PROCEEDINGS
OF THE MARINE SAFETY COUNCIL

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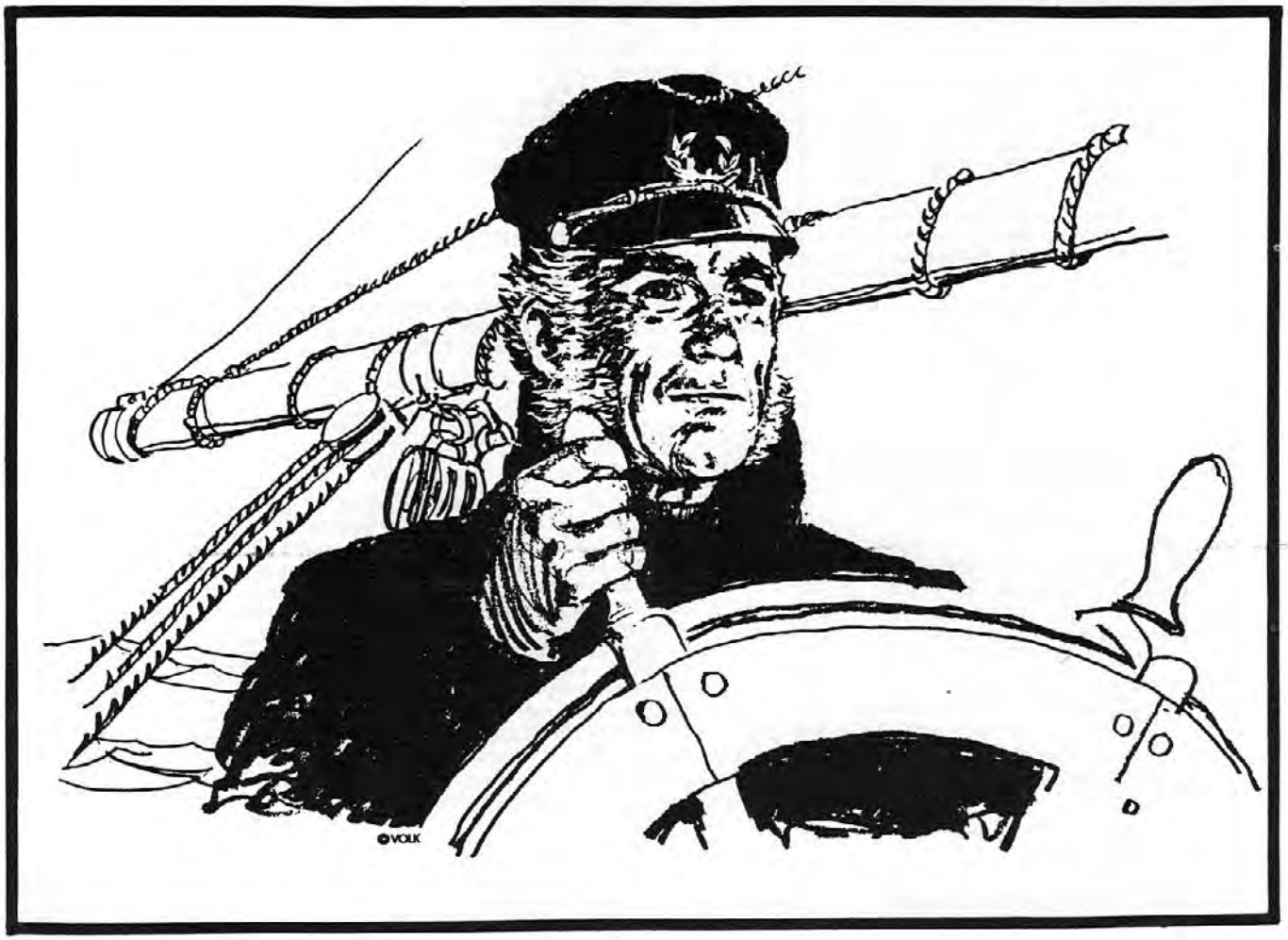

U.S. Department of Transportation **CG-129** United States Coast Guard

PROCEEDINGS

OF THE MARINE SAFETY COUNCIL

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Contents

features

departments

Cover

Some of the most colorful words in the English language were spawned by those infamous "old salts" who, generations ago, sought fortune and adventure on the high seas. Many of these expressions are now used commonly by "landlubbers," and in some cases their meanings have been generalized. Originally, most sea language was related to the strict discipline necessary to shipboard safety and survival. Enforcing rules and punishing rulebreakers was important in maintaining a well-controlled, hazard-free vessel. Some origins and meanings of the sailors' colorful vocabulary are revealed in "Sea Language Washes Ashore," beginning on page 127.

DIST. (SDL No.109)
A: acde(2); fghklmntuv(1)
B: n(50); c(16); e(5); f(4); ghj(3); r(2); bkipq(1)
C: eglmp (1)
D: adgklm(1)
E: mn(1)
F: bckp(1)
Lists TCG-06, CG-13

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key notes

Any questions regarding regulatory dockets or companies and individuals wishing to speak at public hearings should notify Capt. P. J. Danahy **at our new address:** (G-CMC/TP24), U.S. Coast Guard Headquarters, 2100 Second St. SW, Washington, DC 20590; (202)426-1477.

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

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

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

As stated in the last issue, these projects have been withdrawn (44 FR 25243).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

REVISION OF ELECTRICAL REGULATIONS CGD 74-125

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 June 27, 1977 (42 FR 32700). A supplemental NPRM will be issued later in 1979.

STANDARDS FOR NEW SELF-PROPELLED VESSELS CARRYING BULK LIQUEFIED GASES CGD 74-289

These regulations adopt the Intergovernmental Maritime Consultative Organization (IMCO) Resolution, the Code for Construction and Equipment of Ships Carrying Liquefied Gas in Bulk.

The increased use of liquefied gases for energy sources has produced a dramatic increase in the manufacture and use of vessels designed for the cargo. Due to the unusual and unique hazards associated with liquefied gases, these vessels must be addressed in regulations specially tailored to their unique situation.

The final rule was published May 3, 1979 (44 FR 25986). Copies of this rule and its supporting documents may be obtained by writing or calling the Marine Safety Council at the telephone number given at the beginning of the Keynotes section.

UPGRADE OF 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 which were the result of a Presidential initiative of March 17, 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 will be 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 advanced notice of proposed rulemaking (ANPRM) will be issued to gather additional data and assess impacts related to existing barges.

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

Public hearings have been scheduled on the dockets as follows: August 2, 1979, Washington, DC; August 15, 1979, Seattle, WA; August 23, 1979, New Orleans, LA; September 5, 1979, Washington, DC; and September 7, 1979, St. Louis, MO. (For times and places of the meetings, see the meetings and public hearing schedules at the end of the Keynotes section.)

