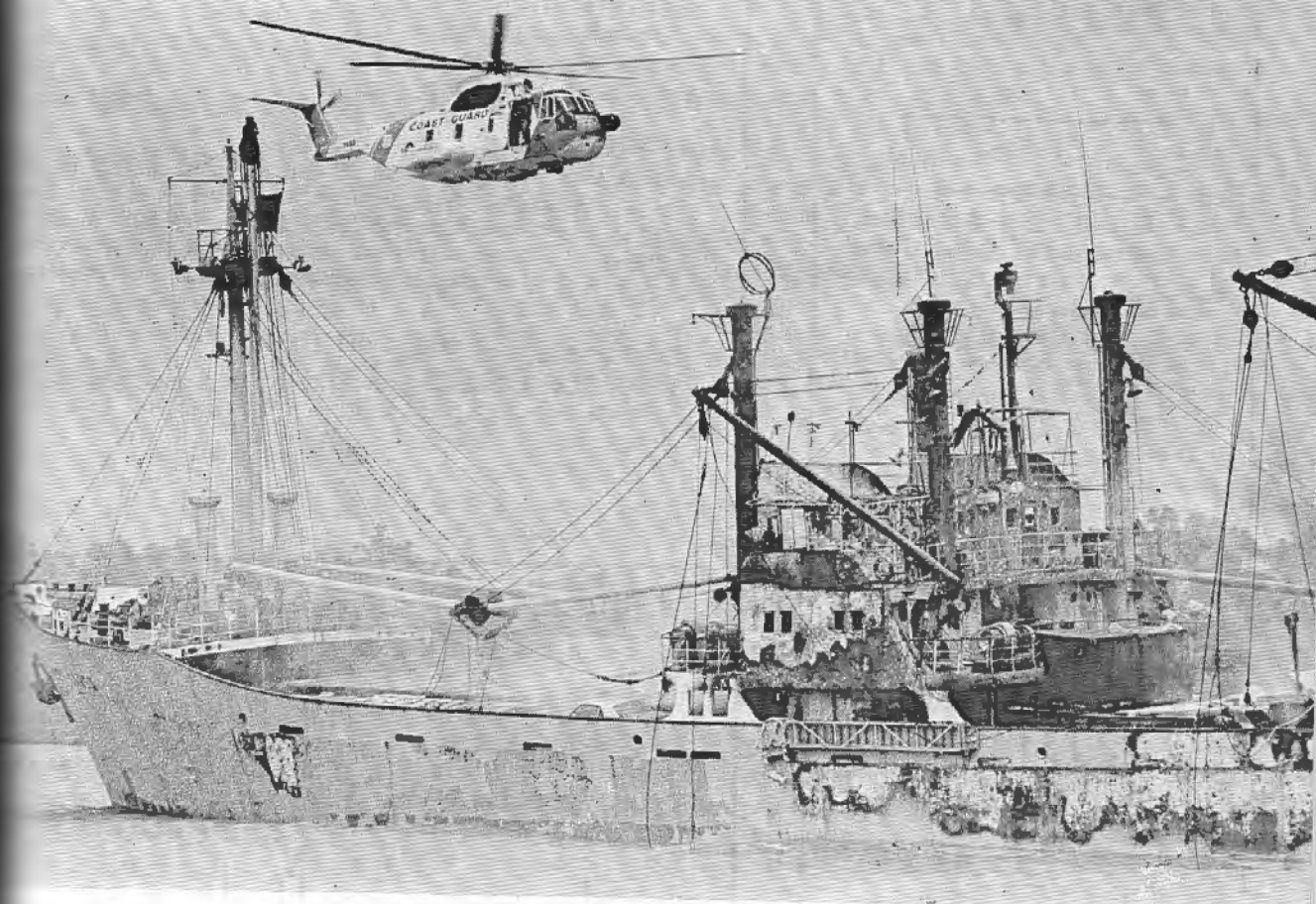


PROCEEDINGS

OF THE MARINE SAFETY COUNCIL



DEPARTMENT OF TRANSPORTATION

UNITED STATES COAST GUARD

maritime sidelights

MEETING

A meeting of the Towing Industry Advisory Committee will be held in New Orleans, La., on September 15 and 16. The meeting, which begins at 10:00 a.m., will be held at the Rivergate, 100 Canal Street. Meetings of this committee are open to the public.

PERSISTENT PILLOW

A fire occurred on a U.S. Coast Guard cutter which had the tenacity of an English bulldog. A foam rubber pillow was inadvertently placed in contact with a reading light on a sea-bunk. After approximately 30 minutes the foam rubber caught fire and began to give off large amounts of black acrid smoke. Fortunately through the quick efforts of the crew, a small fire was "controlled," which if left unchecked, could have had serious consequences. "Bulldog tenacity, you say? Well, controlled was a word carefully chosen in the previous sentence. After the smoke cleared, the pillow was doused with water from a hose and set aside. One hour later the pillow began to smolder and give off smoke. The pillow was placed in a bucket of water for 30 minutes and again set aside. About an hour later smoke began to emanate from the pillow. Another dunking, this time for 15 minutes, and then put aside. The scene gets old at this point—yes, it caught fire again. The pillow was disposed of, but what caused the phenomenon?

"Self heating"; some materials are susceptible to self heating if the right conditions occur. Self heating, or spontaneous combustion as it has been

incorrectly called, is the result of either oxidation or other chemical reaction that produces heat. The heat in turn cannot be carried away fast enough and the material heats to the point of spontaneous combustion. Foam rubber is susceptible to spontaneous heating when subjected to heat from an artificial drying process or, as in this instance, when it catches fire due to other reasons and then, because of the heat input caused by the fire, continues to self heat after the fire has been extinguished.

The National Fire Protection Association, in the "Fire Protection Handbook," 13th Edition, recommends that the following precautions be taken against spontaneous heating in foam rubber in consumer products:

Where possible remove foam rubber pads, etc., from garments to be dried in dryers or over heaters. If garments containing foam rubber parts have been artificially dried, they should be thoroughly cooled before being piled, bundled or put away. Keep heating pads, hair dryers, other heat sources from contact with foam rubber pillows, etc.

As a further remark, they add:

Foam rubber may continue to heat spontaneously after being subjected to forced drying as in home or commercial dryers and after contact with heating pads and other heat sources. Natural drying does not cause spontaneous heating.

Spontaneous heating, which subsequently causes spontaneous combustion, is often the cause of mysterious fires. In this instance it wasn't the initiating factor, but could have served as a source of secondary ignition if it had been left unattended.

INSPECTED BARGES

The List of Inspected Tank Barges published 2 March 1973 by the Office of Merchant Marine Safety and made available to the public through the local Officer-in-Charge, Marine In-

spection has been revised effective 1 January 1975. The list has been expanded to include inspected tankships and will be updated semiannually. This new publication, List of Inspected Tank Barges and Tankships, is available to the public from the U.S. Department of Commerce, National Technical Information Service, Springfield, Va. 22151 at a cost of \$8.75 each, accession order No. ADA012006.

LIFE RAFT DISPLAY

In an effort to improve the potential for training mariners, the San Diego Marine Safety Office has developed and made available a display of an inflatable raft and its survival equipment.

Most inspected vessels and a great many uninspected vessels have inflatable rafts as part of their lifesaving equipment. They are self-contained, launched by the crew, or in the event of sinking, float free and inflate. The rafts are delivered for shipboard use in a weathertight sealed container which does not allow for ships' crews to examine or otherwise become familiar with their use and features.

