PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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U.S. Merchant Marine Academy midshipmen have the opportunity for "hands on" training, both at Kings Point and aboard ship during their sea year. However, classroom theory is just as important as practical training at the U.S. Merchant Marine Academy, with each midshipmen qualifying for a bachelor of science degree, a merchant marine license, and a naval reserve commission at the end of Kings Point's four-year college program. More about the Academy begins on page 124.

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maritime sidelights

PROCEEDINGS EDITOR RESIGNS

They say that all good things must come to an end—so ends my service as Proceedings editor. The past two years have been a truly broadening experience for me. Upon accepting this position, I soon discovered that I had more than a job—I had a unique opportunity to learn about the marine industry first hand. More importantly, I had the enviable opportunity to meet and work with some of the finest professionals in both industry and the Coast Guard. This experience has been invaluable in increasing my understanding of the role of the Coast Guard and its relationship to the marine industry. That's important, for my affiliation with the Coast Guard—and, I hope, with industry as well—doesn't end with my resignation as editor. I am leaving because my husband, a Coast Guard lieutenant, has been assigned to the Marine Safety Office in San Francisco.

Regretfully, Proceedings production must halt (temporarily, I hope) until a new editor can be selected. The Federal hiring freeze has complicated that action for the time being, so there could be quite a delay. I know, however, that my eventual replacement will appreciate your encouragement and input so please don't forget us!

Meanwhile, information on regulations, publications, etc. is still available from the Marine Safety Council. Write: Commandant (G-CMC/24), U.S. Coast Guard Headquarters, Washington, DC 20593, or call (202) 426-1477.

It's been a pleasure serving you.

Signing off,

Babs Beliech Eason

CG HEADQUARTERS ESTABLISHES NEW OFFICE OF NAVIGATION

The Commandant of the Coast Guard ordered a reorganization at Headquarters to create the new Office of Navigation, officially established May 1, 1980. Under RADM Richard A. Bauman, the new office has responsibility for lights, buoys, day beacons, private aids to navigation, all Loran networks and monitoring stations, Omega stations and radio beacons. Bridge permits and enforcement of laws and regulations on bridge construction and maintenance also comes under the new office's purview.

NATIONAL MARITIME LIABILITIES CONFERENCE

The 1980 National Conference on Developments in Maritime Liabilities has been scheduled for September 28-30 at the Sheraton Palace Hotel, San Francisco, California. The conference is aimed at all segments of the maritime industry, including vessel builders, operators and designers, vessel component suppliers, attorneys, insurance interests, cargo adjusters and labor representatives.

Conference registration is managed by Fisher Maritime Transportation Counselors, 50 South Orange Ave., South Orange, New Jersey 07079; (201) 763-4266.

PROPELLER CLUB ANNOUNCES 54TH CONVENTION/CONFERENCE

The Propeller Club of the United States is sponsoring the 54th Annual National Convention and the 1980 American Merchant Marine Conference, to be held this October 8, 9 and 10 in Seattle, Washington. Two local clubs, those of the Port of Seattle and the Port of Tacoma, will co-host the event. The conference, whose theme this year is "The American Merchant Marine—Shadow or Substance?" will be sited at the Washington Plaza Hotel in Seattle.

In addition, a pre-convention golf tournament is scheduled for Monday, October 6.

For more information, contact:

1980 Propeller Club Convention
217 Ninth Avenue N.
Seattle, WA 98109
(206) 624-9525

NATIONAL MARITIME ESSAY CONTEST WINNERS ANNOUNCED

The Propeller Club has awarded ship voyages and cash prizes to this year's winners of the annual National Maritime Essay Contest.

Twenty-one high school students have won trips on American ships, one a $500 cash prize, and one a $250 savings bond in the Harold Harding Memorial Essay Contest. The contest is dedicated to the memory of Harold Harding, National Secretary Treasurer of the Propeller Club of the United States from 1931 until his death in 1952.

The high school contest has been sponsored by the Propeller Club for over 45 years, in order to broaden the education of teenage students in maritime matters and to acquaint the younger generation with the necessity for a strong American Merchant Marine to ensure our national security and economic welfare. The theme for this year's contest was "Our Merchant Marine, Ocean, Great Lakes, and River Vessels - for Energy and Trade."

In addition, winners of the fourth annual Maritime Essay Contest for college students won prizes totaling $1,400.00. Four college students were selected to receive the cash prizes; four others won honorable mentions. Captain William Figari, National President of the Propeller Club, noted that "we have had a successful high school level essay contest for many years. This is only our fourth essay contest for college students. We hope that it will prosper and take a permanent place among the number of Propeller Club educational programs." The objectives of the college contest are to increase public awareness of U.S Merchant Marine and allied industries; illustrate the importance of our Merchant Marine to the military security and economic welfare of

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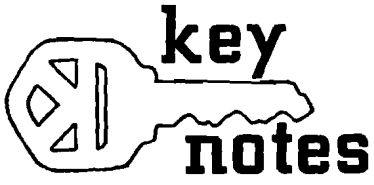
our nation; reflect the dependence of our nation upon our inland and ocean-going marine industry; and stimulate interest in career opportunities in the field of marine transportation.

National awards with citations for both the high school and college level essay winners were presented on May 22 in connection with the observance of National Maritime Day.



The publication load for the month of May was exceptionally light. Aside from local rulemaking efforts (drawbridge regulations and safety zones), only 10 projects were published. These included three final rules, three proposed rules, one supplemental notice of proposed rulemaking and three notices.

The following final rules were published in the Federal Register within the past month. CGD 79-141, Carriage of Unslaked Lime, appeared on 12 May 1980 and CGD 79-027, Safety Approval of Cargo Containers, was published on 2 June. The third final rule, CGD 80-063, designating Anchorage, Alaska as a port of documentation, appeared on 5 June. Three notices were also published. These were CGD 79-126, Proposals for Exemption from Segregated Ballast Tanks, Clean Ballast Tanks and Crude Oil Washing Requirements, which was published on 22 May 1980 and two recreational boating standards, CGD 80-46, Fuel Systems Standards, and CGD 80-047, Electrical Systems Standards, which were published on 5 June 1980. In addition to these, one supplemental notice of proposed rulemaking and three notices appeared. The Supplemental Notice published on 27 May concerned the rulemaking on Stowage of Lifeboat and Liferafts, CGD 79-072. The three notices were published on separate dates. The first, CGD 80-034, published in the 27 May Federal Register, announced the appearance of a Loran C overprint chart. The second, 80-039, which appeared on 29 May, is a notice of Coast Guard approved equipment. The third is a notice that the authority to determine unsafe voyages has been delegated from the district commanders to field unit commanding officers.

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

* * *

REVISION OF ELECTRICAL REGULATIONS
CGD 74-125(A)

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

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

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

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

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

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

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

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

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

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

Continued on next page.....

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

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

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

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

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

SEGREGATED BALLAST AND TANK CLEANING REGULATIONS GCD 77-058(b)

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

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

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

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

LICENSING OF PILOTS CGD 77-084

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

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

This revision would have required an adjustment in vessel manning requirements, to bring them in line with current legislation. It would change the requirements which identify personnel who must be used on the three watches and personnel who may be employed in a day working status. An NPRM formerly scheduled to be published on this docket in January 1980 has been deferred pending legislative action in Congress.

TANK VESSEL OPERATIONS REGULATIONS, PUGET SOUND CGD 78-041

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

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

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

EIGHT-HOUR DAY VOLUNTARY OVERTIME CGD 78-146

This docket is a review of the Eight Hour Day, Voluntary Overtime regulation in 46 CFR 157.20-10, which states that no licensed officer should be required to be on duty more than eight hours per day except in extraordinary circumstances. Existing regulations, how-

Continued on next page.....

ever, do not address overtime or consider any possible "fatigue factor." Recent Coast Guard studies have shown that this factor has a profound effect on reaction time and judgement, therefore the regulatory project has been withdrawn.

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

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

QUALIFICATIONS OF THE PERSON IN CHARGE OF OIL TRANSFER OPERATIONS, TANKERMAN REQUIREMENTS
CGD 79-116 and 79-116A

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

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

As stated in the last issue, these projects have been withdrawn (44 FR 25243). New notices of proposed rulemaking NPRM's) which were anticipated in June have been delayed and are now scheduled for publication in July.

SHIPBOARD NOISE ABATEMENT STANDARDS
CGD 79-134

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

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

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

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

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

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

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

REQUEST FOR PUBLIC COMMENTS ON COAST GUARD DRAFT CONSUMER AFFAIRS PROGRAM
CGD 80-062

The Coast Guard published notice of its Draft Consumer Affairs Program in the Federal Register on 9 June, 1980 (Vol. 45, No. 112, pages 39192-39196).

The purpose of that notice is to describe a Consumer Affairs Program that the Coast Guard proposes to implement to comply with Executive Order 12160 of 26 September 1979 (44 FR 55787-55790) and DOT's Consumer Program (45 FR 39144-39160) published in the Federal Register on 9 June 1980.

The Coast Guard Draft Consumer Affairs Program will be available for public comments through 8 August 1980. After review of public comments, the Coast Guard will revise, as appropriate, its draft program so that a final program may be published in the Federal Register by 31 October 1980, with implementation planned for 1 December 1980. This publication will cover the five main functions identified in the Executive Order. They are: Consumer Affairs Perspective, Consumer Participation, Information Materials, Education and Training, and Complaint Handling.

