made payable to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

CG No.	TITLE OF PUBLICATION
101	Specimen Examinations for Merchant Marine Deck Officers (Chief Mate and Master) (1–1–74).
101–1	Specimen Examinations for Merchant Marine Deck Officers (2d and 3d mate) (10–1–73).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (4–1–72). F.R. 7–21–72, 12–1–72, 11–14–74, 6–18–75.
*115	Marine Engineering Regulations (6–1–73). F.R. 6–29–73, 3–8–74, 5–30–74, 6–25–74, 8–26–74, 6–30–75.
123	Rules and Regulations for Tank Vessels (1–1–73). F.R. 8–24–73, 10–3–73, 10–24–73, 2–28–74, 3–18–74, 5–30–74, 6–25–74, 1–15–75, 2–10–75, 4–16–75, 4–22–75, 5–20–75, 6–11–75, 8–20–75, 9–2–75, 10–14–75, 12–17–75, 1–21–76, 1–26–76, 2–2–76, 4–29–76.
169	Rules of the Road—International—Inland (8–1–72). F.R. 9–12–72, 3–29–74, 6–3–74, 11–27–74, 4–28–75, 10–22–75, 2–5–76, 3–1–76, 6–10–76.
*172	Rules of the Road—Great Lakes (7–1–72). F.R. 10–6–72, 11–4–72, 1–16–73, 1–29–73, 5–8–73, 3–29–74, 6–3–74, 11–27–74, 4–16–75, 4–28–75, 10–22–75, 2–5–76.
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (6–1–75).
175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3–1–73).
176	Load Line Regulations (2–1–71). F.R. 10–1–71, 5–10–73, 7–10–74, 10–14–75, 12–8–75, 1–8–76.
182	Specimen Examinations for Merchant Marine Engineer Licenses (Chief Engineer and First Assistant (1–1–74).
182–1	Specimen Examinations for Merchant Marine Engineer Licenses (2d and 3d Assistant) (4–1–75).
184	Rules of the Road—Western Rivers (8–1–72). F.R. 9–12–72, 12–28–72, 3–8–74, 3–29–74, 6–3–74, 11–27–74, 4–16–75, 4–28–75, 10–22–75, 2–5–76, 3–1–76, 6–10–76.
190	Equipment Lists (5–1–75). F.R. 5–7–75, 6–2–75, 6–25–75, 7–22–75, 7–24–75, 8–1–75, 8–20–75, 9–23–75, 10–8–75, 11–21–75, 12–11–75, 12–15–75, 2–5–76, 2–23–76, 3–18–76, 4–5–76, 5–6–76, 6–10–76, 6–21–76, 6–24–76.
*191	Rules and Regulations for Licensing and Certification of Merchant Marine Personnel (6–1–72). F.R. 12–21–72, 3–2–73, 3–5–73, 5–8–73, 5–11–73, 5–24–73, 8–24–73, 10–24–73, 5–22–74, 9–26–74, 3–27–75, 6–2–75, 7–24–75, 8–13–75, 12–11–75.
*200	Marine Investigation Regulations and Suspension and Revocation Proceedings (5–1–67). F.R. 3–30–68, 4–30–70, 10–20–70, 7–18–72, 4–24–73, 11–26–73, 12–17–73, 9–17–74, 3–27–75, 7–28–75, 8–20–75, 12–11–75, 5–6–76.
227	Laws Governing Marine Inspection (7–1–75).
239	Security of Vessels and Waterfront Facilities (5–1–74). F.R. 5–15–74, 5–24–74, 8–15–74, 9–5–74, 9–9–74, 12–3–74, 1–6–75, 1–29–75, 4–22–75, 7–2–75, 7–7–75, 7–24–75, 10–1–75, 10–8–75, 6–3–76.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (4–1–73). F.R. 12–22–72, 6–28–73, 6–29–73, 8–1–73, 10–24–73, 12–5–73, 3–18–74, 5–30–74, 6–24–74, 1–15–75, 2–10–75, 8–20–75, 12–17–75, 4–29–76, 6–10–76.
258	Rules and Regulations for Uninspected Vessels (5–1–70). F.R. 1–8–73, 3–2–73, 3–28–73, 1–25–74, 3–7–74.
*259	Electrical Engineering Regulations (6–1–71). F.R. 3–8–72, 3–9–72, 8–16–72, 8–24–73, 11–29–73, 4–22–75.
268	Rules and Regulations for Manning of Vessels (12–1–73).
293	Miscellaneous Electrical Equipment List (7–2–73).
*320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (7–1–72). F.R. 7–8–72.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (9–1–73). F.R. 1–25–74, 3–18–74, 9–20–74, 2–10–75, 12–17–75.
329	Fire Fighting Manual for Tank Vessels (1–1–74).
439	Bridge-to-Bridge Radiotelephone Communications (12–1–72). F.R. 12–28–72, 3–8–74, 5–5–75.
467	Specimen Examinations for Uninspected Towing Vessel Operators (10–1–74).

CHANGES PUBLISHED DURING JUNE 1976

CG–169, 184, & 257, Federal Register of June 10.
CG–190, Federal Registers of June 10, 21, & 24.
CG–239, Federal Register of June 3.

*Due to budget constraints or major revision projects, publications marked with an asterisk are out of print. Most of these pamphlets reprint portions of Titles 33 and 46, Code of Federal Regulations, which are available from the Superintendent of Documents. Consult your local Marine Inspection Office for information on availability and prices.