The Port of San Diego is home to a large fleet of tuna, sport fishing, research, naval, and pleasure vessels utilizing inflatable rafts. The display featuring an inflated 25-person raft, a survival equipment display board, and the shipboard cradle with a container and release equipment, provides a much needed "hands on" display which allows members of the maritime community to "get the feel" of the raft and its equipment under the direction of Coast Guard Marine Safety personnel.

An interesting sidelight in setting up the display is that of the over 150 mariners who have been instructed to date, most had never seen an inflatable raft out of the container. This includes masters of merchant vessels, career naval personnel, long time tuna fishermen and yachtsmen.

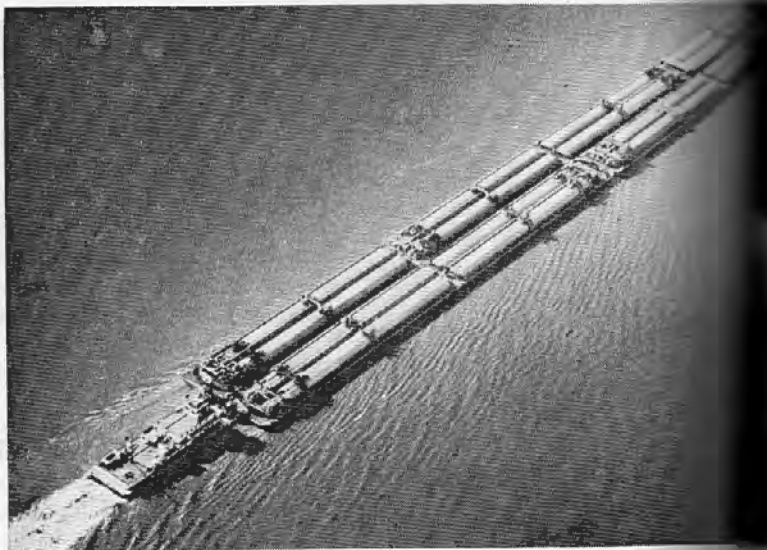
(Continued on page 142)

THE COAST GUARD HAZARDOUS

by LCDR F. D. Halvorsen

It has been estimated that over 2 billion tons of hazardous materials are transported yearly within this country—over our highways, railroads, in the air above us, and on our waterways. For the most part, this material is moved efficiently and safely and we are hardly aware of its presence in our transportation system. You may have noticed highway vehicles with "CORROSIVES" or "COMPRESSED GAS" placards or seen rail cars with "DANGEROUS" or "POISON GAS" placards. If you live near a port area you may have seen tank ships or tank barges transferring products to a tank farm, chemical plant, or refinery. Those of you who travel by air probably aren't aware that shipments of vital, short-lived radioisotopes are speeded to hospitals and clinics on many commercial passenger flights. It should be no surprise to anyone that these shipments of hazardous materials are important to our economy and life style.

But sometimes shipments containing hazardous materials—corrosive, flammable, explosive, poisonous or radioactive—are not transported in the desired manner. Accidents happen; property is damaged or destroyed, people are injured and sometimes killed. Water and air pollution may result with attendant degradation or destruction of our ecological system. Such incidents, although few, generate a good deal of publicity and pub-



AND MATERIALS



lic interest. The regulatory agencies, the "bureaucrats" if you will, are then called upon to issue new regulations, or properly enforce old ones.

Background

The U.S. Coast Guard is one of the five Federal regulatory agencies, all within the Department of Transportation, which write and enforce safety regulations for the movement of hazardous materials within this country.

The Coast Guard is the primary representative of the Federal Government responsible for maritime law enforcement and safety of life at sea, and operates under the Secretary of the Department of Transportation. The Coast Guard's duties and responsibilities encompass all aspects of maritime safety including aids to navigation, recreational boating, general port safety, supervision of U.S. merchant vessel construction and operation, and search and rescue. The mission of the Coast Guard is both operational and regulatory. The total personnel complement of the Coast Guard is approximately 5,700 officers and warrant officers, 30,000 enlisted personnel, and 8,000 civilians. Among its regulatory duties, the Coast Guard is responsible for the safe transportation of hazardous materials in the marine mode.

An unofficial definition of hazardous materials is materials in the transportation system which if released could or will present an immediate or chronic hazard to persons, property, or the environment. A recent congressional definition (Transportation Safety Act of 1974) of a hazardous material is simply a finding by the Secretary of Transportation, at his discretion, that the transportation of a particular quantity and form of material in commerce may pose an unreasonable risk to health, safety, or property. Hazardous materials take all physical forms and may be solid, liquid, or gas. The specific dangers

that these materials potentially present range from minimal to catastrophic. In some cases uncontrolled or accidental release of a hazardous

The specific dangers that these materials present range from minimal to catastrophic.

material may give only temporary discomfort to persons in the immediate vicinity, or result in localized environmental harm, or only cosmetically damage property. In other more grim cases the accidental release of hazardous materials can result in widespread death and injury to an unsuspecting populace, destroy the ecological system in an entire river or estuary, or lead to massive property damage.

Comments on Transportation of Hazardous Materials

Transportation by water within this country has generally proven to be cheaper and safer than any other form of transportation. Accordingly, the majority of materials which can be classed as hazardous are transported by vessel. On our inland river and intracoastal waterways systems, shallow draft tank barges carry all forms of bulk liquid hazardous materials. These barges are made up into tows of up to 40 or more barges and pushed by powerful towboats. The construction requirements and operational restrictions placed upon these barges are in direct relation to the

In general, the more hazardous the material, the more stringent the requirements for design and operation of the barge.

specific hazard or hazards the particular material presents. In general the more hazardous the material, the

more stringent the requirements for design and operation of the barge. Large tank ships transport tremendous quantities of liquid petroleum and other industrial chemicals between foreign and U.S. ports; U.S.-flag vessels carry these products coastwise between U.S. ports, and U.S. and foreign vessels carry these products internationally. Construction requirements and operational restrictions for tank ships, like tank barges, are dependant on the specific hazards presented by the product being transported. U.S.-flag vessels, both ships and barges, carrying hazardous materials are subject to reinspection by the Coast Guard at intervals during their operational life.

Foreign tank ships entering our ports which wish to transport certain unusually dangerous bulk liquid materials must comply with our letter of compliance program. Prior to the first arrival of such foreign vessels in a U.S. port, plans of the vessel's cargo containment system and safety systems are reviewed for compliance with our regulations. On the first visit to a U.S. port the foreign vessel is inspected by Coast Guard personnel to insure that the vessel is in satisfactory material condition. Foreign vessels are then boarded upon each visit to insure that the cargo containment and safety systems are well maintained and fully operational.

Dry cargo vessels and container vessels carry all kinds of materials which can be classed as hazardous. Such dry bulk cargoes as wheat, ferrous metal turnings, and ores are regulated as being hazardous primarily to the vessel. Dry cargo vessels and container vessels may carry explosives, poisons, radioactive materials, or any other hazardous material that can be moved in our transportation system.

Regulatory Authority

Historically, water transportation preceded rail, highway, and air transportation. Therefore it is not unexpected to find the first Federal regulation of hazardous materials in the

water mode. The Steamboat Inspection Act of 1852, whose primary purpose was to halt the appalling number of boiler explosions on steam vessels, contained restrictions and requirements for the transportation of steam passenger vessels of flammable and combustible liquids. A later act in 1871 sought to improve safety in transportation of such "hazardous materials" as loose hay, cotton, kerosene, oil of vitriol, nitrol, camphene, benzene, glycerine, naphtha, benzene, benzene, crude oil, crude or refined petroleum, and other dangerous articles. The Steamboat Inspection Service in the Department of Treasury had the duty of enforcing these early regulations.

The Coast Guard first entered the area of hazardous materials regulation with the Dangerous Cargo Act of 1940.