Anyone wishing to obtain copies of the rulemaking or desiring to be scheduled to speak at any of the public hearings may do so by contacting Capt. P. J. Danahy, Marine Safety Council **at our new address** (telephone number has not changed) given at the beginning of 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.

The NPRM was published on June 27, 1977 (42 FR 32670). A supplemental NPRM was published October 27, 1977 (42 FR 56625). As stated in the last issue (June-July), the draft of the final rule is under its legal review prior to publication.

OFFSHORE OIL POLLUTION FUND CGD 77-055

This document established procedural rules concerning administration and operation of the fund,

Continued on next page.....

including liability limits for certain facilities, financial responsibility factors, damage claim settlement procedures, et. al.

This regulation was passed in order to implement administration of the fund by creating procedures for prompt settlement of claims arising from damage caused by oil pollution.

The final rule of this docket was published March 19, 1979 (44 FR 16860).

TANK VESSEL OPERATIONS REGULATIONS, PUGET SOUND CGD 78-041

This regulation would govern the operation of tank vessels in the Puget Sound area. This regulation was initiated in order 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.

Secretary of Transportation Brock Adams signed a 180-day Interim Rule on March 14, 1978 prohibiting entry of oil tankers in excess of 125,000 deadweight tons in Puget Sound; this appeared in the Federal Register of March 23, 1978 (43 FR 12257). An ANPRM was published March 27, 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 June 11 and 12 in Seattle, Washington, June 13 in Mt. Vernon, Washington, and June 14 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 is at the Federal Register and is scheduled to be published in the June 21, 1979 issue. This extension will be effective July 1 and will be in effect until the Coast Guard prints notice of its cancellation. Copies of the documents or the transcripts of the hearings may be obtained by writing the Marine Safety Council.

The following three regulations make up the Tanker Safety and Pollution Prevention (TSPP) Regulations. Public hearings have been held on the package, comments were requested and 541 have been received. Final rules on this package are currently being written. A notice of delay in publishing the final regulations has been published in the June 7, 1979 Federal Register (43 FR 32713). Final rules are anticipated in the fall of 1979.

INERT GAS SYSTEM CGD 77-057

This regulation would require certain oil tankers of 20,000 deadweight tons and over to be fitted with inert gas systems.

As part of the President's initiatives to reduce marine pollution, this regulation will reduce the possibility of in-tank explosions which have been the cause of some pollution incidents.

The Inflationary Impact Statement for this regulation was completed in May 1977. An NPRM was published May 16, 1977 (42 FR 24874). An ANPRM was published February 12, 1979 (44 FR 8984); 136 comments have been received on the docket.

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

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

The NPRM was published May 16, 1977 (42 FR 24868). As a result of the IMCO Tanker and Pollution Prevention Conference of February 1978, a new NPRM will be issued. This rulemaking was also mandated by the Port and Tanker Safety Act of 1978. An NPRM was published February 12, 1979 (44 FR 8984); 265 comments have been received on the docket.

STEERING GEAR DESIGN STANDARDS TO PROVIDE REDUNDANCY CGD 77-063

As part of the President's initiatives to reduce pollution, this regulation is needed to help reduce the possibility of a marine collision due to a loss of steering.

An NPRM was published May 16, 1977 (42 FR 24869). As a result of the IMCO Tanker Safety and Pollution Prevention Conference of February 1978, a new NPRM was issued on February 12, 1979 (44 FR 8984); 138 comments have been received on the docket.

PUBLIC HEARINGS

AUGUST 1979

2: Tank Barge Construction Standards, 0900, room 2230 old CG Hdqtrs, 400 7th St. SW, Washington, DC.

15: TBCS, 0900, Williamsburg Room, Olympic Hotel, 4th & Seneca Sts., Seattle, WA.

23: TBCS, 0900, Russel B. Long Room, Holiday Inn Superdome Downtown, 1111 Gravier St., New Orleans, LA.

SEPTEMBER 1979

5: TBCS, 0900, room 2230 old CG Hdqtrs, 400 7th St. SW, Washington, DC.

7: TBCS, 0900, Jefferson A and B Rooms, Stouffer's Riverfront Towers, 200 South 4th St., St. Louis, MO.

Hazardous Work Environment for Marine Personnel

Ken Doolan
Industrial Hygienist, Safety Programs Division
U.S. Coast Guard Headquarters

Marine personnel assigned to chemical tankships and barges may be exposed to chemical vapor concentrations which could have a serious impact on their health. Most marine inspectors are aware of the acute (immediate) hazards of encounters with high chemical vapor concentrations which could result in fire/explosion or asphyxiation. They are more frequently subjected to such exposures due to the nature of the job, but other shipboard personnel may risk exposure at times. Both groups should also be aware of the chronic (long-term) hazards due to repeated exposure to low levels which can cause illness, disease or death years later.

Threshold limit values (TLV's) are frequently used as guides for safe exposure to chemicals and are referenced in the Chemical Hazards Response Information System (CHRIS) and CG-388, Chemical Data Guide for Bulk Shipment by Water. These values represent conditions under which it is believed that the average employee can be safely exposed for a working lifetime without producing chronic health effects. However, some more sensitive workers may be affected by repeated exposures to concentrations which are equal to or less than the TLV.

This sensitivity may be hereditary or it may result from an interaction between one chemical and another chemical within the body such as drug, medication, or alcohol. This additive or synergistic effect can also be produced by multiple exposures to certain combinations of chemicals. In effect, two normally safe exposures may be quite hazardous if they impact the body at the same time. Marine inspectors encounter multiple exposures to many of the 900 CHRIS chemicals on a daily basis.

As indicated, TLV's represent exposure limits thought to be safe, based on current medical knowledge. For the most part, they are based on scientific studies of the chemicals' effect on animal populations and, to some extent, industrial experience. Due to the difficulty in predicting human effects from animal studies, TLV's should only be used as guidelines. In practice, exposures should be reduced as low as possible.

Personnel rely principally upon the marine chemist to determine whether a tank is safe to enter. However, in many cases, the chronic toxicity level for a particular chemical may not be considered during the chemist's evaluation. Tank atmosphere having a gas/vapor concentration well below the lower explosive limit (LEL) may still present a severe health hazard. For example, one-tenth of the lower explosive limit for benzene--130 parts per million (ppm)--is 130 times the current OSHA proposed standard of 1 ppm. Most persons would not notice an immediate (acute) reaction upon exposure to 130 ppm benzene; however, it is likely that repeated exposures at that level would cause a slow poisoning of the body, resulting in occupational disease.