The Coast Guard looks forward to receiving public comments on additional ways that it might improve its consumer and citizen participation efforts.

For additional information or to request a copy of the Coast Guard Draft Consumer Affairs Program, as published in the Federal Register, contact: Consumer Affairs Officer, U.S. Coast Guard Headquarters, 2100 Second Street, SW., Washington, DC 20593; or telephone (202) 426-2290.

Comments must be received by 8 August 1980.

* * *

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

TOXIC HAZARD AWARENESS IN RESPONSE TO HAZARDOUS MATERIALS SPILLS

By Lieutenant Thomas J. Haas
Cargo and Hazardous Materials Division
U.S. Coast Guard Headquarters, Washington, DC

This paper was presented to the 1980 National Conference and Exhibition on the Control of Hazardous Material Spills. The conference, held May 13-15, 1980 in Louisville, Kentucky, attracted over 900 attendees.

INTRODUCTION

Chemicals in an uncontrolled release into the environment can pose many hazards to the immediate area and the personnel responding to a spill. These hazards include possible fire and explosion, chemical reactivity, and adverse health effects. The assessment of the adverse health effects of chemical exposures is within the realm of **toxicology**. Few of the individuals involved with responding to hazardous material spills have received any formal training in this field yet its value to them becomes increasingly important as more exotic materials are involved in transportation accidents.

This paper is designed to familiarize these individuals with the terminology and some of the fundamental principles of toxicology, thus enabling them to more competently evaluate the health effects of exposures to chemicals. The concepts of acute and chronic toxicity and dose/response are discussed, and the primary intoxication pathways are described.

KINDS OF TOXICITY

Toxicology is defined in Webster's as "a science that deals with poisons and their effect and with the problems involved (as clinical, industrial or legal)." A more meaningful approach is to describe toxicology as the study of the harmful action of chemicals on biologic mechanisms. Toxicology is a multi-disciplinary field which borrows freely from several basic sciences. A knowledge of physical, chemical, and biological concepts is a must. It also is dependent on fields such as physiology, statistics, pathology, and pharmacology.

Toxicity is the capacity of a substance to induce injury. Because it is a relative term, it becomes necessary to identify the site of action or specific organism in which the harmful effect is produced. For example, a chemical could be harmful or even lethal to the mosquito, but relatively harmless to man. Therefore, toxicity is a property of a particular substance, much like other properties such as heat of combustion or vapor pressure.

Hazard is the probability that a particular substance will and can induce an injury. Asbestos, for example, is assumed to be relatively safe if it is bound in a matrix, but when released into the air and inhaled, the fibers can cause the disease asbestosis, or even cancer.

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Generally, toxicity can be classified as either acute or chronic. **Acute toxicity** involves an exposure to a relatively high concentration of a material over a relatively short period of time. There is usually a short period (seconds, minutes, hours) of time between the exposure and the effect, making it much easier to relate the specific exposure and its effect. **Chronic toxicity** is characterized by exposure to relatively low concentrations of a substance over a relatively long period of time (months, years). There could be a long period of time between the exposure and the effect, making it much more difficult to relate the specific exposure and the specific effect.

Local and systemic toxicity should also be explained. **Local toxicity** refers to the local action of a toxic material on the skin, mucous membranes of the upper respiratory tract, or the eyes. **Systemic toxicity** concerns the action of a toxic substance when absorbed into the body (by inhalation, ingestion, or through the skin). A systemic toxic effect can be generalized, such as anemia, or can affect one particular site, such as the kidney or liver.

Individuals responding to hazardous materials accidents are primarily concerned with the acute toxicity of the materials involved. However, these people are becoming increasingly aware of the possible long-term effects of exposures to chronic toxic agents such as carcinogens, mutagens, and teratogens. A **carcinogen** is a substance that induces cancer from either an acute or chronic exposure; a **mutagen** is a substance that will induce a permanent, transmissible difference in the characteristics of an offspring from those of its parent; a **teratogen** is a substance that will produce a physical defect in a developing embryo. Substances other than those listed above may cause other chronic toxic effects directed at a specific organ or organ systems. For example, exposure to benzene could lead to blood abnormalities such as anemia. an interesting note is that in some sensitive individuals these effects, normally attributed to exposure to low concentrations over prolonged periods of time, could possibly result from just one exposure to a very high concentration of the material.

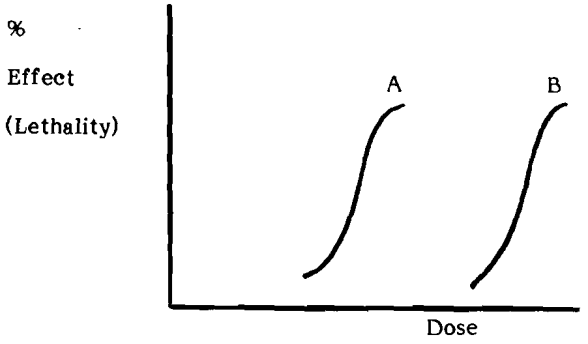
Inherent in the discussion of toxicity is the concept of dose. **Dose** is a function of the concentration of the substance to which an organism is exposed and the duration of the exposure. The most familiar term used to describe "dose" in industrial situations is the Threshold Limit Value (TLV). TLV's published by the American Conference of Governmental Industrial Hygienists (AGGIH) are time-weighted averages and are defined as "the concentration of a substance in air which can be breathed for five consecutive eight-hour work days (40 hour week) by most people without adverse effect."

The major concept relating chemical exposure (dose) and its effect is called the "dose/effect" potential. This is the single most important factor in determining the potential harmfulness of a chemical.

The graph in Figure 1 represents the conventional way to plot data which relate the dose or amount of substance with the cumulative percentage of animals showing a response (such as death). These plots are known as dose/response curves.

The curves are generated experimentally for a group of test animals, such as mice or rats, given a chemical substance by a certain route of administration (fed, inhaled, injected, etc.). The amounts given are chosen so that not all the animals will die or all of them survive. In subsequent groups of animals the amount would be increased by either a constant multiplier (x2) or logarithmically until all the animals in one of the groups die as a result of their exposure to the substance. For the majority of the time the curve is linear, showing that the incidence of death is directly related to the concentration of the chemical present. In the plot above, death or lethality is the effect (end point) and at the 50 percent cumulative level, the corresponding lethal dose can be defined. This point, commonly referred to as the LD_{50}, is the dose which produces death in 50 percent of the test animals and, therefore, serves as a specific reference point for the material.

Figure 1



If the LD_{50} for compound B is greater than that of compound A, compound B may be said to be less potent than compound A. Therefore potency (in terms of qualtity of substance) and toxicity (in terms of harmfulness) are both relative terms which are used only with reference to other substances. In an example from Loomis there is a great range of con centration or doses of chemicals that will produce harm or injurious effects.[1]

TABLE 1

Extremely toxic	(1mg/kg or less)
Highly toxic	(1 to 50 mg/kg)
Moderately toxic	(50 to 500 mg/kg)
Slightly toxic	(0.5 to 5 g/kg)
Practically non-toxic	(5 to 15 g/kg)
Relatively harmless	(more than 15 g/kg)

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Therefore, toxicity is a relative term and must be evaluated in light of the specific substance, amount of material present, and the possible effects of the substance upon the response personnel during an uncontrolled spill.

TOXIC SUBSTANCES AND THE BODY

In order to prevent injury from toxic materials it is essential that one have a clear understanding of how materials enter the body, distribute, and are eliminated. The physical, chemical, and physiological classifications of the materials are also important. These concepts, along with the toxicity evaluation must be utilized when determining the health risk to personnel involved in a hazardous materials spill.

There are four basic routes for a substance to enter the body: inhalation, skin/eye absorption, ingestion, and injection.

Inhalation is the primary route of exposure for volatile toxic substances and the one of primary concern for individuals responding to a hazardous chemical spill. The substance present in the atmosphere is inhaled and can either be deposited (absorbed into the mucous layer of the respiratory tract) or exhaled. Injury may occur by either the direct contact of the irritating or corrosive material on lung tissue, which produces local lesions, or absorption of the harmful substance into the blood through the lungs. Many factors play a role in this absorption including the solubility of the substance in body fluids, the permeability of the lungs, inhalation volume, volume of blood in the lungs, and the concentration gradient between the vapors present in the atmosphere and the blood.

From Figure 2, the respiratory system is composed of two main parts: the upper respiratory tract (nose, throat, trachea, and bronchus) and the lower respiratory tract (smaller bronchioles and alveoli, or air sacs). If particulate material, gases, or vapors are not trapped in the upper respiratory tract, local injury deep in the lung or absorption of the harmful material into the blood will occur.

Skin eye contact and absorption is a very common route of exposure in spill response activities. Direct contact with the skin can result in dermatitis, a general term describing any inflammation of the skin. The effects on the skin can be severe enough to actually destroy skin tissue or just produce mild irritancy or redness which disappears quickly after the contact. Contact with certain substances, such as solvents (trichloroethylene, acetone, etc.), can remove the skin's natural oils, leaving the skin dry and subject to cracking and possible infection.

Some materials can produce systemic toxicity through direct contact with the skin. Many organic materials can cross the skin barrier and be absorbed into the blood because of the substance's fat solubility. Some examples are organo-cyanides, aromatic amines, phenol, and organophosphate insecticides.