The Coast Guard first entered the area of hazardous materials regulations just prior to WWII with the Dangerous Cargo Act of 1940. That act required the Coast Guard and Bureau of Marine Inspection and Navigation in the Department of Commerce to write and enforce regulations for the safe transportation of hazardous materials excluding explosives carried on general cargo vessels.

At the start of WWII, (March 1942, by Executive Order No. 9458 under title I of First War Powers Act of 1941) the Bureau of Marine Inspection and Navigation was placed under Coast Guard control. The Bureau of Marine Inspection and Navigation had been formed in 1936 by combining the Steamboat Inspection Service in the Department of Treasury and the Bureau of Navigation in the Department of Commerce. The basic law under which the BMIN operated were the Tank Vessel Act of 1912 and the Dangerous Cargo Act

1940. The Tank Vessel Act of 1936 authorized regulations on design, construction, repair, and operation of tank vessels carrying combustible or flammable cargoes. Administration of these laws was the primary function of the BMIN which was transferred to the Coast Guard.

In 1946, under Reorganization Plan No. 3, the functions of the old BMIN were permanently transferred to the Coast Guard. The Coast Guard was also directed to use the regulations of the Interstate Commerce Commission as they applied to marking and packaging of hazardous materials.

In 1950 President Truman, acting under the Magnuson Act of 1949, by Executive Order 10173 directed that the Coast Guard take any action necessary to maintain the safety and security of U.S. port areas. While the Magnuson Act was primarily directed at prevention of sabotage in U.S. ports during the Korean War, a broad interpretation of the powers granted the Coast Guard was made—and it exists today.

On April 1, 1967, the Department of Transportation was created and the Coast Guard was transferred from the Department of Treasury to the Department of Transportation. All functions pertaining to the Coast Guard's regulation of hazardous materials were transferred to the Secretary of Transportation, who then delegated this authority to the Coast Guard. The most important and far-reaching legislation for the transportation of hazardous materials has been passed in the last few years:

First, the Federal Water Pollution Control Act (FWPCA), as amended in 1972, requires the Secretary of the Department in which the Coast Guard is operating to write and enforce regulations to control oil pollution by hazardous substances (yet to be defined by the Environmental Protection Agency), to promote sewage abatement on vessels. Under this legislation, the Coast Guard became 1 of the 10

agencies making up the National Response Team required under the National Oil and Hazardous Substances Pollution Contingency Plan required by the FWPCA. From our forces we provide a National Response Center (a continuously manned facility in Washington, D.C.) and a National Strike Force consisting of three teams. These teams are established to assist in control of pollution on the navigable waters of the United States. It is interesting to note that our response teams and equipment have participated in pollution emergencies throughout the world.

Second, in 1972, the Ports and Waterways Safety Act was signed into law. Title I of this act generally replaces and supersedes the Magnuson Act and its implementing Executive Order. Title I extends responsibility of the Coast Guard (again by delegation from the Secretary of Transport-

The Coast Guard staffs a National Response Center and a three-team National Strike Force to cope with pollution incidents.

tation) to all structures in, on, and near navigable waters of the United States. This responsibility insures protection of ports and waterways, facilitates transportation, and prevents degradation of the marine environment. Functions deemed necessary to achieve these goals include: supervision and control of vessel movements; establishment and enforcement of inspection procedures for operation, maintenance, fire prevention, and stowage on moored vessels and waterfront facilities; and establishment and enforcement of regulations for the transportation, handling, and storage of hazardous materials.

Title II of the Ports and Waterways Safety Act generally supersedes the Tank Vessel Act of 1936. Additionally, title II specifically extends

the authority for regulation to hazardous materials other than, and in addition to, flammables and combustibles.

Third, the most recent legislation in the area of hazardous materials is the Transportation Safety Act of 1974. The full impact of this act has

The full impact of the Transportation Safety Act of 1974 has yet to be realized.

yet to be realized. The act is directed towards packaged hazardous materials and is applicable to all modes of transportation. This act permits the Federal Government to license and inspect manufacturers and reconditioners of containers for hazardous materials, places all responsibility for the regulation of hazardous materials with the Secretary of Transportation, and reaffirms the independence of the National Transportation Safety Board. This act establishes the civil penalties for violation of regulations written thereunder at \$10,000 per violation per day.

Regulations from the Laws

As you already may have surmised, there are essentially two methods in which hazardous materials can be transported—by "package" and by "bulk." In the marine mode we use a

If a material is lifted on and off a vessel, it is "packaged"; if it is pumped on and off, it is "bulk."

convenient and oversimplified unofficial definition. If a material is physically lifted on and lifted off a vessel, it's a "package"; if it is pumped on and pumped off a vessel through a piping system, it is "bulk."

Particular hazardous materials not fitting either of these definitions are bulk solids, such as grain, ore, fish-meal, wood pulp, and ferrous metal turning and borings. Bulk solids are carried on specially designed dry-bulk vessels or are loaded into holds on ordinary dry-cargo vessels.

The separation of hazardous materials into "bulk" and "packaged" is a practical, rather than legal, distinction.

This separation of hazardous materials into "bulk" and "package" is not a legal definition, but is a distinction used to facilitate the promulgation of regulations. "Packages" and dry bulk hazardous materials transported by water are regulated by Title 46, Parts 146-149 Code of Federal Regulations (46 CFR 146-149 (subchapter N)). Bulk liquid and liquefied gases, flammable or combustible, are regulated under 46 CFR 30-40 (subchapter D) for ordinary petroleum products, and under 46 CFR 150-154 (subchapter O) for products having hazards other than or in addition to the ordinary combustibility or flammability of petroleum products.

There are slightly different concepts of containment for packages and bulk. Regulations for packages, 46 CFR 146-149 (subchapter N), are primarily shipper requirements.

The basic principle is that the package should contain the hazardous material under all expected conditions.

These regulations specify the proper shipping container for each material or class of materials, labeling requirements, shipping limitations, and stow-

age requirements. The basic principle is that the package should contain the hazardous material under all expected conditions of transportation. In general, more hazardous products require better designed/stronger containers. Dry bulk requirements are essentially loading and stowage requirements.

In regulations of bulk liquid and liquefied gas hazardous materials, the requirements are primarily aimed at a containment system which is consistent with the physical properties and hazards of the product. Since the vessel, barge or ship, is the containment system, the regulations in 46 CFR 30-40 (subchapter D) and 46 CFR 150-154 (subchapter O) translate into construction requirements for the vessel. These regulations stipulate requirements for damaged and intact stability, gauging, venting, cargo transfer systems, and materials of construction. In general the more toxic and hazardous the product, the more stringent the requirements. Cargo size limitations are placed on the more toxic products. For instance, bulk shipments of chlorine, a toxic liquefied gas, are limited to 300 tons per tank and to a total of 1,200 tons per vessel. Chlorine in bulk is permitted to be transported only on unmanned barges.

If we compare the relative number of shipments of packaged hazardous materials versus bulk hazardous materials, there are hundreds of thousands of packaged shipments daily, while the number of bulk hazardous shipments in U.S. waters are only hundreds, or at most thousands, daily. However, if volume is considered, more materials are moved in bulk daily than are moved in packages yearly. The Coast Guard is one of the four regulatory modal administrations, together with the Federal Aviation Administration, Federal Highway Administration, and Federal Rail Administration, which regulate the shipment of packaged hazardous materials. The Coast Guard is responsible for the regulation and

supervision of the packaging, handling, and stowage of such hazardous materials on vessels.