What can be done to provide better protection for personnel and to decrease the possibility of illness and disease? A widespread effort should be initiated to effect the following changes:

1. Increase awareness concerning health effects of chemical exposures.

2. Minimize entries into hazardous chemical tanks and compartments.

3. Coordinate tank entries with the inspection of the certified marine chemist.

4. Insure that tanks are monitored for compliance with TLV's.

5. Initiate a respiratory protection program to include use of respirators for all tank entries.

6. Insure that exposed personnel are included in a medical monitoring program.

Mr. Ken Doolan

Mr. Doolan is currently in charge of the Coast Guard Industrial Hygiene Program within the Safety Programs Division at Coast Guard Headquarters, Washington, DC. In addition to 10 years of industrial hygiene experience, he has an academic background of pre-med and a B.S. degree from the University of Maryland.

CHRONIC CHEMICAL EXPOSURE

"What is it?"

"How does it affect me?"

"How can I protect myself?"

Lieutenant Thomas J. Haas
Cargo and Hazardous Materials Division
U.S. Coast Guard Headquarters

Edited and abridged from "Merchant Marine Inspectors and Chemicals" published in Veterinary and Human Toxicology, Volume 20, No. 4, August 1978, pp. 257-260.

BACKGROUND

There has been increasing concern over the effects of chronic exposure to hazardous chemicals. This includes mixtures of chemicals, since exposure to a single substance under carefully controlled conditions is generally most unrealistic. It is very difficult to evaluate the possible hazardous effects of chemical mixtures, since these substances can be combined in an almost infinite number of ways. Consequently, relatively little is known about the various interactions of chemicals and what they might do to persons exposed to them, particularly over a long period of time.

Marine personnel who come into contact with chemicals should be aware of the hazards of low level exposure. Commander Fred Halvorsen stated in the April 1976 Proceedings that merchant marine inspectors were voicing concern over continuous exposure to chemical concentrations. They had many years of experience in the field and understandably desired to know what the ill effects of this type of exposure might be. Other individuals now share the same concerns over chronic exposure from hazardous materials and its effect on the human body. For example, medical doctors have found that long-term administration of chemical mixtures can affect the response of the body to drugs. In addition, a growing public awareness of the health hazards of atmospheric contaminants has prompted further study of low concentrations of potentially toxic (poisonous) gases, vapors, and particles.

TERMINOLOGY

The terminology in the field of chemical interactions can be confusing and misleading. A complete and sound knowledge of the terms is essential to marine chemists and merchant marine inspectors, but other marine personnel should also have some knowledge of these terms and an understanding of the individual interaction of the chemicals to which they may be exposed.

There are two levels of chemical exposure, acute and chronic. An **acute** exposure occurs when a large dose is delivered at once and is rapidly absorbed into the body. Inspectors may be acutely exposed to high levels of chemicals when inspecting flame screens, or

Continued on next page.....

pockets of heavier-than-air vapors may be present in an enclosed space. Usually, though, inspectors are infrequently exposed to acute levels of substances but must be concerned with chronic, low level concentrations found in chemical cargo tanks. **Chronic** exposure occurs when a substance is encountered at low concentration levels over a period of time.

Although encounters with mixtures of chemicals far outnumber encounters with individual chemicals, there are no ongoing studies examining joint toxic action for chemical mixtures encountered at chronic levels. Judgements of the relative safety or hazards of these mixtures must often be made, usually without knowing exactly what will result from their interaction. In most cases a model for **additive** toxicity is followed, i.e., one chemical will neither enhance nor inhibit the effect of the other chemical and the effect of the two together will equal the sum of the two separately. When the chemicals do not follow the additive action model, the interaction is **synergistic;** their effect is greater than the sum of the two chemicals' independent effects. **Potentiation,** the condition whereby one substance is made more potent in the presence of another substance, may also occur. When the reverse happens and inhibits the toxicity, **antagonism** has ocurred. Low level chemical concentrations are usually calculated by the part per million (ppm) volume measurement. The Coast Guard's vinyl chloride booklet draws the analogy that one ppm can be illustrated by evaporating an 8-ounce cup of liquid vinyl chloride in a room the size of a football field with a 60-foot ceiling. Assuming an equal mixing of air and vinyl chloride, we would have a 1 ppm concentration.

THRESHOLD LIMIT VALUES

Toxicology is basically the science of poisons. A poison is a substance which can seriously incapacitate or damage the body, sometimes to the extent of causing death. This way of describing a poison might first appear to be sufficient; however, it fails to establish any guidelines for concentration or length of exposure, in addition to other physical conditions. The toxicity of a chemical is more helpful in measuring how harmful it may be. Toxicity can be used to set up certain safety limits; this is very important to the inspector who is concerned whether or not a cargo tank is safe for entry.

The threshold limit values (TLV's), published by the American Conference of Governmental Industrial Hygienists (ACGIH), are limits which represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect. It should be noted that certain hypersensitive individuals may experience discomfort in concentrations at or below the TLV's. Threshold limits should be used as guides in the control of health hazards but should not be used as fine lines between safe and dangerous concentrations. These limits are based on the best available information from industrial experience and experimental studies. The TLV is usually regarded as the highest concentration allowed for safety of health, however, the lowest concentration achievable in the work place is desirable.

Due to work practices, the marine inspector is exposed to a number of chemicals. This exposure is sequential; however, "mixing" takes place, creating an exposure to several chemicals at once. Special consideration should be given when applying the TLV's where there is an exposure to mixtures of two or more substances. The TLV's for mixtures found in the ACGIH Pamphlet "Threshold Limit Values . . . 1977" should be used when the substances have similar toxicological effects. The assumption made here by the ACGIH is that the chemicals are additive in their action.

DIFFICULTIES

The study of the interaction of a mixture of two or more chemicals at chronic levels is constantly plagued by lack of data. Studies have been made on the acute and some of the chronic aspects of exposure to individual chemicals; the majority of information generated is at acute concentration levels. The Chemical Hazards Response Information System (CHRIS, CG-446) and Chemical Data Guide for Bulk Shipment by Water (CG-388) both contain information about the acute dangers of exposure to an individual chemical. While there are well-known chronic effects from exposure to certain chemicals, such as benzene causing certain blood diseases or vinyl chloride leading to cancer later in life, only acute data is well documented for a large number of chemicals.

Problems may arise from drug-drug interactions, drug-chemical interactions, and chemical-chemical interactions. Very little work has been done in examining the chronic effects of these interactions. In most cases, these problems have been examined in the acute exposure range and the findings used to predict effects at chronic levels. This "educated guess" approach is useful in assessing the type of interaction which might be encountered.

Drug-drug interactions are not of primary concern for chemical carrier personnel. However, the number of reports of drug interactions resulting in synergism is increasing rapidly. Therefore, when using various drugs together, a doctor must be aware of the possible interactions. The chances of drug interactions are diminished by using as few drugs as possible at a single time.