The eye is a very sensitive route of exposure. The eye does have the protective mechanism, tearing, which can dilute and remove an irritating or corrosive material. However, if this mechanism is overloaded by a very strong irritating or corrosive material, even for just a few seconds, serious injury can occur.

Ingestion is the most common, non-industrial route of exposure for a material to be absorbed into the body. In some industrial settings, through sloppy work practices or carelessness, an individual can ingest a

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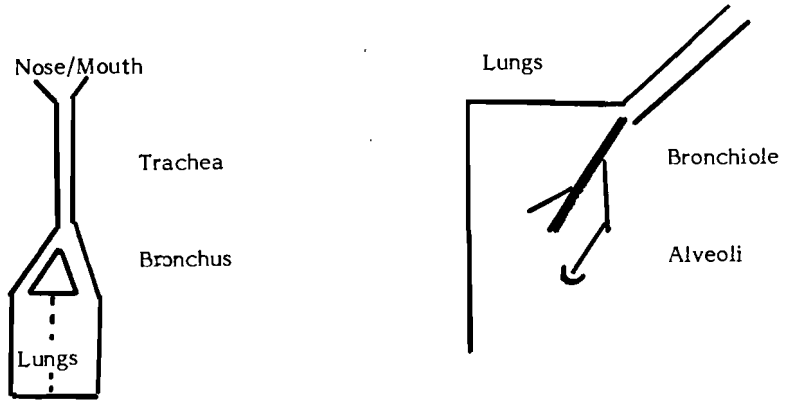
Figure 2



toxic material. One a substance has entered the G-I tract it can either be absorbed or excreted, unchanged. It can also be metabolized to a more/less toxic substance and then absorbed or excreted. The metabolism of the chemical generally leads to a more water soluble product and a quicker removal from the body.

Injection is a very rare route of exposure during a spill, but may occur if an individual's skin is punctured by metal debris coated with the toxic material.

Once a substance is absorbed into the body, the circulatory systems (blood and lymph) can distribute it to different parts of the body where toxic effects can occur. The material during this transit may remain unchanged, be metabolized, or be stored.

The body can rid itself of a harmful substance through various mechanisms. If a gas or vapor enters the lungs it can be exhaled unchanged; particles can be entrapped in the mucous layer and either coughed out or swallowed. If a material is absorbed into the circulatory system through the lungs or G-I tract and then distributed, it can be metabolized by the liver or kidneys and excreted in the feces or urine. A stored material will usually be inactivated until released, however, with asbestos, asbestosis or even cancer may occur once the material is embedded in the lung.

The **physical classification** of a substance can affect how the material enters the body and, therefore, can affect the substance's actions. The two primary forms of a contaminant are gases/vapors and particulates. These are described in Table 2.

The **chemical classification** of a substance is based upon its chemical composition. This enables one to assign a specific commodity to "a group" of similar products. A detailed description of chemical groups is found in the **Chemical Data Guide for Bulk Shipment by Water (CG-388).** Some examples listed in CG-388 include organic acids, caustics, amides, aldehydes, phenols, halogenated hydrocarbons, and hydrocarbons.

The specific chemical properties of the substance are also important in determining the potential hazards. These include the vapor pressure, boiling point, melting point, and solubilities. These are also available in CG-388 and in the **Chemical Hazards Response Information System** (CHRIS).

Because inhalation is the primary route of exposure for spill response personnel, description of the **physiological classification** will be slanted in this direction.

It is very difficult to correctly place a material in a single physiological class because the type of physiological action depends upon concentration. For

Continued on next page.....

TABLE 2

Physical Classification[2]

1. Gases and Vapors

   a. Gas - any material that is in a gaseous state at 25°C and 760 mm Hg.

   b. Vapor - the gaseous phase of a substance ordinarily liquid or solid at 25°C and 760 mm Hg.

2. Particulate Matter

   a. Aerosol - a dispersion of solid or liquid particles of microscopic size in a gaseous medium; for instance smoke, fog, or mist.

   b. Dust - a loose term applied to solid particles predominantly larger than colloidal and capable of temporary suspension in air or gases.

   c. Fog - a loose term applied to visible aerosols in which the dispersed phase is liquid; formation by condensation is implied.

   d. Fume - solid particles generated by condensation from gaseous state, generally, after the volatilization from melted substances and the accompanied chemical reaction, such as oxidation.

   e. Mist - a loose term applied to dispersion of liquid particles—many of which are large enough to be individually visible without visual aid.

   f. Smog - a term derived from smoke and fog and applied to extensive atmospheric contamination by aerosols arising from a combination natural and man-made sources.

   g. Smoke - small gas-borne particles resulting from incomplete combustion and consisting predominantly of carbon and other combustible materials.

instance, a vapor at one concentration may exert its principle action as an anesthetic, while at lower concentrations of the same material, the nervous system, blood-forming system, or some other body organ may be affected.

There are, however, some very general physiological classes of materials: irritants/corrosives, asphyxiants, anesthetics/narcotics, systemic toxicants, and material other than systemic poison.

Irritants/corrosives are **materials** that can inflame moist or mucous surfaces in the pulmonary system, skin, or eyes. The effects are essentially the same in test animals as in humans and the concentration is more significant than the exposure time.

Certain substances, such as acetaldehyde, ammonia, ethylene oxide, hydrogen chloride, and sulfur dioxide can affect the upper respiratory tract. Chlorine, fluorine, and ozone are substances that can affect the upper and the lower respiratory tract (lung tissue). Finally, irritants such as nitrogen dioxide and phosgene affect the terminal respiratory passages and alveoli.

Asphyxiants exert their effects by interfering with oxidation of lung tissues. This group can be subdivided into two types, simple and chemical.

Simple asphyxiants are physiologically inert gases that act principally by diluting the atmospheric oxygen below the partial pressure required to maintain sufficient saturation of the blood for normal tissue respiration. Some typical examples include carbon dioxide, ethane, helium, hydrogen, methane, and nitrogen.

Chemical asphyxiants, through chemical action, either prevent the blood from transporting oxygen from the lungs, or prevent normal oxygenation of the tissues even though the blood is well oxygenated. Some examples are:

Carbon monoxide: combines with hemoglobin;

Hydrogen cyanide: inhibits tissue oxidation by combining with cellular catalysts;

Aniline: combines with hemoglobin;

Nitrobenzene: combines with hemoglobin, lowers blood pressure;

Hydrogen sulfide: causes respiratory paralysis.

Anesthetics/narcotics exert their principle action as simple anesthesia without any serious systemic effects. Usually a depression of the central nervous system occurs, which is governed by the substance's partial pressure in the blood supply to the brain. Some examples include various ketones, alcohols, and esters.

Systemic toxicants cause injury to specific target sites within the body or damage an entire organ system leading to non-specific effects. Materials such as halogenated hydrocarbons can injure specific organs such as the heart, liver, or kidney. Other substances, such as benzene, phenols, and toluene, can damage the blood-forming system, causing anemia. Carbon disulfide, methyl alcohol, and organophosphate pesticides can affect the nervous system.

Finally, there is a possibility that **particulate material** could lead to systemic injury. Silica and asbestos can produce a general fibrosis of the lungs, mists of acids or alkalines can irritate and scar lung tissue, and inert dusts can physically inhibit the lungs' ability to oxygenate the blood supply.

CONCLUSION

This paper has attempted to familiarize those individuals responding to hazardous chemical spills with the terminology and fundamental principles of toxicology. By becoming aware of these concepts, personnel can better evaluate the hazards to life and health in order to protect themselves and the people around them.