The modal regulations for transport of hazardous materials are found in different parts of the Code of Federal Regulations, Title 14 for air and Title 49 for rail and highway. Hopefully it will come as no surprise that the regulations for classification, labeling, and packaging found for each mode are consistent with other modes. Regulations are kept consistent by a Hazardous Materials Regulations Board (HMRB) made up of the modal administrations. The HMRB oversees promulgation of "packaged" hazardous materials regulations where more than one mode is concerned. The nonvoting chairman of the HMRB is the Director, Office of Hazardous Materials, a staff officer under the Secretary of Transportation. The packaging requirements for the hazardous materials moved intermodally are promulgated by the HMRB in Title 49 CFR.

OCMI/COTP Functions

In some very large ports (New York, New Orleans, Philadelphia) where the Coast Guard has two functions, two separate Coast Guard commands are maintained: Captain of the Port (COTP), and an Officer in Charge of Marine Inspection (OCMI).

The COTP is responsible for general port safety and enforcement of pollution prevention regulations.

The Captain of the Port is responsible for general port safety and enforcement of pollution prevention regulations.

staff daily inspects vessels, facilities and anchorages. The purpose of these inspections is to safeguard harbors, ports, and waterfront facilities by enforcement of hazardous

regulations and other related regulations. The COTP is also responsible for establishing, coordinating, and if necessary putting into effect emergency contingency plans in the event of a major casualty in the port. The COTP has moderate capabilities to assist in response to casualties.

The OCMI is responsible for vessel inspection, enforcement of personnel qualifications requirements, and investigation of casualties.

The OCMI is responsible for the inspection and certification of United States vessels which includes vessels carrying more than six passengers, cargo vessels of more than 15 gross tons, tank vessels, steam vessels, seagoing barges, and all seagoing motor vessels of over 300 gross tons. The examination of foreign-flag vessels is carried out within the framework of the International Convention for the Safety of Life at Sea Conventions and the United States Pollution Prevention Regulations. Further responsibility extends to the licensing and certification of officers and seamen, the recruitment and discharge of seamen on United States vessels engaged in foreign voyages, and the investigation of casualties and misconduct aboard vessels. In order to make better use of available manpower, the OCMI and COTP functions are being combined into a single Marine Safety Office (MSO). This combination of offices takes place, or has already been completed, in all except the three port areas of New York, Philadelphia, and New Orleans.

Facts and Figures

An estimate of the total resources available to the Coast Guard for the regulation of hazardous materials is approximately 2,800 personnel and about \$30 million. In 1974, the following inspec-

tions were made by Coast Guard Captain of the Port personnel throughout the country:

1. 32,857 vessel inspections were made. Violations of the regulations resulted in 1,155 penalty cases. Many minor violations which could be corrected on the spot resulted in no violation action. A total of \$149,990 in penalties was collected as a result of completion of 1,000 cases.

2. 10,247 waterfront facilities were inspected. As a result of these inspections 2,871 facilities were found to be in violation. Many minor violations which could be corrected on the spot resulted in no penalty action. In addition to these on-the-spot corrections, 1,266 advisory warnings were issued.

3. 15,700 bulk transfer operations were monitored to insure compliance with pollution prevention regulations (33 CFR 154-156). Action by the Coast Guard was mainly corrective in nature as needed to insure compliance.

The enforcement activities of Marine Inspection Offices relating to

In order to make better use of available manpower, the OCMI and COTP functions are being combined into a single Marine Safety Office.

hazardous materials during 1974 included 6,000 inspections of U.S. flag tank vessels under the commercial vessel safety program. 2,560 inspections were made of U.S. flag cargo and miscellaneous vessels permitted to carry regulated packaged materials. No violations were issued, per se, since vessels are not issued a Certificate of Inspection which permits them to carry hazardous materials until they are in compliance with the regulations.

Some Recent Accidents/Problem Areas

It is estimated that three major accidents involving the bulk shipment

of hazardous materials occur each year on our navigable waters. These accidents are unfortunately spectacular, costly, and involve significant loss of life. Of particular concern to the Coast Guard is a recent incident involving two foreign-flag crude-oil carriers in the Delaware River.

On the average, three major accidents involving bulk shipments of hazardous materials occur each year on our navigable waters.

On 7 April 1974 the *Elias* exploded without warning, burned, and sank while in the last stages of offloading a cargo of low vapor pressure crude oil. Thirteen persons were killed and the vessel was a total loss. Pollution was widespread. The fire was not brought under control for some hours. The hulk of the vessel can still be seen in the Delaware River at the northeast end of the Philadelphia airport.

On 31 January 1975, a U.S. flag vessel apparently struck the moored Greek flag vessel SS *Corinthos*. The collision occurred while the *Corinthos* was offloading a fairly volatile Algerian crude. This collision set off a chain of 30 or more explosions which eventually sank the vessel. Twenty-five persons are dead, or missing and presumed dead. Despite frantic firefighting efforts, the vessel burned out of control for 12 hours. Pollution reached as far as 10 miles downstream.

The cost of such accidents is high. Total damages, losses, and claims from the two accidents described above will exceed \$100 million. The cost of the firefighting foam used on *Corinthos* alone was \$223,000.

Accidents or incidents involving packaged hazardous materials also unfortunately occur with some regularity. These incidents usually are not as severe as bulk accidents; some are quite serious, however. One acci-

dent in particular is symptomatic of a number of difficulties in the shipment of packaged hazardous materials.

Last November, two 34-pound (capacity) cylinders of arsine gas were placed in a 40' freight container loaded in the Newark, New Jersey area. Additional goods including agricultural machinery were also loaded into the freight container. The freight container was then delivered to a water carrier and placed aboard a container vessel, *C.V. Asian Freighter*, for delivery to a European port. The container was loaded underdeck, #2 hold. Once at sea the vessel experienced heavy weather. A few hours after a routine inspection in #2 hold, three crew members became ill, passing blood, vomiting, and complaining of kidney pains. The vessel was diverted to an English port. Other crew members then became ill with what was diagnosed as arsine gas leaking from one of the containers. The end result was 18 very sick people, one of whom will be on a kidney machine for the rest of his life. Use of a vessel was lost for almost 4 weeks while the gas was allowed to dissipate from the

Arsine is a highly toxic gas, and in fact was used as an effective poison gas in World War I.

hold. Claims against the carrier are reported to exceed \$20 million.

Arsine is a highly toxic gas. In fact, it is a class A poison (the most poisonous designation) and was used as an effective poison gas in WWI. Shipping requirements for this material are extensive and include stowage of the container on the main deck in the open. Placarding of the freight container and documentation of the contents of the container by listing on a Dangerous Cargo Manifest are also required. None of these requirements were fulfilled in the incident described above and a serious and costly incident resulted.

This incident delineates several difficulties facing us in the area of packaged hazardous materials. Containerized freight is rapidly replacing break-bulk freight on vessels. Specialized container ships, roll-on-roll-off vessels, and LASH and SEABEA vessels are increasingly being used

The problems posed by container shipments arise from the fact that freight containers are usually loaded outside the port area.

because of their greater economic return. The difficulties arise from the fact that freight containers are usually loaded outside the port area. The water carrier must depend on documentation provided by shippers in other modes to identify any hazardous material within the container and to assure that the hazardous material is classified, labeled, and packaged properly. Even if proper documentation is provided, the water carrier does not know that the container's contents are properly secured and braced. Proper bracing for rail or highway shipment of a freight container does not mean proper securing and bracing for ocean shipment. Once a freight container is loaded aboard a container vessel and the vessel leaves port, the method of stowage does not normally permit opening or moving of the container. The Coast Guard attempts to spot check containers and their contents, but the tremendous number of these containers and the rapidity with which they pass through the port area prevents inspection of all but a few.