Drug-chemical interactions could be a problem for persons exposed to chemical vapors. Phenobarbital, a commonly used barbiturate, has been shown to increase the toxicity of carbon tetrachloride and chloroform. This could represent a potential hazard, since barbituates are used by a considerable segment of the working population. Persons taking medication such as phenobarbital should consult a physician prior to entering tanks which have carried an organic solvent.

Chemical-chemical interactions are of the utmost concern for the inspector. Many studies have shown that some of the chemicals with which the inspector routinely comes into contact will react with each other and/or chemicals within the body. Carbon tetrachloride, benzene, trichloroethylene, and alcohol are some of the more common types of chemicals to which an inspector is exposed. The anesthetic effect

Continued on next page.....

REACTIVITY DIFFERENCES (DEVIATIONS) WITHIN CHEMICAL GROUPS

A Acrolein (19), Crotonaldehyde (19), and 2-Ethyl-3-propyl acrolein (19) are not compatible with Group 1, Non-Oxidizing Mineral Acids.

B Isophorone (18), and Mesityl Oxide (18) are not compatible with Group 8, Alkanolamines.

C Acrylic Acid (4) is not compatible with Group 9, Aromatic Amines.

D Allyl Alcohol (15) is not compatible with Group 12, Isocyanates.

E Furfuryl Alcohol (20) is not compatible with Group 1, Non-oxidizing Mineral Acids.

F Furfuryl Alcohol (20) is not compatible with Group 4, Organic Acids.

G Dichloroethyl Ether (36) is not compatible with Group 2, Sulfuric Acid.

H Trichloroethylene (36) is not compatible with Group 5, Caustics.

I Ethylenediamine (7) is not compatible with Ethylene Dichloride (36).

GUIDE TO COMPATIBILITY OF CHEMICALS

"The accidental mixing of one chemical product with another inside a cargo tank or pipe may result in a vigorous chemical reaction. Combinations that generate significant heat or produce gas can be very hazardous to personnel and property. The purpose of the Compatibility Guide is to indicate, in chart form, combinations believed to be dangerous."

Extracted from CG-388, "Chemical Data Guide for Bulk Shipment by Water."

CARGO COMPATIBILITY

CARGO GROUPS / REACTIVE GROUPS	1 NON-OXIDIZING MINERAL ACIDS	2 SULFURIC ACID	3 NITRIC ACID	4 ORGANIC ACIDS	5 CAUSTICS	6 AMMONIA	7 ALIPHATIC AMINES	8 ALKANOLAMINES	9 AROMATIC AMINES	10 AMIDES	11 ORGANIC ANHYDRIDES	12 ISOCYANATES	13 VINYL ACETATE	14 ACRYLATES	15 SUBSTITUTED ALLYLS	16 ALKYLENE OXIDES	17 EPICHLORHYDRIN	18 KETONES	19 ALDEHYDES	20 ALCOHOLS, GLYCOLS	21 PHENOLS, CRESOLS	22 CAPROLACTAM SOLUTION		
1. NON-OXIDIZING MINERAL ACIDS		X			X	X	X	X	X	X	X	X	X			X	X		A	E				1
2. SULFURIC ACID	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		2
3. NITRIC ACID		X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			3
4. ORGANIC ACIDS		X			X	X	X	X	C			X				X	X			F				4
5. CAUSTICS	X	X	X	X							X	X	.			X	X		X	X	X	X		5
6. AMMONIA	X	X	X	X						X	X	X	X			X	X		X					6
7. ALIPHATIC AMINES	X	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X		7
8. ALKANOLAMINES	X	X	X	X							X	X	X	X	X	X	X	B	X					8
9. AROMATIC AMINES	X	X	X	C							X	X							X					9
10. AMIDES	X	X	X			X						X									X			10
11. ORGANIC ANHYDRIDES	X	X	X		X	X	X	X	X															11
12. ISOCYANATES	X	X	X	X	X	X	X	X	X	X					D					X		X		12
13. VINYL ACETATE	X	X	X			X	X	X																13
14. ACRYLATES		X	X				X	X																14
15. SUBSTITUTED ALLYLS		X	X				X	X				D												15
16. ALKYLENE OXIDES	X	X	X	X	X	X	X	X																16
17. EPICHLOROHYDRIN	X	X	X	X	X	X	X	X																17
18. KETONES		X	X				X	B																18
19. ALDEHYDES	A	X	X		X	X	X	X	X															19
20. ALCOHOLS, GLYCOLS	E	X	X	F	X		X					X											*	20
21. PHENOLS, CRESOLS		X	X		X		X			X														21
22. CAPROLACTAM SOLUTION		X			X		X					X												22
30. OLEFINS		X	X																					30
31. PARAFFINS																								31
32. AROMATIC HYDROCARBONS			X																					32
33. MISCELLANEOUS HYDROCARBON MIXTURES			X																					33
34. ESTERS		X	X																					34
35. VINYL HALIDES			X																			X		35
36. HALOGENATED HYDROCARBONS		G			H		I																	36
37. NITRILES		X																						37
38. CARBON DISULFIDE							X	X																38
39. SULFOLANE																								39
40. GLYCOL ETHERS		X										X												40
41. ETHERS		X	X																					41
42. NITROCOMPOUNDS					X	X	X	X	X															42
43. MISCELLANEOUS WATER SOLUTIONS		X										X												43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		

CHRONIC EXPOSURE.....

of alcohol may compound the already narcotic effect of these solvents. Therefore, the inspector may be in trouble if he goes to inspect after a few drinks. Not only the individual chemicals' effects, but the interaction between chemicals--which may be more damaging--must be considered when inspecting various cargo tanks.

TANK CERTIFICATION

The types of chemicals which are commonly found on chemical carriers are listed in Subchapters O and D in Title 46 of CFR. CHRIS and CG-388 have these chemicals listed with some of their common acute exposure effects. However, most people still feel they

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Reprinted from the Coast Guard's vinly chloride booklet, free upon request from Commandant (G-MHM/3), U.S. Coast Guard Headquarters, Washington, DC 20590.

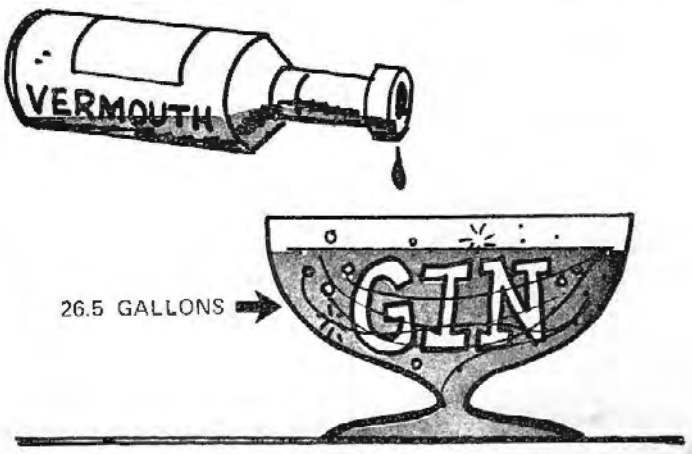
What is meant by ppm?