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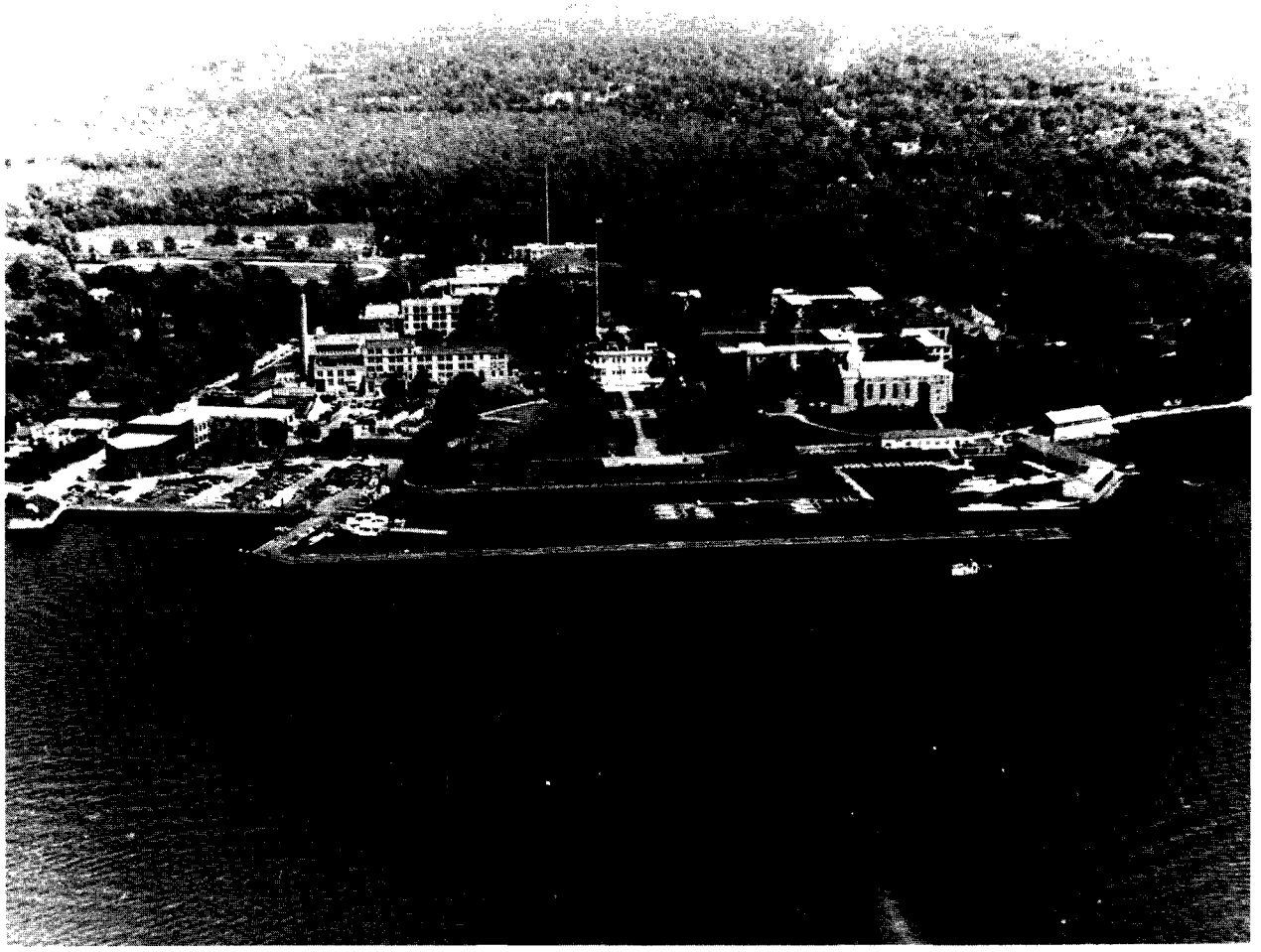
About the Author

Lieutenant Thomas J. Haas

Lt. Haas, a 1973 graduate of the Coast Guard Academy, received postgraduate training in chemistry and environmental health sciences (toxicology) from the University of Michigan. Since coming to the Cargo and Hazardous Materials Division at Coast Guard Headquarters, he has contributed to the *Proceedings* in addition to preparing articles for publication in other professional journals, such as the Journal of Veterinary and Human Toxicology. Recently, Lt. Haas has lectured on chemical hazards at the Coast Guard Reserve Training Center, Yorktown, Virginia and at the Maritime Institute of Technology and Advance Graduate Studies. He has also been instrumental in the developmental stages of a National Cancer Institute epidemiological study of Coast Guard marine inspectors, and is presently serving as secretary of the Chemical Transportation Advisory Committee's Subcommittee on Personal Protection and Chief of the Hazard Evaluation Branch at Coast Guard Headquarters.

THE UNITED STATES MERCHANT MARINE ACADEMY



124 June / July 1980

The United States Merchant Marine Academy, familiarly known as Kings Point, is located about 20 miles east of New York City. The 76-acre campus overlooks the waters of Long Island Sound and provides a scenic as well as a practical location for maritime training.

One of the five federal service academies, Kings Point was dedicated in 1943 under the War Shipping Administration (the forerunner of the Maritime Administration of the Department of Commerce) in recognition of the national need for a body of well-trained merchant marine officers.

The Academy usually has about 1,100 men and women enrolled at any given time, and there is a full-time faculty of 83. Most graduates of the Academy become the officers that operate the vessels of the American Merchant Marine. Others serve in such capacities as ship designers (naval architects), maritime lawyers (admiralty law), port engineers, shipping company executives, naval officers, Coast Guard officers, and oceanographers.

HISTORY OF THE ACADEMY

The United States Merchant Marine Cadet Corps was established on March 15, 1938, following passage of the Merchant Marine Act of 1936. Training was first given aboard merchant ships and later at temporary shore establishments pending the acquisition of permanent facilities. The Walter P. Chrysler estate at Kings Point, New York, was selected as the permanent site for the Academy in March 1942, and construction was begun the following May. Fifteen months later the task was virtually completed and the United States Merchant Marine Academy was dedicated on September 30, 1943.

World War II required the Academy to forego normal operation and devote all of its resources toward meeting the emergency personnel needs of the merchant marine. The enrollment was increased to 2,700 and the planned course of instruction was reduced in length from 4 years to 24 months. By the end of the war, the Academy had graduated 6,634 officers.

Notwithstanding the war, shipboard training continued to be an integral part of the Academy curriculum, and midshipmen served at sea in combat zones the world over. Two hundred and twelve midshipmen and graduates gave their lives in service to their country and many others survived torpedoings and bombings.

In the closing days of World War II, plans were formulated to establish a college-level program to meet the peacetime needs of the merchant marine. At the end of the War, the four-year course was immediately instituted with the September 1945 class of midshipmen.

The Academy has since grown in stature and has become one of the world's foremost institutions in the field of maritime education. In 1949, authorization for awarding graduates the degree of Bachelor of Science was granted by the 81st Congress and the Academy was fully accredited as a degree-granting institution. The Academy was made a permanent institution by an Act of Congress on February 20, 1956, and its operation was placed under the authority of the Department of Commerce.

THE ACADEMY AND THE UNITED STATES NAVY

A strong relationship exists between the Academy and the U.S. Navy, which stems from the Navy's interest in well-trained merchant officers who will form a "fourth arm of defense" in times of national emergency. Each midshipman enrolled at Kings Point is also a midshipman in the relatively new Merchant Marine Reserve, U.S. Naval Reserve program (MMR, USNR) and receives instruction from U.S. Navy personnel stationed at the Academy, in addition to the regular curriculum.

After accepting an appointment as an Ensign in the MMR, USNR program, a graduate must perform satisfactorily in the Naval Reserve for six years. He or she may apply for and, if accepted, serve on full-time active duty as an officer in the Naval Service for three consecutive years. Any portion of the six-year period not served on active duty will be served on inactive duty.

ADMISSIONS REQUIREMENTS

Applicants to the Academy must:

--be graduates of an accredited high school, or the equivalent;

--be nominated by a member of Congress or other nominating authority;

--have had at least three years of English, three years of mathematics (algebra, geometry, and trigonometry) and one year of chemistry or physics with a laboratory during high school;

--be at least 17 and not have passed their 22nd birthday on July 1 of the year of admission. A waiver may be granted for veterans of the armed forces up to the age of 24;

--meet physical qualifications including visual and aural acuity requirements;

--be citizens of the U.S., by birth or naturalization.

Candidates are required to qualify on either the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board or the American College Testing Program's examination (ACT). Last year, the average candidate had an SAT verbal score of 520 and a mathematics score of 620 and ranked in the top 15 percent of his or her class. Candidates are selected competitively for the vacancies allocated to their state or geographic subdivision. Each state has a quota proportionate to its representation in Congress.

THE FOUR-YEAR PROGRAM

A midshipman at the United States Merchant Marine Academy receives a four-year scholarship--

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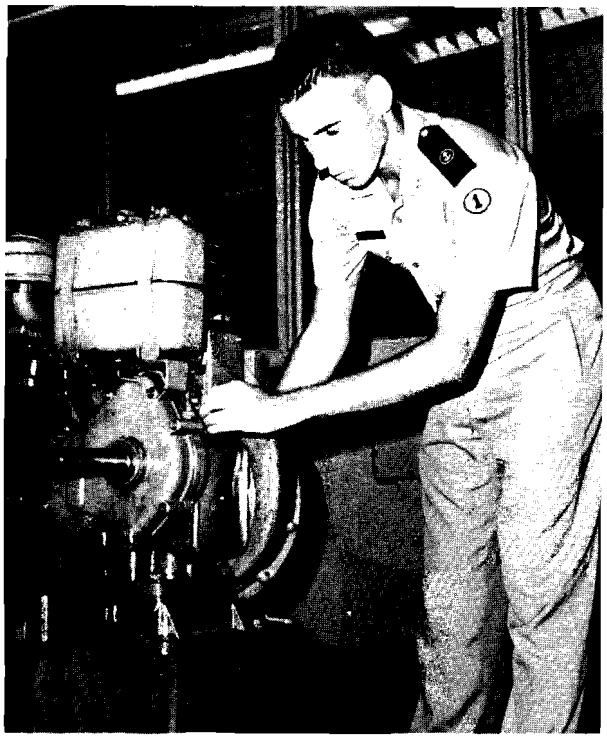
tuition, room and board, medical and dental care are all provided at government expense.

The newly appointed Plebes (freshmen) report to the Academy during the third week in July for two weeks of orientation prior to the beginning of classes in August. During the orientation program, and during most of the remainder of Plebe Year, the new midshipmen undergo an intensive program of regimental training and indoctrination.

All Plebes follow a common program of study for the first two quarters of the freshman year. During this period, in addition to basic courses in mathematics, science and the humanities, every midshipman takes introductory courses in nautical science and marine engineering. The new midshipman is thus given an opportunity to determine intelligently an area of special interest before choosing a major field of concentration.