Efforts to Improve Transportation of Hazardous Materials

Nationally and internationally, the Coast Guard is participating in efforts to improve the transportation of hazardous materials. Primary efforts

are being directed towards standardization of requirements.

Internationally, the Coast Guard participates in two forums: IMCO (Intergovernmental Maritime Consultative Organization); ECOSOC (United Nations Economic and Social Council). The importance of these forums cannot be overstated.

ECOSOC is a specialized agency of the United Nations seeking to facilitate worldwide standards of transportation. A committee of experts on transportation of dangerous goods has been established under ECOSOC to develop and maintain a book of recommendations on the safe intermodal (intermodal) transport of packaged hazardous materials.

IMCO is the specialized agency of the United Nations concerned solely with maritime affairs. Eighty-six nations are members of IMCO including shipowning nations, countries which use shipping services and countries in the course of development. The objectives of IMCO are to facilitate cooperation among governments on technical matters affecting shipping by establishing minimum

ECOSOC is a specialized agency of the United Nations seeking to facilitate worldwide standards of transportation.

safety standards. The Maritime Safety Committee is the technical arm of IMCO and is the body which these standards are established. The efforts of two subcommittees directed to the safe transportation of hazardous material:

1. The Subcommittee on Carriage of Dangerous Goods has developed the Code for Carriage of Dangerous Goods (packaged hazardous materials, excluding dry bulk). Based on recommendations of ECOSOC committee of experts on Transportation of Dangerous Goods, substances h

divided into nine classes according to the major physical hazards associated with each substance. In the code each substance is listed together with the chemical formula, physical properties and hazards, and detailed recommendations for packaging and stowing aboard vessels. The code was approved in 1965 by the 10th IMCO Assembly and recommended for adoption by member

Substances have been divided into nine classes according to the major physical hazards associated with each.

Comments as a basis for their national regulations. The code is kept under constant review by the subcommittee at meetings held throughout the year.

The Subcommittee on Ship Design is concerned with standards for the safe transport of bulk liquid and solid dangerous chemicals. In 1974, through the efforts of this subcommittee, IMCO produced the Code for the Construction and Equipment for Ships Carrying Dangerous Chemicals in Bulk. This code is directed at carriage of low vapor pressure chemicals. A similar code for liquefied gases, the Code for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, has been completed and is expected to be adopted by the full IMCO assembly in October.

Nationally, the Coast Guard is attempting to improve the transportation of hazardous materials both in

national movement of packaged hazardous materials. When IMCO adopted the Code for Carriage of Dangerous Goods in 1965, the amount of U.S. export trade and worldwide acceptance of our regulations at that time did not necessitate immediate acceptance of this code's recommendations. In the early 1970's however, it became obvious that the code would become the preferred standard internationally and it was decided to augment the code into our regulations.

Implementation of the Code for Carriage of Dangerous Goods required extensive rewriting of our packaged hazardous materials regulations (46 CFR 146-149, subchapter N). Since the existing regulations required wide and extensive alterations, it was decided among the modal administrations of the Department of Transportation to consolidate all intermodal hazardous materials regulations into a single title, Title 49 of the Code of Federal Regulations. The Coast Guard initiated and undertook action to combine the regulations from 46 CFR 146 into a single code under Title 49. With the assistance of the Office of Hazardous Materials, this was accomplished and went out as a notice of proposed rulemaking in January 1974. A substantial number of comments were received and reviewed. This combination of regulations will have the effect of making U.S. intermodal regulations for the transportation of hazardous materials consistent with worldwide standards.

The Coast Guard played a significant role in the development of the IMCO Code for the Construction and Equipment for Ships Carrying Dangerous Chemicals in Bulk and also in the development of the Code for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk. A concerted effort was made to keep our national regulations, (46 CFR 150-154, subchapter O) consistent with the international standards as they were developed. Since our regulations provided the model for these two codes, our regulations

will require only moderate revision to become consistent with the international standards.

Another area of particular interest in the transport of packaged hazardous material is the adoption of a Hazard Information System (HIS system). The Coast Guard is participating with other modal administrations to adopt such a system. This system has many purposes including, general warnings to the public, specific warnings to persons handling and transporting hazardous material, and specific warnings and instructions to emergency response personnel. Proposal of this system has appeared as a Notice of Proposed Rulemaking. The period for receipt of comments concerning this proposal has ended.

The combination of regulations will make U.S. regulations consistent with worldwide standards.

Many comments were received and are under review. The system consists of a two-number code giving hazard and response information for each chemical or group of chemicals.

Future Challenges

The importation of liquefied natural gas from foreign countries and the proposed movement of LNG from Alaska have received a great deal of publicity. The Maritime Commission estimates that by 1985, 100 LNG vessels of about 125,000 cubic meters capacity each will be required to meet the expected demands of consumers for this product. Natural gas is a highly sought, clean burning, ecologically favorable fuel. Critics of importation point to the potential for disaster associated with the transport of large volumes of this product.

LNG is primarily liquefied methane gas carried at an extremely cold temperature (-260° F). The vapor pressure of LNG at this temperature is about 1 atmosphere. This cryogenic

The marine mode is the primary means for international movement of packaged hazardous materials.

and in bulk. The marine mode is the primary means for inter-

material must be transported in specially designed and very sophisticated and expensive ships. The tanks in these ships are essentially large thermos bottles which maintain the liquid methane at its low temperature.

There have been catastrophes associated with this product. In 1944 in Cleveland, Ohio, an LNG storage

LNG ships are essentially large thermos bottles which maintain the low temperature of the liquid methane.

tank ruptured, spilling 1,100,000 gallons (4,200 cubic meters) of LNG within a few seconds. The LNG vaporized and soon ignited. The fire spread havoc and devastation over a wide area. Flames were reported to reach 3,000 feet into the air. The result was 130 dead, over 300 injured, and property damage exceeding \$8,000,000.

Rest assured that another Cleveland disaster could not occur. The Cleveland disaster occurred ostensibly because improper materials were used in the tank. Additionally, the area was not diked and LNG flowed into the city's drainage system, vaporized, and found ignition sources far from the site of the tank failure. The tank was located adjacent to residential areas which were highly susceptible to the intense heat from the fire.

Responsible persons have voiced fears that the number and size of the LNG ships visiting our ports will eventually give rise to a catastrophic accident. There can be no doubt that an accidental release without early ignition, of even one tank of LNG (25,000 cu on the "standard" size vessel) would be catastrophic. However, such an accident would produce damaging effects no greater than those caused by the release of other

less exotic products—certainly potential effects no worse than the Texas City disaster of 1947 involving ammonium nitrate. A recent accident involving a vessel carrying liquefied petroleum gas (a slightly denser material than LNG) indicated that tanks containing a product carried at atmospheric pressure can effectively withstand a hostile fire environment without releasing the bulk of the cargo. It would be expected that

cargo tanks on an LNG vessel would react similarly. Additionally, the Coast Guard protects the movement of these vessels as they pass through congested port areas. During previous movements of such vessels through Boston and New York harbor, stringent traffic control measures were put into effect. The Coast Guard now feels, and has testified before Congress, that the risk lessened by these vessels is acceptably low, and that these vessels can enter U.S. port areas without posing a risk greater than vessels carrying conventional cargoes.

Although LNG has received widespread public attention in the recent past, it is but one of several hazardous materials whose handling, storage, and transportation may involve serious risk to public safety. Probably the most important initial consideration for an LNG terminal or any other terminal handling hazardous materials is where it is to be located.