CONCENTRATION BY VOLUME

100,000 ppm = 10%

10,000 ppm = 1%

A ppm is a unit used to indicate small concentrations of a gas or liquid. PPM is an abbreviation for "parts per million", i.e. one ppm is a concentration of one unit per million units. A ppm can be illustrated by making a very large, very dry martini. A 1 ppm martini would be one drop of vermouth in 26.5 gallons of gin.



are "in the dark" about the effects of chemicals. They are not always aware of the possible accumulation or interaction of chemicals within their bodies.

While performing his job the inspector works closely with the marine chemist. A professional and mutual respect exists between the two parties. The marine chemist insures that the tank or barge is safe for men and safe for fire. The marine chemist certificate means that in the compartment or space so designated:

a. The oxygen content of the atmosphere is at least 18.0 percent by volume;

b. Toxic materials in the atmosphere are within permissible concentrations; and

c. In the judgement of the marine chemist, the residues are not capable of producing toxic material under existing atmospheric conditions while maintained as directed on the certificate.

When a marine chemist certifies a tank, its atmosphere is at the safest level achievable. In order to insure this he must know what the last cargo was and then measure the atmosphere for oxygen and toxic vapors, using a gas indicator or other suitable device. For particularly hazardous materials, such as benzene, he will check for the levels of that specific chemical to make his determination. There are problems; a lack of odor does not guarantee safety and a marine chemist certificate is not the last word. The certificate must be current, as conditions at the time of certification may change, causing the tank to be unsafe. For many chemicals no TLV's are listed; in addition, there is no reference to the problems of possible interactions of the chemicals. Each tank must satisfy the TLV for the individual chemical (if known). No mention is made about the need to achieve a lower TLV due to the subsequent exposure of the inspector to other chemicals during that day--he must be aware of possible interactions and the possibility of needing a lower exposure limit! The marine chemist.certificate is very important to the inspector, and he should be aware of all aspects of the gas tests made and the results. Appropriate instructions, discrepancies, and dates and times of tests should be examined prior to entry.

posed to high concentrations of chemicals; most of his exposure will be limited to low concentrations. The problems of interactions or accumulations of chemicals may surface here. In addition, sensitive individuals may have problems working in atmospheres of chemicals at or slightly below TLV levels. For example, one man experienced a type of paralysis while working in a "safe" atmosphere. He stated that the tank was certified by a marine chemist. This occurred after he had been working around chemical carriers for six years. Could he have been accumulating chemicals in his body and the latent response have surfaced with the cargoes encountered during his last exposure? It is impossible to retrace the types of chemicals, exposure concentrations, exposure times and the sequences of exposure, but there seems to be some correlation between the work around chemical carriers and future medical problems. Some inspectors have been found after retirement to have liver dysfunctions which may be indicative of the kind of work they previously performed. The Coast Guard and the National Cancer Institute have recently begun a study which will evaluate the mortality experience of marine inspectors in light of their work experience. This study is proposed to continue for 24 to 36 months.

Tanker personnel should always be aware of the possibility of harmful effects from exposure to chemicals, both acute and chronic. Guidelines (Occupational Safety and Health Administration and Coast Guard regulations) must be followed for safety. Entry into confined spaces should be kept at a minimum and made only when necessary. Marine personnel must have an awareness and an appreciation of the materials with which they may come in contact. There is a need for compatibility with the chemicals within the body. Certain chemicals should not be mixed. This means a person should not drink alcohol before or after (for a specific period of time) working in any chemical atmosphere. The new Marine Safety Manual to be published soon will be a good up-to-date reference guide. Those involved in tank entry must not be left "in the dark." The biggest concerns are "What is it?" "How does it affect me?" and "How can I protect myself?" Medical monitoring is necessary to flag any problems before they surface into disease or impairments.

There should not be a blind reliance on the gas free certificate. The time of day, temperature, and other factors must be taken into account before entry into the tank. The tank might be void of toxic vapors at 0800, but as the temperature increases any liquid residue could vaporize and concentrations above the TLV could appear in the tanks. The individual must regard each tank entry situation as a new one and protect himself from possible injury.

As previously noted, a lack of data exists in the field of interactions of substances on a chronic level of exposure. Information at the acute exposure level may be applied to the chronic level, making assumptions possible; however, this leads to many inaccuracies. Further studies must be made.

Personal safety should be the main concern of the merchant marine inspector. Chemical interaction could become an invisible enemy to health. Do not fall victim to the psychology, "If I can't see it, it won't hurt me." Treat chemicals with respect!

Lieutenant Thomas J. Haas

Lieutenant Thomas Haas graduated from the U.S. Coast Guard Academy in 1973. He attended the University of Michigan and received two Master of Science degrees, one in Chemistry and one in Environmental Health Sciences (Toxicology).

Lieutenant Haas is assigned to Cargo and Hazardous Materials Division, Coast Guard Headquarters. He is a member of the American Conference of Governmental Industrial Hygienists (ACGIH) and the American Industrial Hygiene Association (AIHA), and has been involved in numerous seminars dealing with industrial toxicology and respiratory protection.

Sea Language Washes Ashore

Robert L. Scheina

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The rich colorful vocabulary of the sea from generations past is still a vibrant part of daily English language. Most persons do not know the origins of words and phrases that have become colloquial expressions, and time has changed or distorted the meanings.

What were precise directions or descriptions have become general phrases that hint at meaning. Yet, they retain the flavor and imply the discipline they once had--and the language of the sea emphasizes discipline. Going to sea--whether for sustenance, transportation, or war--was not a carefree business. The late dean of American maritime history, Samuel Eliot Morison, chastised the poet Allan Cunningham for his ballad:

"O for a soft and gentle wind!
I heard a fair one cry:
But give to me the soaring breeze
And white waves heaving high."

Morison wailed, "Baloney! No real seaman likes high and heavy seas because they bring trouble and danger. His ideal is the trades--a good steady full-sail breeze . . . ."