Each midshipman, during half of the sophomore year and half of the junior year, serves five months at sea aboard commercially operated American-flag merchant vessels. This Shipboard Training Program is perhaps the most unusual and exciting part of the Academy curriculum. While aboard ship, in addition to shipboard duties, midshipmen are required to complete special written assignments in a wide variety of professional subjects. This unique work-study program takes them to many parts of the world and provides them with practical experience. Every effort is made to assign midshipmen to several different vessels during their two periods of training. They thereby become familiar with the performance and operating characteristics of various classes of ships and with the diverse operating requirements of different trade routes, while at the same time gaining valuable experience in the performance of shipboard duties. Between periods of shipboard training, each midshipman returns to the Academy and continues academic work in his chosen field.

Engineering midshipman works in the U.S. Merchant Marine Academy's modern diesel laboratory.



The sea tour is concluded with a two-week assignment ashore for internship training in a maritime-related activity. Depending upon a midshipman's field of specialty and his individual interests, he or she may be asigned to a steamship company, shipyard, ship repair facility, ship brokerage/chartering firm, stevedoring firm, surveyor's office, towing company, port and terminal facility, or similar enterprise.

The senior year is devoted to intensive study in the chosen major and preparation for the written examinations, administered by the United States Coast Guard, which lead to licensing as a Third Mate, Third Assistant Engineer, or Dual License officer.

To be eligible for graduation, a midshipman must pass all required courses, earn the minimum number of credit hours prescribed for his curriculum, attain a cumulative quality-point average of 2.00 (C), pass the appropriate USCG license examination, and apply for, and accept if offered, a commission in the USNR.

ACADEMY CURRICULUMS

Academy midshipmen can choose from three basic curriculums in preparation for maritime careers: Nautical Science for the preparation of deck officers, Marine Engineering for students interested in becoming engineering officers, and a combination of the two, a Dual License curriculum, which leads to a license in each specialty.

Courses are administered through eight departments, described briefly below.

The **Department of Nautical Science** offers introductory courses to familiarize students with the merchant marine and shipboard safety in general. Basic classes include Marine Safety, with particular emphasis on firefighting; Marine Materials Handling; Safety of Life at Sea; Marine Electronics; Seamanship; Navigation; Oceanography; and Small Vessel Operations. These same subjects are also dealt with in advanced classes, plus Microwave Techniques, Maritime Satellites Information System, Marine Instrument Developments, Basic Electronic Circuits and Devices, Electronic Circuits and Systems, Marine Electronics, Astronomy, Pollution Control, Meteorology, Offshore Oil Operations, Domestic Shipping, and Tanker Terminal Operations.

All midshipmen are required to take a program of naval science courses administered by the **Department of Naval Science.** The department is staffed by officers and men who are assigned to the Academy by the Department of the Navy. The Chief of Naval Education and Training prescribes the naval science curriculum and furnishes required textbooks, refer-

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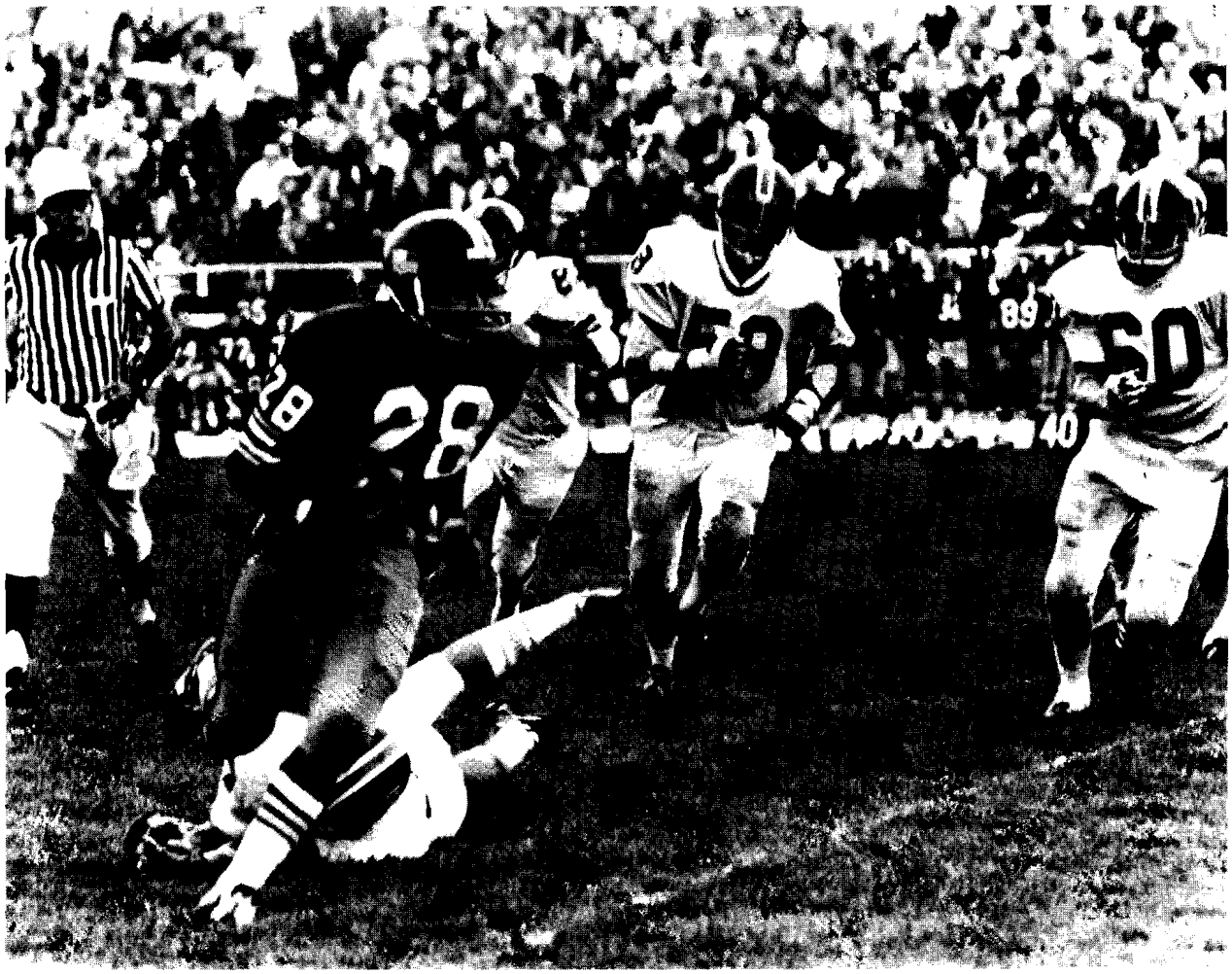

Seventeen varsity sports, as well as a variety of intramural competition--enough sports for anyone--highlight the U.S. Merchant Marine Academy's physical education and athletic program.

ences, and training aids. Information covered includes Naval Weapons Systems, Naval Operations, and Naval Organization; the program is completed with an Advanced Naval Science Seminar.

The **Department of Engineering** offers basic and complex courses in Engineering Graphics, Marine Engineering, Electrical Engineering, Engineering Shop, Metal Cutting, Metal Joining, Computer Engineering, Small Vessel Engineering, Thermodynamics, Geometry, Priciples of Naval Architecture, Fluid Mechanics, Electric Circuits, Switching Theory, Computer Engineering, Management Systems, Computer Control Systems, Machine Design, Ship Resistance and Propulsion, Ship Structure and Dynamics, Basic Ship Design, Heat Transfer, Marine Refrigeration, Air Conditioning, AC/DC Machinery, Electronics, Internal Combustion Engines, Diesel Engine Maintenance, Gas Turbines, Thermal Systems Analysis, Automatic Control Systems, Ocean Engineering, Nuclear Engineering, Nuclear Ship Propulsion, and Engineering Economics.

The **Department of Humanities** teaches English and several modern foreign languages; national and world history; social and political sciences; and literature and drama. In addition, the department offers a special class on U.S. Maritime History.

The **Department of Maritime Law and Economics** offers programs that provide midshipmen with the background and professional competence needed to pursue an executive career in the shipping industry. Courses include Business Law, Maritime Law, International Law of the Sea, Economics, Marine Transportation, Accounting for Management, Seaport Management, Government and Business, Environmental Law, Admiralty Law, Law for Engineers and Scientists, Labor Relations, Marine Insurance, Ship Chartering and Brokerage, Personnel Administration and Supervision, International Trade and Finance, Personal Finance, and Industrial and General Psychology.

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The **Department of Mathematics and Science** offers a program of courses that can lead to a concentration in chemistry, mathematics, or physics. These include Trigonometry, Calculus and Analytic Geometry, Physics, General Chemistry, Probability, Statistics, Differential Equations, Operations Research, Nuclear and Atomic Physics, Oceanographic Chemistry, History and Philosophy of Science, Advanced Mathematics for Engineers, Solid State Physics, Physics of Solar Energy, Quantum Mechanics, Organic Chemistry, Biochemistry, and Astrophysics.

The **Department of Physical Education and Athletics** has a sport for every student. The Academy seeks to promote the growth of each midshipman as a whole person and is thus concerned with physical development as well as with development of character and intellect. Physical fitness and athletics are therefore an important part of Academy life.

The Academy fields varsity teams in 17 sports: baseball, basketball, bowling, crew, cross-country, golf, rifle, pistol, sailing, soccer, swimming, tennis, indoor track, outdoor track, football, volleyball, and wrestling. In addition, the intramural athletic program offers all midshipmen the opportunity to enjoy the benefits of competitive sports at a level appropriate to their athletic ability.