About the Author

Lieutenant Commander Fred D. Halvarsen is presently the Chief of the Hazardous Materials Training Branch, Coast Guard Headquarters, Washington, D.C. Commander Halvarsen is a 1954 graduate of the Coast Guard Academy. Upon graduation from the Academy he served aboard the U.S.C.G.C. Northwind and the U.S.C.G.C. Klamath. In 1968 he began post graduate study and received his Master of Science in Chemical Engineering from the University of Maryland in 1970. From 1970-1973 he served as assistant Branch Chief, Chemical Engineering Branch, Coast Guard Headquarters. In 1973 he returned to the University of Maryland and received his PhD in 1974.

Though LNG has received much public attention, it is but one of several materials that may involve serious risk.

authority to determine the site of LNG storage and transfer facilities is divided between the Federal Power Commission and the local zoning authority. Federal Power Commission authority in LNG facility siting does not extend to other hazardous materials.

There is now no national policy on the siting of facilities subject to the jurisdiction of the United States which use materials or employ processes which pose a hazard to the public. This topic has been brought in the Senate and is receiving attention within the Department of Transportation.



THEODOSIA

The treacherous shoal waters of North Carolina's coast, which stretch from Nags Head to Cape Fear, are steeped in mystery and abound with strange tales of pirates, shipwrecks, and even an occasional ghost. It was along this coastline that Theodosia Burr Alston, the beautiful young wife of Governor Joseph Alston of South Carolina, mysteriously disappeared in 1813. Theodosia, a lady of both charm and beauty, earned the respect of Washington society when as a young girl, barely into her teens, she became hostess for her father Aaron Burr, the newly elected Vice President of the United States.

On December 30, 1812, Theodosia, desperately ill and grieving the recent death of her infant son, boarded a ship in Charleston Harbor bound for New York to visit her father. The difficult winter passage was complicated by the presence of the British Fleet blockading the eastern seaboard.

In the grey light of early dawn, the privateer *Patriot*, her guns and valuable cargo of contraband concealed below decks under bags of rice, slipped out of Charleston Harbor and began her fateful passage. The

Patriot's distinguished passenger carried a letter from her husband addressed to the commander of the British Fleet calling upon his gallantry to allow the lady to pass undisturbed.

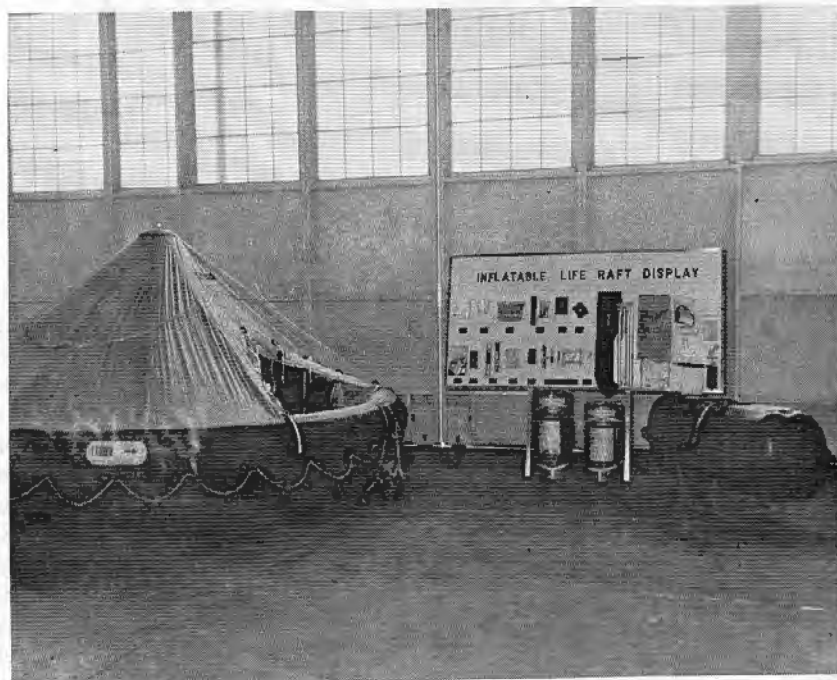
On New Year's Day, 1813, the *Patriot* encountered a British man of war off Cape Hatteras, and was boarded. The letter was presented, and the privateer was allowed to pass—the ruse had worked! The crew of the British warship were perhaps the last to see the beautiful Theodosia alive, for that evening a violent storm blew up and the *Patriot* vanished without a trace.

The fate of the *Patriot*, her crew, and her lovely passenger are shrouded in the mysteries and legends of North Carolina's Outer Banks, and perhaps only the dunes will ever know the real story. But local legend says that the vessel was boarded by a band of pirates who stripped the helpless ship of her cargo and forced the crew to walk the plank. This strange tale of murder and piracy on the high seas is supported by the deathbed statements of several sailors who claim to have been members of the boarding party.

(Continued on page 142)

maritime sidelights

(Continued from page 131)



The San Diego Marine Safety Office has developed a display of an inflatable raft and survival equipment designed to aid mariners in familiarizing themselves with emergency equipment.

THEODOSIA

(Continued from page 141)

The pirates are said to have found the *Patriot* hard aground off Cape Hatteras, driven onto the shoals by the violence of the storm. The small privateer was threatening to break up under the constant pounding of the gale. One of the accounts recalled a beautiful lady who requested a moment's reprieve while she went below decks, then reappeared dressed in a flowing white gown, bible in hand, and walked serenely to her watery

grave.

Many mysteries of North Carolina's outer banks are surrounded by historical controversy, and the fate of the beautiful *Theodosia* will be argued and reargued. But there are those who claim to have seen the solitary figure of a pale young woman moving across the lonely sands, her long white dress shimmering in the moonlight, and then vanishing among the silent dunes. &

Hopefully, if any of these people have a sudden need to see one in the future, they will know how to use it. Organizations having an opportunity to train mariners are encouraged to develop a similar display.

Where such displays are not available, it is suggested that seamen be taken to inflatable life raft servicing facilities where rafts are inflated and the survival equipment is available. Periodically each facility has its rafts serviced; this should provide a ready opportunity for members to see their own equipment in an inflated condition. Address servicing facilities may be found in CG-190, Equipment Lists.

Remember, *training* is the key to the effective use of safety gear.

DIVING MANUAL

The National Atmospheric and Oceanic Administration recently announced publication of a diving manual designed to guide divers in low water work.

Called "NOAA Diving Manual," the publication was prepared primarily for the nearly 300 divers within the Commerce Department agency. However, it contains up-to-date information on the technology required to carry out diving investigations and other diving tasks, and is expected to find use to scientific and working divers throughout the world. It is designed to provide divers with the knowledge needed both for safe and efficient diving, and for carrying out scientific research.

The work is illustrated with diagrams, sketches and photographs designed to help the user understand the techniques and procedures involved. Warnings regarding diver procedures are highlighted throughout the book.

The NOAA Diving Manual is available by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at a cost of \$8.55. The Stock Number is 003-017-00283.

MARINE SAFETY COUNCIL MEMBERSHIP

The membership of the Marine Safety Council has increased notably in recent months. Of the seven members previously introduced to readers of the *Proceedings* (April, June–November, 1974), two have retired and one moved on to a new assignment.

On April 30, Rear Admiral J. W. Moreau, formerly Chief of the Office of Engineering, assumed command of the 4th Coast Guard District, headquartered in Honolulu. And in June and July, Rear Admirals J. F. Thompson (Chief, Office of Boating Safety) and J. A. Palmer (Chief, Office of Public and International Affairs) retired, with a total of nearly 70 years' Coast Guard service between them. In this issue we begin a series of articles to acquaint readers with their successors.

The new Chief of the Office of Boating Safety is Rear Admiral David F. Lauth. He assumed his present position in June, his nomination for flag rank having been approved by the Senate to be effective July 1.