Discipline has always been demanded by the taskmasters of the sea. "He let the cat out of the bag," said today, is often followed by an expletive deleted. Six score years ago on board a square rigger, this utterance would have brought chills to the spine, for some poor soul had just committed an offense sufficiently grave to extract the cat-of-nine-tails from its canvas bag. The cat has been out of vogue since the early nineteenth century and needs an introduction. The cat was made of nine lengths of cord, each about 18 inches long with three knots at the tip, fixed to the end of a larger rope which was used as a handle. Flogging, at the very least, would cause severe wounds and could cripple or even cause death. Only Errol Flynn and fellow Hollywood mariners have been able to shrug off its effects. The United States Congress prohibited the use of the cat in 1850, and it was outlawed from the British Royal navy in 1879. In fact, the cat had fallen into disuse in both fleets shortly after the War of 1812. The brutal instrument is also the basis of the expression "not enough room to swing a cat." Obviously, the two-foot cat, added to the length of the fully extended arm of the flogger, required a good measure of working room. A sailor's misdeeds were recorded daily, and punishment was carried out on the following Monday; thus, the birth of the expression "blue Monday."

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SEA LANGUAGE.....

Sailors were considered a rough lot and not to be trusted by their superiors--the officers. Although armed to the teeth when the enemy was at hand, sailors were prohibited from having weapons at any other time. The one exception to this rule was the knife, for this was an essential tool for all seamen. Should, however, the sailor draw his knife in anger, he could lose his hand as specified by British Admiralty law--thus, the derivation of the expression "hands off."

Maritime discipline was harsh; human rights were restricted and, as a result, specific shipboard havens developed. The term "scuttle butt" evolved from this background. There was a cask (butt) with a square hole (scuttle) cut in its bilge, kept on deck to hold water for ready use. On board ships where discipline was strictly enforced, merchant as well as war, the "scuttle butt" was one of the few places on deck where sailors were at liberty to talk; and, today, the term is synonymous with gossip.

Discipline was the ounce of prevention in combating the ancient mariners' greatest fear--fire at sea. Today, "the smoking lamp is lit" frees an individual to "light up" wherever he might be. This interpretation does not bear the severe restriction originally intended. For aboard ship, this lamp was the only place where the sailor had access to fire, and the tobacco had to be smoked in its immediate vicinity, usually the galley (kitchen). To protect the weak-willed from the "cat," sailors were not permitted to carry flint--the match was not in general use until the middle of the nineteenth century. As iron and steel replaced wood as the primary building material for ships, additional precautions against fire were enforced on vessels carrying dangerous cargoes. For example, mariners were prohibited from wearing shoes using metal nails. A spark in the magazine of a warship or the hold of a merchantman loaded with nitrates or grains could be catastrophic.

"catting around"

"let the cat out of the bag"

At sea, the captain and the law were synonymous. Martyrdom was the only reward for the individual who opposed injustice. This is illustrated in American literature by Herman Melville's novel Billy Budd. However, the system could be challenged if there was strength through numbers, and if leaders could be protected by concealing their identity. Immunity was achieved by the "round robin." Signatures on a grievance petition would appear as a circular pattern of ribbons similar to the spokes of a wheel. The robin is derived from the French *ruban*, or ribbon. Hiding the identity of the leaders within the circle of signatures may be the origin of the term "ringleader" as well.

Going ashore was in fact as well as name, liberty, and sailors had the reputation of taking full advantage of the relaxed discipline. "Catting around" is a colloquial expression meaning frivolity. Richard Henry Dana wrote that 'cat' used as a verb means "to hoist the anchor up to the cathead." In order to raise the anchor, hickory bars were inserted into a capstan, a spool-shaped cylinder; and like children on a merry-go-round, the men strained around this apparatus. This may be the origin of "catting around."

Mariners, being the chief patrons of seaport pubs, were often extended credit. A talley board was kept of the pints and quarts that a sailor consumed. The quartermaster of the ship, who was responsible for having a full crew for the next sailing, did well to remind his charges to "mind your P's and Q's," since this equated to their consumption. And, of course, sailors would have to toast the drink with "down the hatch." If a mariner consumed too much alcohol and became intoxicated, he would be "three sheets to the wind." A sheet is a line used for trimming a sail to the wind. Three broken sheets would render any sailing ship uncontrollable. "Loaded to the gills," yet another nautical expression relating to drunkenness, infers that the individual "drank like a fish."

There are other expressions relating to relaxing of discipline on board ship. A number of these utterances have lost both precise statement as well as meaning. Consider "shake a leg." Originally "show a leg," this was the cry of the boatswain's mate as he turned out the new watch on board eighteenth- and nineteenth-century British warships. As an incentive to mariners not to desert, they were permitted to have women, ostensibly wives, on board while the ship remained in

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harbor. Showing a leg was a means of identification. The practice of having women aboard Royal naval ships was not abolished until about 1840. Not surprisingly, the end result of this accommodation was a "son of a gun." Below-decks in a warship were very crowded and the gangways (passageways) had to be kept clear. The only place where a woman could give birth was between the guns. Such circumstances were the subject of sea chants:

"Begotten in the galley and born under
the gun.
Every hair a rope yarn,
Every tooth a marline spike,
Every finger a fishhook,
And his blood right good Stockholm tar."

Originally, the term "son of a gun" questioned the legitimacy of the birth of an individual. Another colloquial expression which has unpleasant connotations is "flotsam and jetsam." Flotsam are goods swept overboard and floating in the sea. Jetsam are goods deliberately thrown overboard when a ship was in imminent danger. Thus, together they are the undesirable elements of society.

"shake a leg"

Utterances against the devil are wails of frustration. However, the mariner's devil was not the anti-Christ, but was a particular seam, a narrow gap between planks, one on each side of the ship just above the waterline. This seam--christened the devil's seam--was the most difficult and dangerous to caulk. A sailor would have to be lowered over the side and work in the dangerous location "between the devil and the deep blue sea." "There'll be the devil to pay" has a similar derivation. Paying is the act of pouring hot pitch into a seam after oakum has been pounded in, commonly referred to as caulking. In bygone years, the complete utterance was "There'll be the devil to pay and no hot pitch"; thus, not only damning the work location, but also cursing the lack of preparation, since no hot pitch was ready. Caulking was a frustrating job. Nerves became raw as the hot pitch was spread along the seams. A loggerhead was a tool used for this work. Fights would break out, and the tool would be used as a weapon. The seriousness of the affair was captured by the expression that the combatants were "at loggerheads." This term today describes an angry relationship between two individuals.

"son of a gun"

"there'll be the devil to pay"

The principles of sailing a full-rigged ship are as mysterious to some as those of splitting an atom. And yet, the English language draws extensively upon the rich language barked out by captains and mates to sailors on deck and aloft during bygone days. A captain would be wise to give the order to sail "by and large" to an inexperienced helmsman (steerer). The ship would not be sailing directly toward its desired destination; but this command would not tax the ability of the helmsman. Colloquially, "by and large" means generally speaking, or lacking precise knowledge or skill. If the helmsman did make an error and the wind struck the face or front of the sails, the ship would be "taken aback." This term means to be stopped suddenly and bears the same significance today. Should another ship come between a vessel and the wind, that ship would block out the breeze and "take the wind out of my sails." Colloquially, this saying denotes that someone has been out-performed.