Kings Point is particularly proud of its Sailing Squadron. A fleet of 30 interclub dinghies and 15 420's provides intercollegiate sailing at its best. The squadron participates in frequent races on Long Island Sound using six 30-foot Shields sloops. Academy yachts, skippered by Academy midshipmen, have participated in the grueling Marblehead to Halifax race, the Annapolis to Newport and Bermuda races, and the Martha's Vineyard race. A collection of silver cups and trophies attests to the prowess of Academy sailors, who have been nationally ranked in the top 10 the past few years.

A program of particular interest to midshipmen is the Kings Point Scholar Program, in which selected midshipmen participate in special research projects of value to the maritime industry. This program is managed by the **Department of Interdisciplinary Studies.**

The Scholar Program is designed to provide an opportunity for highly qualified midshipmen to engage in independent study and guided research, in lieu of electives, during their First Class Year. The program is sponsored and funded by the National Maritime Research Center (NMRC) and administered by the Kings Point Scholar Committee. The National Maritime Research Center, under the direction of the Office of Commercial Development of the Maritime Administration, was established at the Academy in June 1971. The location of the center at the Academy enhances faculty research opportunities and enriches the educational program for Academy midshipmen through the infusion of state-of-the-art knowledge into the Academy's educational and research program.

Under the guidance and supervision of selected faculty, midshipmen in the program engage in self-directed study and research in an area of their own interest. Midshipmen submit reports on the results of their research to NMRC, which are published through the National Technical Information Service. The best Scholar paper of the year is eligible for an award.

The NMRC is proud to have one of the world's most advanced ship-operations simulator, a Computer-Aided Operations Research Facility (CAORF), equipped with an extensive computer bank. It has the capability of researching and solving problems in ship handling, collision avoidance, and other aspects of ship operations that take into account the equipment, the environment, the ship structure, and human factors. Another major research program at the center involves the use of satellites as an aid to communication and electronic navigation for the maritime industry. The center is also involved in many research programs relating to advanced ship operations, energy, economics, personnel studies of licensed merchant marine officers and unlicensed seamen, and the support of MarAd Headquarters projects.

CAREER OPPORTUNITIES

After graduation from the Academy, a newly licensed Third Mate or Third Assistant Engineer joins a ship as a fully qualified junior officer. He or she will be in charge of a watch, on the bridge or in the engine room, and will be responsible for the safety of the ship or its propulsion plant while on duty. After a year of shipboard experience, the examination for a Second Mate's or Second Assistant Engineer's license may be taken; then, after serving a year as "Second," the young officer is qualified to sit for the Chief Mate's or First Assistant Engineer's license. The final step, after additional service and experience, is to sit for the license of Master or Chief Engineer.

Upon graduation and Coast Guard licensing and with the recommendation of the Head of the Department of Naval Science and the Superintendent of the Academy, midshipmen are commissioned as Ensigns, Merchant Marine Reserve, United States Naval Reserve. This commissioning program, initiated in 1978, recognizes the special qualifications of licensed deck and engineering officers who are members of the Naval Reserve.

As an Ensign, USNR, the Academy graduate has an opportunity to apply for and serve on active duty in the Navy. Many graduates have remained in the Navy as career officers in surface ships, in submarines, and as aviators, in every rank from ensign to rear admiral. Similar career opportunities are available in the United States Coast Guard and in the National Oceanographic and Atmospheric Administration.

CONCLUSION

The major component of our nation's maritime industry is the United States merchant marine—the fleet of privately owned, American-flag vessels which transports goods, mail, and passengers to all ports of the world. But a strong maritime industry consists of more than oceangoing ships. It also includes large numbers of tugs, barges and river craft, steamship companies, ports and terminals, shipyards, marine insurance underwriters, ship chartering firms, admiralty lawyers, and a vast array of other special-

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ized firms directly or indirectly engaged in maritime-related commerce, engineering, research, and management endeavors.

For more than three decades, the U.S. Merchant Marine Academy has trained and graduated highly qualified individuals. Today, Kings Point graduates are serving with distinction in all sectors of the maritime industry. As merchant officers, shipping company executives, naval architects, admiralty lawyers, marine insurance underwriters, oceanographers, and career officers in the United States Navy and Coast Guard, Kings Point alumni continue to make significant contributions to the vital and exciting maritime industry.

Afloat and ashore, in private industry and public service, in civilian and military careers, Kings Pointers serve their nation well.

For more information concerning Kings Point, contact the Office of External Affairs, U.S. Merchant Marine Academy, Kings Point, NY 11024.

* * *

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

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

Men and women at the U.S. Merchant Marine Academy participate in a military system of training and study, and receive Naval Science instruction in preparation for naval reserve commissioning at graduation.

Lessons from Casualties

At approximately 1800, on a clear and calm day early in January last year, a towing vessel and two tank barges were moored at an oil terminal dock on the Tennessee River. At about 0500, offloading 20,000 barrels of No. 6 oil commenced from one of the tank barges. At about 1000, the U.S. Coast Guard port safety inspector arrived and conducted a routine monitor of cargo transfer aboard the barge undergoing offloading and a spot-check aboard the second barge. He noted no discrepancies during the inspection, nor was he informed of any problems existing aboard either of the tank barges at that time.

At about 0500 the next day, pumping operations from the first tank barge were completed and the offloading of 20,000 barrels of No. 6 oil from the second tank barge commenced. Pumping of the product was slow due to the cold weather, even though both vessels were equipped with thermal fluid heaters to heat the thick product to a temperature of about 150 degrees F. At around 1750 that evening, when the product depth was about one foot in the No. 1 cargo tank, suction problems were encountered in the cargo suction line inside the tank. At that point, the chief engineer advised the captain of the problem and the two of them entered the No. 1 tank with a bed sheet torn into strips to wrap around the cargo pipe. They wore no masks or self-contained breathing apparatus of any type, nor was the oxygen level of the tank checked prior to their entry (equipment to do so was not available). After being in the tank about four minutes, they returned on deck to obtain another sheet. Neither showed any ill effects from being in the tank. After about 10 minutes, they reentered the tank with another sheet and had just started to wrap it around the pipe when the captain passed out. The chief engineer called for help, and two deck hands passed him a rope. He failed to secure the rope around the captain, called again for help, and a third man entered the tank. They succeeded in tying the rope around the unconscious man, but the chief engineer suddenly announced that he had to get out. He started for the ladder and then passed out at the bottom of it. At that point the third man also fell, unconscious, face down in the foot or so of oil remaining in the tank.

A radio call for assistance was intercepted by the U.S. Tennessee Valley Authority Public Safety Office. A three-man team of public safety officers was dispatched to assist, and arrived on the barge about 1830. All three men were removed from the tank within 40 minutes by the safety team, other crewmen, and dock personnel.

Upon arrival at a local hospital, the third tankerman was pronounced dead. The death certificate set forth the cause of death as "noxious fume inhalation." This was not concurred with in the Coast Guard investigation report, as the deceased was found face down in approximately one foot of No. 6 oil. He had probably been in that position in excess of 40 minutes, since it likely that he lost consciousness shortly after the first two men passed out. The report maintained that the most probable cause of death was due to drowning in the No. 6 oil.

The other two men were hospitalized with symptoms of anoxia, and released after about a week with no apparent after effects.

It is concluded that the proximate cause of this casualty was the unsafe act on the part of the captain and the chief engineer in entering a non-gas free compartment without first ascertaining if a sufficient oxygen level was available to sustain life.

The two survivors indicated that they were not aware of any dangers involved with tanks containing No. 6 oil and asphalt. Also, the captain stated that entering tanks containing No. 6 oil and asphalt was common practice in the "river industry." While there may not be an immediate danger from toxic gases in tanks containing No. 6 oil or asphalt, these cargoes contain hydrocarbons that displace oxygen in the tank. Tanks containing these cargoes should never be entered without testing the atmosphere in the tank for oxygen and flammable gases. Additionally, proper breathing apparatus should be available. A few minutes of preparation could have saved a man's life.

Marine Safety Council Membership

Rear Admiral Richard A. Bauman has recently been selected to serve as Chief of the newly-formed Office of Navigation at Coast Guard Headquarters, Washington, DC.

A native of Fitchburg, Massachusetts, Rear Admiral Bauman is a graduate of the Massachusetts Maritime Academy, Class of 1944. Following graduation, he sailed as a licensed deck officer in the U.S. Merchant Marine with wartime service on various Atlantic and Mediterranean convoys, including the invasion of Normandy. Following World War II, Rear Admiral Bauman remained in the Merchant Marine, receiving an unlimited Master's license in 1947.

Rear Admiral Bauman entered the U.S. Coast Guard in September 1957 under the provisions of Public Law 219, which provides for the appointment of licensed officers of the Merchant Marine as commissioned officers in the Coast Guard. His initial service as Operations Officer, Coast Guard Cutter CASCO, was followed by various assignments in the Coast Guard's Marine Safety Branch.