Admiral Lauth was born in Buffalo, New York, in 1925 and was graduated from South Park High School in 1945. He received a Bachelor of Science Degree and a commission as Ensign from the Coast Guard Academy in 1949. His earliest assignments included watch officer on board the cutters *Humboldt* and *Dexter* out of Boston, Massachusetts. During the Korean conflict, he was assigned to supervise the loading of munitions under the Captain of the Port of San Francisco, and from 1953 to 1954, he commanded the Loran Transmitting Station at Ampulan, the Philippines. Returning to San Francisco, he served as Executive Officer first of the Captain of the Port Office and then of the buoy tender *Magnolia*. From 1959 to 1961, then Lieutenant Commander Lauth served as Reserve Administrator for the 9th Coast Guard District in Cleveland, Ohio.

When transferred in May 1961 to Galveston, Texas, he first served as Executive Officer of the Coast Guard Base and then commanded the tender *Iris* out of that port. His actions on two occasions in the former capacity earned him special recognition. He was awarded the Coast Guard Commendation Medal for leading a rescue during Hurricane Carla in September 1961. In

October of the same year he took charge of a firefighting crew which was credited with saving the tanker *Berean* following its collision with the MV *Reliance* in the Houston ship channel.

After a year of study at the University of Pittsburgh, he was awarded a Masters Degree in Public Administration in August 1964. For the next 2 years, Commander Lauth was assigned to Coast Guard Headquarters in Washington, D.C., as Chief of the Officer Assignment Branch. He remained in Washington for an additional 2 years as a special assistant in the Office of the Secretary of the newly-created Department of Transportation.



In June 1969 he assumed command of the cutter *Minnetonka*, based at Long Beach, California. In 1971 he returned to Headquarters to serve in the Office of Boating Safety, first as Chief, Planning and Evaluation Staff, and then as Executive Director, Boating Safety Advisory Council. He served as Deputy Chief, Office of Personnel from June 1974 until assuming his present post.

Admiral Lauth and his wife, the former Catherine McDermott of San Diego, have two daughters and live in Rockville, Maryland.

COAST GUARD RULEMAKING

(Status as of 1 August 1975)

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
1972 PUBLIC HEARING							
Tailsaft inspection and drawing (67-71, 4-71).....	3-1-72	3-27-72	4-3-72	....	6-2-75		
ANCHORAGE REGULATIONS							
Los Angeles & Long Beach Harbors, CA (CGD 75-022)...	2-4-75	.....	3-7-75	.....		7-22-75	7-
BOATING SAFETY							
Lifesaving devices on white water canoes & kayaks (CGD 74-159) comment period extended 6-12-75....	2-4-75	.....	7-15-75	.....		
Safe loading and safe powering standards (CGD 73-250)...	3-6-75	.....	4-21-75	.....		
Inboard safe loading standard (CGD 74-83).....	3-6-75	.....	4-21-75	.....		
BRIDGE REGULATIONS							
Chesapeake Ck., NJ (CGD 73-162).....	8-10-73	.....	9-11-73	X			
AIWW, Mile 342, Lauderdale By The Sea, FL (CGD 74-180).....	8-7-74	.....	9-6-74	.....		5-5-75	
Chesapeake & Del. Canal, Del. (CGD 74-72).....	3-29-74	.....	4-30-74	.....		5-5-75	
Chicago River, IL (CGD 74-137).....	6-3-74	.....	7-16-74	X			
AIWW, Hallandale, FL (CGD 74-257).....	11-5-74	.....	12-5-74	X			
North Miami Beach, FL (CGD 75-013).....	1-21-75	.....	2-21-75	.....		5-13-75	
Coney Island Creek, NY (CGD 74-300).....	1-29-75	.....	3-4-75	X			
Matanzas River, FL (CGD 75-024).....	1-29-75	.....	3-4-75	X			
Fox River, WI (CGD 75-035).....	2-6-75	.....	3-7-75	X			
Oklawaha River, FL (CGD 75-062).....	3-27-75	.....	4-29-75	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			
Illinois River, IL (CGD 75-060).....	4-1-75	.....	5-6-75	X			
Kent Narrows, MD (CGD 75-081).....	4-1-75	.....	5-6-75	X			
Passaic River, NJ (CGD 75-052).....	4-4-75	.....	5-6-75	X			
Back Bay of Biloxi, MS (CGD 75-088).....	4-30-75	.....	6-10-75	X			
Lake Okkechobee, FL (CGD 75-076).....	4-30-75	.....	5-29-75	X			
Peace River, FL (CGD 75-086).....	4-30-75	.....	6-3-75	X			
Snake R. & Clearwater R., Lewiston ID & Clarkston, WA (CGD 75-099).....	4-30-75	.....	6-10-75	X			
Coosaw R., FL (CGD 75-087).....	5-5-75	.....	6-9-75	X			
Duwamish Waterway, WA (CGD 75-097).....	5-13-75	.....	6-30-75	X			
Escatawpa R., MS (CGD 75-114).....	6-9-75	.....	7-8-75	.....		
Gulf Intracoastal Waterway, LA (CGD 75-131).....	6-18-75	.....	7-22-75	.....		
HAZARDOUS MATERIALS							
Miscellaneous Dangerous Cargoes (CGD 72-182).....	11-11-72	12-12-72	12-29-72	X			
Dangerous Cargo Regulations, miscellaneous (CGD 73-249).....	1-16-74	.....	3-4-74	.....		6-18-75	
Sodium sulfide solution and sulfur dioxide (CGD 73-275)...	7-16-74	.....	12-5-74	X			
	Corrected 9-5-74						
Vinyl chloride (CGD 74-167); supplementary notice 9-19-74.....	7-23-74	8-15-74	9-6-74	.....		4-16-75	
Unmanned barges carrying certain bulk dangerous car- goes (CGD 74-275).....	1-15-75	.....	2-28-75	.....		5-20-75	