An expression more commonly used in "British" English than in the Yankee provincial form is "carry on." Recall the series of British movie comedies, Carry On, Nurse and Carry On, Teacher. Aboard the square rigger, "carry on" was a specific order not to shorten sail, but to carry as much canvas as possible. A Yankee might bellow "full steam ahead," a nautical expression of a later era. An individual who "knows

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the ropes" today is an expert who knows what to do. A century-and-a-half ago, a novice sailor knew no more than the names and uses of the primary ropes, and his discharge papers were marked "knows the ropes." When the wind fills sails, a ship takes on a slight inclination or list. Accordingly, the only time the sailing ship is not listing is when there is no wind at all and the ship becomes "listless." Today, the word

"listless"

means dull or lifeless. On board a square rigger, to ask "give me some leeway" would be requesting the helmsman to leave adequate room between the ship and an object on the leeward side. Colloquially, this is used commonly to request room to spare. To an experienced square-rig sailor, the meaning of "it's an ill wind that blows nobody any good" is apparent, for a sailing ship mariner will curse the calm. But to his way of thinking, a wind from any direction must be benefiting someone. William Shakespeare also appreciated this thought for he used it again and again with slight variation: "Ill blows the wind that profits nobody" and "Not the ill wind which blows no man to good."

The sea can be demanding and many nautical expressions have grown out of man's confrontation with the elements. To be "under the weather" bears its original meaning today. "Overwhelm" is derived from the Saxon *whelmen*, which means "to bury in heavy seas." Sailing ships are powered by the wind as it fills the sails. Should rigging break, a part would be carried away and control would be lost. When a person gets "carried away," he also loses control. If a mast should fall and pass over the bulwarks, the walls of the ship surrounding the main deck, it would have "gone by the boards." As implied in the colloquial meaning, the mast would be irretrievable. Decisions aboard sailing ships had to be prompt; any order took time to execute. Sailing ships lying in poorly protected harbors were anchored with their bow toward the sea, for in bad weather they were safer at sea than pinned against the shore. If a storm arose, the captain could give the order to "cut and run." The anchor cable would be sliced and the ship put to sea immediately.

The parts of a ship are often referred to in daily speech. Ornate "figureheads" enhanced the bows of most sailing ships: originally there to ward off evil spirits, as sailors became less superstitious, the pragmatic value of this art gave way to its decorative appeal. Today, a person who is a "figurehead" is also ornamental.

"cut and run"

"Bitts" are two vertical beams through which the ship's anchor cable passes. If all of the anchor cable were run out, that which remained on board running through the bitts would be "the bitter end." The expression "I don't like the cut of his jib," warns to beware of a stranger. The jib is a triangular sail set in the stays of the foremast. Many regions of the world have recognizable ways of cutting and rigging a jib, thus revealing a stranger's identity.

Midway down the deck of a ship is a "booby hatch." Not found on many ships, this is a small opening used to facilitate movement to below-decks. The evolution of the current meaning has been lost. Deranged sailors were often confined below-decks and generally this hatch was the smallest and the least used. These facts may have influenced the current meaning, a mental institution. Until a few decades ago, sailors slept in hammocks and only a few officers on each ship had bunks. During the early nineteenth century, before passenger ships were in common use, packet ships plyed regular routes. Packets were designed to carry mail, special cargoes, and passengers whose accommodations included small permanent sleeping berths known as "cribs." Most cargo ships are equipped with booms, which lift cargo on board. When the loading is finished, the booms are lowered. Today, "lowering the boom" means to bring something to an end.

Shipbuilding has also been the source of several common expressions to language. A beached ship, or one under repair, was considered "high and dry," much as the person who is out of his element. To ease the launching of a vessel, grease--in the old days lard--was applied to the runners under a hull, hence "greased the ways." Now it means the path has been eased or smoothed.

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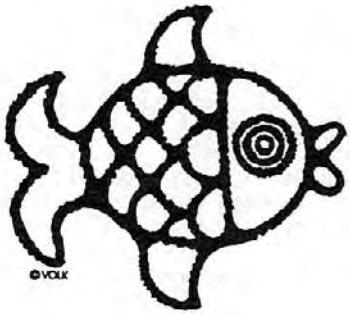
SEA LANGUAGE.....

Sea warriors have yielded rich additions to our vocabulary such as the expression "no quarter," a phrase meaning no mercy. During combat in medieval times, an officer could surrender and purchase his life for a quarter of his yearly earnings. The call "no quarter given" notified an opponent that the fight must be to the death. Notwithstanding the superb marksmanship exhibited in the movies, sailing-ship cannon were effective only at ranges less than 50 yards; anything beyond that distance was considered to be a "long shot." Today, as yesterday, the expression means of great odds and is particularly associated with the race track.

The fisherman has also contributed to the rich nautical vocabulary. "Fish or cut bait" emphasizes that there is no room for the idler on these hard-working boats. Have you ever "taken the bait"? Once you have, you are "hooked"! And if you become more deeply involved than reason would dictate, you have fallen "hook, line and sinker."

"fish or cut bait"



Most people have unknowingly adopted the language created by the merchant mariner to express quality and honesty. "A-1" condition tells that the hull--the A rating--is in superior condition as is the gear--the "one" rating. This system, created by the marine insurance firm Lloyd's of London is used by ABS in its shipping register *Record*.

"Posh" accommodations were the most expensive available aboard the British P&O line, which sailed between England and India using the Suez Canal. The word, stamped on the ticket, was a composite of the first initial of the words "Port Out Starboard Home." This cabin arrangement placed the ticket holder on the shaded side of the ship for the entire voyage. This was particularly important as the ship passed through the boiling Red Sea.

"posh"

"quarantine"

Bills of lading are manifests listing goods entrusted to a ship's captain to be transported. The recipient of these goods would be a prudent man if he checked the merchandise to be sure that it "fits the bill." And a ship's "bill of health" is a certificate signed by an authority stating the general health conditions in the port and on board the departing ship. A "clean bill of health," one without reservations, was highly desired. If plague were found on board, a ship would be "quarantined." The first case of isolating a ship for this reason occurred in Marseilles and the vessel was held for forty days, or *quarant* in French; thus the evolution of the term quarantine.

"windfall"

"Mark twain!" was the cry of rivermen measuring the depth of water to determine if it was sufficient for safe passage for the vessel and is the pen name of Samuel Langhorne Clemens.

Geographic names became synonymous with goods and events within the sailor's vocabulary, and have been borrowed freely. "Java" is coffee, the logical reason that during past centuries the island then called Java was among the primary sources of coffee beans. Have you ever been "shanghaied" from someplace? During the last century, sailors found life so good in port they had to be tricked or bullied back to their ship.