He returned to sea duty in 1965 as Executive Officer of the Coast Guard Cutter CHINCOTEAGUE, an ocean station vessel based at Norfolk, Virginia. He attended the Armed Forces Staff College at Norfolk, Virginia from August 1966 to January 1967, then was assigned to Coast Guard Squadron One, the squadron of 82-foot Coast Guard patrol cutters engaged in anti-infiltration patrols off the coast of Vietnam. Service as Chief Staff Officer of Squadron One was followed by command of Division Twelve of Squadron One, consisting of 13 cutters based at Da Nang, Vietnam.

Rear Admiral Bauman was awarded the Navy Commendation Medal with Combat "V" for action involving the destruction of an armed enemy trawler attempting to infiltrate arms and munitions into South Vietnam on the night of 29 February - 1 March 1968. For this action he was also awarded the Vietnamese Gallantry Cross with Gold Star by the Government of the Republic of Vietnam. He was awarded the Bronze Star Medal with Combat "V" for his service with Squadron One in Southeast Asia from March 1967 to April 1968.

Rear Admiral Bauman was assigned duties as the U.S. Coast Guard Liaison Officer to the Commander in Chief, U.S. Atlantic Fleet, U.S. Navy, at Norfolk, Virginia from June 1968 to February 1971. For this service, he was awarded the Joint Service Commendation Medal by the Atlantic Command.

From February 1971 through May 1973, Rear Admiral Bauman commanded the Norfolk-based Coast Guard Cutter INGHAM, which was engaged in North Atlantic Ocean weather station duties. He was awarded the Coast Guard Commendation Medal with Operational Distinguishing Device for his performance in that command.

The Admiral was next assigned as Chief of the Information Sytems Division at Coast Guard Headquarters. For this service he was awarded a Gold Star, in lieu of a Second Coast Guard Commendation Medal. He graduated from the National War College at Fort McNair, Washington, DC in June 1975. He then served as the Chief of Port Safety and Law Enforcement Division, Coast Guard Headquarters, for which he was awarded the Meritorious Service Medal. Prior to his present assignment, he was Chief of the Operations Division, Ninth Coast Guard District, Cleveland, Ohio, for which service he was awarded a Gold Star, in lieu of a third Coast Guard Commendation Medal.

Rear Admiral Bauman is married to the former Dorothy H. Schmalz of Fitchburg, Massachusetts. The Baumans have a married daughter and three sons, one of whom graduated from the U.S. Merchant Marine Academy at Kings Point, New York, and is now a ship's pilot on the Chesapeake Bay.

MIO NEW ORLEANS TAKES TO THE AIR

By Lieutenant P. T. Delaire

In addition to the more conventional forms of transportation used by past Coast Guard marine inspectors, a new breed of inspector from the Marine Inspection Office (MIO) New Orleans, Louisiana now flies to work on the Outer Continental Shelf of the Gulf of Mexico.

Utilizing three commercial helicopters leased through the Office of Aircraft Services, Department of Interior, these inspectors, along with others from marine inspection division (MIDET) Morgan City, Louisiana, fly daily into a 16,800 square mile area of the Gulf of Mexico between Mobile, Alabama and Lafayette, Louisiana. Their mission: to inspect, annually, approximately 1,860 artificial islands and fixed structures and 58 or so mobile offshore drilling units (MODU's) on the Outer Continental Shelf (OCS).

THE OUTER CONTINENTAL SHELF INSPECTION PROGRAM

Although the OCS program was originally established to inspect platforms, there is an increasing number of MODU's, submersible and semi-submersible drilling units, jack-up rigs, drill ships and posted drilling barges on the Gulf of Mexico. MIO New Orleans is responsible for inspecting the approximately 1,040 artificial islands located in South Pelto, South Timbalier, Grand Isle, West Delta, South Pass, Mississippi Canyon, Main Pass, Breton Sound, and Chandeleur Sound offshore leasing areas, and all of the MODU's in the entire New Orleans marine inspection zone. MIDET Morgan City annually inspects the remaining artificial islands located in South Marsh Island, Eugene Island, and Ship Shoal leasing areas.

MIO New Orleans is only one of the participants in the OCS Program in the Eighth Coast Guard District. Presently, there are five contract helicopters assigned to the OCS program. Two are located in New Orleans, one in Morgan City, and one in Port Arthur, with Galveston and Corpus Christi sharing the fifth.*

BACKGROUND OF THE OCS PROGRAM

Coast Guard activity in this program stems from the Outer Continental Shelf Lands Act of 1953, as amended by P.L. 95-372, which delegates to the U.S. Coast Guard the authority to promulgate and enforce regulations with respect to lights and other warning devices, safety equipment, and matters relating to the promotion of safety of life and property on the islands and structures of the Outer Continental Shelf. Coast Guard publication CG-320, entitled "Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf" (33 CFR 140-147 and 33 CFR 67), contains the requirements relating to the promotion of safety of life and property on the artificial islands and fixed structures of the Outer Continental Shelf. These regulations relate to, but are not limited to, inspection, construction and arrangement, lifesaving appliances, firefighting equipment, and operations.

While earlier Coast Guard policies called for an annual inspection of each platform and MODU, there was, in fact, very little activity due to the limited resources available for such inspections. For example, in 1977,

Continued on next page.....

**The three Marine Safety Offices located in Texas are engaged in similar types of operations but on a smaller scale due to the lesser number of platforms and related oil field activities in their marine inspection zones. MSO Port Arthur uses their one leased helicopter to perform 470 offshore inspections annually and MSO Galveston conducts 140 platform and 25 mobile offshore drilling unit inspections in its offshore region. MSO Corpus Christi, which shares a leased helicopter with MSO Galveston, performs aproximately 25 annual inspections in its zone.*

only 48 platforms and 32 MODU's were inspected throughout the Coast Guard. These were inspected primarily by utilizing Coast Guard 210-foot medium endurance cutters and HH52 helicopters for transportation of inspectors. Additionally, there were the traditional investigative activities looking into the circumstances pertaining to deaths, serious injuries, and fires on OCS facilities.

With the passage of the OCS Lands Act Amendments in 1978, annual inspections became mandatory. MIO New Orleans was assigned its first helicopters in August 1978 and personnel were then dedicated full-time to offshore inspections. In 1979, MIO New Orleans alone inspected 1,040 platforms or artificial islands and 32 MODU's. Between 1 January 1980 and 1 May 1980, MIO New Orleans anticipated conducting an estimated 25 MODU inspections requiring approximately 300 man days (75 days utilizing 4 inspectors). Artificial islands in this zone are expected to number well over 1,900 by the year 1981.

OCS INSPECTOR TRAINING

The OCS Program has created a need for the Coast Guard marine inspector to learn new terms and to become familiar with new procedures; in short, to become more diversified.

Each OCS inspector attends the Eighth Coast Guard District Offshore Marine Inspectors School located on the campus of the University of Southwestern Louisiana, Lafayette, Louisiana. The course of instruction is divided into two phases. Phase one consists of two weeks of intensive classroom study dealing with such items as terminology, industrial safety, drilling tools, the drilling operation, operator/contractor relationship, cranes, helicopter safety, diving, American Petroleum Institute (API) standards, and USGS and USCG regulations. The second two-week phase involves actual on-site industry training where the inspector becomes familiar with the environment in which he will be working, including MODU and platform equipment, operations and industry problems, and offshore industrial personnel and their work schedules. It is intended that the inspector/trainee learn the terminology and develop a foundation for mutual understanding between industry and Coast Guard.

Minimum inspector qualification requirements have been established for OCS inspectors as follows:

a. Pre-OCS indoctrination of approximately one week with a qualified OCS inspector;

b. OCS school in Lafayette, Louisiana as described above;

c. Post-OCS school final qualification by a supervisory OCS inspector.

To supplement the OCS inspector training program, each MIO/MSO in the Eighth Coast Guard District has been supplied with a video tape player, TV monitor, and video training tapes that were produced by the Petroleum Extension Service of the University of Texas. In addition, a series of reading and study materials relating to offshore operations are available to the inspector for use in a home study program. Each qualified OCS inspector has attended the OCS School at Lafayette, Louisiana, has demonstrated a working knowledge of CG-320 and Vol. II, Chapter 38 of the Marine Safety Manual (MSM) and has conducted satisfactory inspections of both manned and unmanned platforms.

The OCS Program is escalating and is becoming more demanding on the OCS inspector to be qualified, not just on platforms, but also as a deck and engineer inspector. Utilizing the recommended check-off sheets referred to in the Marine Safety Manual, OCS inspectors fly offshore five days a week to ascertain the safety of personnel and property. Presently, an average week for the OCS Program at MIO New Orleans encompasses inspection of approximately 10 manned platforms, 40 unmanned platforms, and 3 or 4 MODU's. To meet the demand for increased inspection services, two additional helicopters have been scheduled for New Orleans this year.

OCS "COURTESY VISITS"

Offshore drilling is one means of helping provide present and future petroleum resources. In the interest of promoting safety in this expanding area of Coast Guard responsibility, MIO New Orleans is currently dispatching, as part of its OCS Program, a two-man boarding team to conduct "courtesy visits" to presently uncertificated MODU's. These Coast Guard representatives explain the regulations which will affect that rig when due for its initial inspection for certification. The intent of this program is to promote an understanding of the Coast Guard's new role involving the offshore oil industry. It is hoped that this cooperative effort will serve to alleviate possible future misunderstandings regarding regulations and enforcement policies.