Coast Guard Rulemaking—Continued

	Notice of proposed rulemaking	Public hearing	Deadline for comments	Awaiting final action	Withdrawn	Published as rule	Effective date
Staked line in bulk (CGD 74-225).....	1-29-75	2-25-75	3-17-75	×	.....	.....	.....
Stable tanks, proposed DOT specification (CGD 74-292).....	6-9-75	7-1-75	7-16-75	.....	.....	.....	.....
Hazardous cargo labeling (CGD 75-050).....	6-18-75	7-16-75	7-31-75	.....	.....	.....	.....
MARINE ENVIRONMENT AND SYSTEMS (GENERAL)							
Beacons, lights to be displayed (CGD 73-216).....	9-19-74 Corrected 10-18-74	10-21-74	11-4-74	×	.....	.....	.....
Liability for hazardous substance liability (CGD 73-185).....	12-4-74	.....	1-16-75	×	.....	.....	.....
Operating barges on the Mississippi (CGD 74-185).....	2-4-75	2-19-75 New Orleans	3-17-75	×	.....	.....	.....
Security zone, New London Harbor, CT (CGD 74-188).....	3-12-75	.....	4-14-75	.....	.....	7-24-75	8-25-75
Lakes radiotelephone exemption (CGD 74-304).....	3-25-75	4-9-75 Cleveland	4-24-75	.....	.....	5-5-75	5-6-75
Water ports (CGD 75-002); corrected 5-19-75.....	5-7-75	6-6-75	6-23-75	×	.....	.....	.....
Navigation line, Guayanilla Bay, PR (CGD 73-287).....	6-18-75	.....	8-4-75	.....	.....	.....	.....
MERCHANT MARINE SAFETY (GENERAL)							
Geographic vessels, fire main systems (CGFR 72-20).....	2-4-72	.....	3-19-72	.....	6-12-75	.....	.....
Dangerous Cargoes, Inspection of Barges (CGD 73-271).....	3-11-74	4-15-74	4-30-74	×	.....	.....	.....
Aid Certificates (CGD 73-272).....	4-2-74	.....	6-15-74	×	.....	.....	.....
Storage of Solid Hazardous Materials in Bulk (CGD 74-13).....	5-15-74	7-16-74	8-31-74	×	.....	.....	.....
Small vessels in domestic trade (CGD 74-32).....	6-28-74 Corrected 7-23-74	7-23-74 Seattle 7-30-74 Wash. D.C.	8-19-74	×	.....	.....	.....
Welding and brazing; adoption of ASME Code (CGD 74-102).....	9-26-74 Corrected 11-1-74	.....	11-11-74	.....	.....	6-30-75	7-29-75
Line regulations, rail height adjustment (CGD 74-127).....	10-4-74	.....	11-15-74	×	.....	.....	.....
Construction and equipment of tank vessels (CGD 74-127); advance notice 9-5-74.....	4-21-75	5-21-75	6-5-75	×	.....	.....	.....
Lakes pilotage (CGD 74-233).....	11-5-74	11-20-74	11-26-74	×	.....	.....	.....
Training of nautical school ships (CGD 74-201).....	1-21-75	.....	3-6-75	×	.....	.....	.....
Training and certificating; apprentice mate endorsement (CGD 74-226); Comment period extended 3-7-75.....	1-23-75	.....	4-9-75	×	.....	.....	.....
Engineering systems and components; miscellaneous amendments (CGD 73-254); corrected 5-6-75.....	4-3-75	5-7-75	5-15-75	×	.....	.....	.....
Grain cargoes; intact stability requirements (CGD 74-182).....	4-17-75	.....	5-31-75	×	.....	.....	.....
Geographic vessels (CGD 75-031).....	6-12-75	.....	7-28-75	.....	.....	.....	.....

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 rules which have appeared in the Federal Register as Notices of Proposed Rulemaking, and as rules will be recorded. Proposed rules which have not been placed formally before the public will not be included.

Nautical Queries

This month's "Nautical Queries" features questions selected from examinations presently in use for deck officers (2d and 3d Mate) and engineers (2d and 3d Assistant).

Deck

1. All of the following are parts of the sensitive element of a Sperry gyrocompass EXCEPT the—

- A. wire suspension.
- B. phantom ring.
- C. rotor and rotor case.
- D. vertical ring.

2. On February 7, 1971, your vessel is in DR position latitude $22^{\circ}28.0'$ south, longitude $32^{\circ}32.0'$ west when an azimuth of the sun is taken at 1020 zone time. The chronometer time of the sight is 00h 16m 15s and the sun is bearing 070.5° per Standard Compass. The chronometer error is 3m 49s slow and the variation in the area is 10° east. What is the deviation of the standard compass?

- A. 1.5° east.
- B. 11.4° east.
- C. 18.4° west.
- D. 38.6° west.

3. Your vessel is at anchor in fog in international waters. The fog signal of another vessel, apparently underway, has been steadily growing louder and the danger of collision appears to exist. In addition to the normal fog signal, what signal may be used to indicate the presence of your vessel?

- A. The danger signal, five or more short rapid blasts on the whistle.
- B. Three blasts on the whistle, one short, one prolonged, and one short.

C. Three blasts on the whistle, one prolonged followed by two short.

D. No special signal other than the normal fog signal.

4. Your vessel is at longitude $68^{\circ}20'$ west and the ship's clocks, set to the correct zone time, read 0350 on January 6. What is the time and date at Greenwich?

- A. 2250 on January 5.
- B. 2350 on January 5.
- C. 0750 on January 6.
- D. 0850 on January 6.

5. Which of the following is the chief problem encountered when surging synthetic mooring lines on the gypsy head during mooring operations?

- A. The lines may jam and then jump off the gypsy head.
- B. If there is sudden strain on the line, the man tending the line may be pulled into the gypsy head.
- C. The line's surging may cause the vessel to surge.
- D. The heat generated may cause the lines to temporarily fuse to the gypsy head.

Engineering

6. An increase in diesel engine crankcase pressure indicates excessive—

- A. compression pressure.
- B. lube oil header pressure.
- C. piston ring blowby.
- D. scavenge air pressure.

7. Air in the fuel lines to the fuel injection nozzles could cause a diesel engine to—

- A. knock excessively under load.
- B. run away without load.
- C. stop suddenly under load.
- D. overheat without smoking.

8. Diesel engine piston ring blowby is caused by excessive ring—

- A. gap clearance.
- B. side clearance.
- C. bottom clearance.
- D. back clearance.

9. Which diesel engine cylinder liner has internal cooling water passages?

- A. Integral liner.
- B. Internally finned liner.
- C. Externally finned liner.
- D. Wet liner.

10. Trunk type diesel engine cooling surfaces are most effectively cooled by—

- A. radiated through the cylinder block.
- B. conducted through the piston crown.
- C. transfer to water cooled jacket liner walls.
- D. losses to escaping exhaust gases.

Answers

1. A 10. C
2. A 3. B 4. D 5. D 6. C 7. C

Pardon Our Shrapnel

As the more sharp-eyed of our engineer types have informed us, we made a small typo on the Question page in the July issue. The answer to question 6 should have been pressure vessels of the type described are required to be tested hydrostatically, *not* pneumatically.

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 \$45 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.
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.
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.
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 (3-1-73).
*176	Load Line Regulations (2-1-71). F.R. 10-1-71, 5-10-73, 7-10-74.
182	Specimen Examinations for Merchant Marine Engineer Licenses (1-1-74).
182-1	Specimen Examinations for Merchant Marine Engineer Licenses (2d and 3d Assistant) (10-1-73).
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.
190	Equipment List (8-1-72). F.R. 8-9-72, 8-11-72, 8-31-72, 9-14-72, 10-19-72, 11-8-72, 12-5-72, 1-15-73, 2-6-73, 2-26-73, 3-27-73, 4-3-73, 4-12-73, 4-26-73, 6-1-73, 8-1-73, 9-18-73, 10-5-73, 11-26-73, 1-17-74, 2-28-74, 3-25-74, 4-17-74, 7-2-74, 7-17-74, 9-5-74, 10-22-74, 11-27-74, 12-3-74, 12-30-74, 1-15-75, 1-21-75, 2-13-75, 2-19-75, 3-18-75, 3-19-75, 4-9-75, 4-16-75, 5-1-75, 5-7-75, 6-2-75, 6-25-75, 7-22-75, 7-24-75.
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.
*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.
*227	Laws Governing Marine Inspection (3-1-65).
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.
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.
*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.
*266	Rules and Regulations for Bulk Grain Cargoes (5-1-68). F.R. 12-4-69.
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.
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 JULY 1975

The following have been modified by Federal Registers:

CG-190, Federal Registers of July 22 & 24.

CG-200, Federal Register of July 28.

CG-191, Federal Register of July 24.

CG-239, Federal Registers of July 2, 7, & 24.

*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.

U.S. Coast Guard

Basic Programs Related to Hazardous Materials

- * Commercial Vessel Safety Program**
- * Port Safety & Law Enforcement Program**
- * Pollution Prevention Program**

**Laws require Coast Guard to write and enforce regulations
and to protect:**

- * All vessels in U.S. navigable waters**
- * U.S. flag merchant vessels anywhere in the world**
- * Persons on vessel and in port areas**
- * U.S. ports**
- * Property in port area**
- * Navigable waters from environmental damage**