About the Author

Lieutenant Paul T. DeLaire

Lieutenant DeLaire is a 1970 graduate of East Tennessee State University with a Bachelors Degree in Marketing. He enlisted in the Coast Guard in 1970 and was assigned to Naval Weapons Station Concord, California, as an Explosive Loading Supervisor. He later attended Aviation Electricians-mate School and was assigned to Coast Guard Air Station San Francisco, California.

Lieutenant DeLaire received his commission from Coast Guard Officer Candidate School in 1973. He was assigned to MSO Corpus Christi, Texas, from 1973 to 1977 where he served as an investigating officer, marine environmental protection officer, and port safety officer. He then was assigned to the USCGC UNIMAK in New Bedford, Massachusetts, which was involved in fisheries law enforcement. There he served as a deck watch officer and as first lieutenant. He is presently assigned to the Marine Inspection Office New Orleans, Louisiana, as a deck inspector. Previously, he worked in the Offshore Program inspecting artificial islands, platforms, and mobile offshore drilling units.

Nautical Queries

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

DECK

(1) U.S.C.G. approved buoyant work vests are considered to be items of safety equipment and may be worn by members of the crew

A. in lieu of life preservers during fire drills.
B. in lieu of life preservers during boat drills.
C. in lieu of life preservers during an actual emergency.
D. when working near or over the water under favorable working conditions.

REFERENCE: 46 CFR 35.03, 46 CFR 97.34-10

(2) The Master is responsible that each lifeboat is lowered to the water at least once in each

A. two months.
B. three months.
C. four months.
D. five months.

REFERENCE: 46 CFR 97.15-35(b)(6)

(3) Loran-C can be adversely affected by interference from many sources. To offset this, most manufacturers provide

A. tuneable filters.
B. pre-oscilloscope readings.
C. antenna wave length.
D. pre-tuned A and B phase.

REFERENCE: Bowditch 1977

(4) The basic principle on which Loran-C is based is referred to as

A. reflected electron system.
B. electrical radiation system.
C. quarterpoint electrical navigation.
D. hyperbolic radio navigation.

REFERENCE: Duttons 13th

(5) The Master of a vessel transporting hazardous materials or his authorized representative shall prepare a dangerous cargo manifest, list, or stowage plan. This must be kept

A. in the ship's office.
B. in a designated holder on or near the vessel's bridge.
C. in the master's office.
D. on the main deck near the gangway.

ENGINEER

(1) Heat exchanger tubes can be protected against erosion and abrasion by the use of

A. metallic packing on the inlet end.
B. fiber bushings in the ferrules.
C. zinc pencils on the waterside.
D. plastic tube end protectors.

REFERENCE: Osbourne

(2) When there is no movement of the rams on an electrohydraulic steering gear, the tilting box of the running pump is

A. set for maximum torque.
B. on the purge and vent stroke.
C. in the neutral position.
D. rotating backwards.

REFERENCE: Fluid Power

(3) According to Coast Guard regulations, how often shall internal combustion engine driven emergency generators be operated under load?

A. Once a week for two hours
B. Once a week for four hours
C. Once a month for two hours
D. Every six months for four hours

REFERENCE: 46 CFR 97.15-30(b)

(4) An insulating flange would be used in a cargo hose connection instead of a bonding wire

A. when pumping LNG only.
B. when static may be generated.
C. when the terminal is equipped with a cathodic protection system.
D. during cold weather.

REFERENCE: CG-174

(5) Four tugs on the lifeline by the wearer of an OBA means

A. Okay.
B. Advance.
C. Take Up.
D. Help.

REFERENCE: Oath - Marad Fire Fighting Manual

ANSWERS

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

Engineer
1. D; 2. C; 3. C; 4. C; 5. D

MERCHANT MARINE SAFETY PUBLICATIONS

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

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

CG No.	TITLE OF PUBLICATION

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

* CG-101-1	Specimen Examinations for Merchant Marine Deck Officers (2nd and 3rd Mate) (4-1-77).
CG-101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (7-1-78).
CG-108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75, 9-26-77.
CG-115	Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78, 3-12-79, 5-3-79, 2 19 80.
CG-123	Rules and Regulations for Tank Vessels (8-1-77). Ch-1, 4-78. FR 1-3-77, 8-18-77, 9-12-77, 9-26-77, 9-29-77, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79, 11-19-79, 12-27-79, 1-31-80, 3 3 80.
CG-169	Navigation Rules - International - Inland (5-1-77). FR 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
CG-169-1	Colregs Demarcation Lines (7-15-77).
CG-172	Rules of the Road - Great Lakes (7-1-72). FR 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
* CG-174	Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
* CG-175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-73).
** CG-176	Load Line Regulations (2-1-71). FR 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76, 7-24-78.
CG-177	Yacht Admeasurement and Documentation (9-72).
CG-182-1	Specimen Examinations for Merchant Marine Engineers License (2nd and 3rd Assistant) (4-75).
CG-182-2	Specimen Examinations for Merchant Marine Engineer Licenses; First Assistant Engineer, Steam and Motor, any Horsepower (4-76).
CG-182-3	Specimen Examinations for Merchant Marine Engineer Licenses; Chief Engineer Steam and Motor, any Horsepower (4-76).
CG-184	Rules of the Road--Western Rivers (8-1-72). FR 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
* CG-190	Equipment Lists (8-1-77).
CG-191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (11-1-76). FR 3-3-77, 5-16-77, 8-8-77, 4-9-79, 12-6-79.
CG-227	Laws Governing Marine Inspection (7-1-75).
**** CG-239	Security of Vessels and Waterfront Facilities (5-1-74). FR 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77, 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78, 11-16-78, 1-22-79, 1-25-79, 2-12-79, 11-5-79, 12-10-79, 1-31-80.
CG-242	International Conventions & Conferences on Marine Safety (6-51).
* CG-257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). Ch-1, 3-17-78. FR 1-31-77, 9-26-77, 9-29-77, 12-19-77, 10-10-78, 1-11-79, 3-12-79, 5-3-79, 6-14-79, 7-2-79.
CG-258	Rules and Regulations for Uninspected Vessels (4-77). FR 9-26-77, 9-29-77, 6-14-79, 7-2-79, 12-17-79, 2-4-80, 2-19-80.
CG-259	Electrical Engineering Regulations (7-1-77). FR 9-26-77, 10-10-78, 11-16-78, 12-4-78.
CG-268	Rules and Regulations for Manning of Vessels (7-1-77). FR 11-19-79.
CG-293	Miscellaneous Electrical Equipment List (6-73).
CG-323	Rules and Regulations for Small Passenger Vessels (7-1-77). Ch-1 3-17-78. FR 9-26-77, 10-25-77, 12-15-77, 7-17-78, 3-12-79, 6-14-79, 7-2-79, 12-13-79, 2-19-80, 3-3-80.
CG-329	Fire Fighting Manual for Tank Vessels (1-1-74).
* CG-388	Chemical Data Guide for Bulk Shipment by Water (1976).
* CG-403	Great Lakes Pilotage Regulations (7-76).
CG-439	Bridge to Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
* CG-467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
CG-474	When You Enter That Cargo Tank (3-76).
OLD CG-478,	Liquefied Natural Gas and Liquefied Petroleum Gas, Views and Practices, Policy and Safety (3-80), now M16616.4.
CG-480	Oil Pollution Control for Tankermen (6-75).
CG-482	Benzene Safe Handling Practices (12-76).
CG-486	Shippers Guide to Hazardous Materials Regulations (Water Mode) (8-77).
CG-491	Safety for Small Passenger Vessels (8-77).
OLD CG-497,	Rules and Regulations for Recreational Boating (12-78), now M 16752.2 (12-78) FR 7-19-79.
*** CG-515	Rules and Regulations for Foreign Vessels Operating in the Navigable Waters of the U.S. (2-78). FR 1976--7-8, 8-26, 9-16, 9-20, 12-13, 12-20. 1977--1-3, 5-16, 5-19, 6-16, 7-7, 7-14, 7-21, 7-25, 8-4, 8-11, 9-8, 9-12, 9-22, 9-26, 9-29, 11-10, 12-8, 12-15, 12-19. 1978--4-6, 5-18, 5-22, 6-29, 7-24, 8-10, 9-11, 9-25, 11-16, 11-20, 11-30, 12-7, 12-28. 1979--1-22, 1-25, 2-5, 2-12, 2-26, 3-29, 4-12, 4-16, 4-24, 5-3, 5-7, 5-31, 6-14, 6-21, 8-2, 8-16, 8-27, 9-4, 9-24, 10-15, 10-18, 11-1, 11-5, 11-19, 12-3, 12-10, 12-27. 1980--1-10, 1-31, 2-4, 2-19, 3-10, 3-20, 3-24, 3-31.
CG-518	Marine Investigating Officer's Regulations Handbook (2-78). FR 2-16-78, 4-27-78, 5-25-78, 6-15-78, 9-25-78, 10-19-78, 11-20-78, 1-25-79, 7-19-79, 9-4-79, 1-10-80, 2-11-80.
* CG-526	Utilizing the Packaged Hazardous Materials Regulations, 49 CFR (5-78).
Safety of Life at Sea:	Convention, with Regulations, London, June 17, 1960.
Specifications for Merchant Vessel Equipment	(Subparts of Chapter Q, 46 CFR, parts 160 to 164.

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*Temporarily out of stock
**Under revision--CG-176 text can be found in Title 46 CFR Parts 41-69
***Available only through the Superintendent of Documents
****Cancelled

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