Luck also has its place in nautical expressions. In past centuries trees could not be cut on specified tracts of land in Great Britain. These forests were timber reserves for the Royal Navy--a critical national resource. However, if a tree blew down, the proprietor could use the timber for his own ends; thus a stroke of good fortune, or a "windfall."

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SEA LANGUAGE.....

No sea story is complete without pirates, and the language owes a debt to Blackbeard and Henry Morgan who plundered the Spanish main four hundred years ago. "Aboveboard," today meaning honesty, may have been derived from the pirate practice of hiding crews below-decks and trying to entice merchant ships to come close. Another method of deception employed by pirates, as well as by some ships of the line, was to "sail under false colors." Today this expression is used to describe an attempted deception.

"aboveboard"

"shanghaied"

These pirates had few havens ashore where they could obtain supplies. However, many of the Caribbean islands were populated by wild cattle and their meat became a primary staple for the pirates. The French word *boucan* is a grill for cooking meat. From this has evolved "buccanneer," or one who eats dried meat. Recalling Robert Louis Stevenson's character Long John Silver in Treasure Island, one can almost hear him refer to Jim Hawkins as a "stinkpot." This term well describes an incendiary bomb filled with combustibles used by eighteenth-century privateers. This infernal device was thrown or dropped onto the decks of an opposing ship. the intolerable stench and smoke filled the decks causing tumult.

On an evening when a breeze is soaring and the white waves heave high, think of other salty words and phrases that have added flavor to our speech and think too of the sailors who confront the seas and hope for a fair wind from the trades.

Robert L. Scheina

Robert Scheina, Ph.D. has been the Coast Guard historian since 1977. Before joining the Coast Guard's civilian force he worked for the Navy, first as a special research officer in the Historical Research Branch, Naval History Division and then as a senior analyst at the Naval Intelligence Support Center. During that time he received an Outstanding Performance Evaluation and several letters of commendation.

Dr. Scheina has authored and co-authored numerous publications, both government and non-government. In the latter category, his efforts include: co-author, "Naval Craft," Encyclopedia Britannica, 15th edition; author, "Benjamin Stoddert, Politics and the Navy," the American Neptune, 1976; author, "Mass Labor: The Key to Spanish Ship Construction during the 16th Century," The Mariners Mirror, 1971; author, "Seapower Misused: Mexico at War, 1846-48," The Mariners Mirror, 1971; author, "The Forgotten Fleet: The Mexican Navy on the Eve of War," The American Neptune, 1970; co-author, "Battleships of the U.S. Navy 1886-1969," and contributing consultant to "Historia Maritima del Peru," volumes for 1850 through 1875, and 1875 through 1920.

In 1976, Bob Scheina received his Ph.D. from the Catholic University of the Americas, Washington, DC. He has also earned an M.A. from the University of the Americas, Mexico City, Mexico, and a B.A. from Parsons College in Fairfield, Iowa. He is a talented speaker, as well as writer and researcher, and is often requested to present programs on historical and current interest topics to government officials and civic groups.

Lessons from Casualties

A crewmember aboard an uninspected commercal fishing vessel died as a result of being struck in the head by the main engine crankshaft while repairing the vessel's diesel engine. Approximately 4 weeks before the casualty, the fishing vessel departed her home port en route to fishing grounds with 12 people on board, none of whom held a license issued by the Coast Guard. The chief engineer had served in an unlicensed capacity aboard the vessel for approximately six years.

On the day before the accident, while making a routine search for fish, a loud noise was heard coming from below deck. The mate on watch immediately stopped the main engine while the chief engineer went directly to the engine room and secured the main engine air starting system isolation valve. He then removed the crankcase inspection cover for one of the cylinders and discovered that a connecting rod cap bolt had loosened and dropped, striking the engine base.

When the engine had cooled down, the chief engineer and three crewmen went into the engine room to begin repairs. The chief engineer secured the auxiliary generator, both air compressors, and the isolation valves in the crossover lines between the two air receivers. He opened the compression relief valves for four of the cylinders and the operating lever on the two remaining cylinders in lieu of the compression relief valves, due to interference from the exhaust manifold. The engineer then checked the engine direction operating hand wheel and noted that it was in the neutral position.

Early in the morning the following day, as repairs were nearing completion, the chief engineer decided to start the air compressor in order to build up sufficient pressure for starting the main engine. Before he started the compressor, he again checked the engine operating hand wheel and found that it was still in the neutral position and that there was no pressure indicated on the pressure gage at the control station. At about the same time, he discovered that the starboard crankcase cover for the one cylinder had not yet been reinstalled. Meanwhile, one crewman and the chief mate were looking for the engine sump drain plug. One-half hour later the crankcase cover was reinstalled. The mate and the crewman were near the back of the engine; the crewman had his head and shoulders inside the crankcase while he installed the drain plug. As the chief engineer opened the valve between the air compressor and the air receiver there was a loud rushing sound of air and the engine crankshaft rotated, striking and fatally injuring the crewman. The chief engineer heard the rushing sound and a metallic sound, which came from a hand cranking bar still attached to the fly wheel, and immediately shut the valve. He then helped pull the injured man from the crankcase and attempted first aid, but the crewman's pulse stopped almost immediately.

During the course of the investigation it was concluded that the unlicensed chief engineer failed to take all the necessary safety precautions prior to opening the valve located in the air line at the receiver. The cause of the casualty was determined to be a combination of the main engine air system isolation valve not being completely closed, which allowed air to pass from the air receiver into the engine, and the main engine control wheel being in the astern starting position. The main engine control wheel had been pulled into the astern position by an unknown workman during repairs to the connecting rod assembly. It could not be precisely determined why the main engine air system isolation valve was not completely closed.

This casualty could have been avoided had a positive determination been made that all work had been completed before opening any valves in the air starting system. This failure to determine that a safe condition existed was determined to be evidence of negligence on the part of the chief engineer.

Nautical Queries

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

DECK

(1) The earth is moving fastest through space during the month of

A. January
B. April
C. July.
D. October

(2) Sea fog is caused by

A. advection of cold dry air over a warm ocean current.
B. advection of warm moist air over a colder ocean current.
C. radiational cooling.
D. lack of wind.

(3) The publication(s) which give(s) detailed information on radio beacons is printed in

A. one volume.
B. two volumes.
C. three volumes.
D. four volumes.

(4) Most of the air that supports combustion in a flame safety lamp enters through the

A. side holes in the body of the lamp.
B. control tube to the wick.
C. gap in the top of the lamp.
D. bottom inlet ring.

(5) Index error of a sextant is primarily caused by

A. improperly correcting the other errors in a sextant.
B. the horizon glass not being parallel to the horizon mirror.
C. the horizon glass not being parallel to the index mirror.
D. human error in taking a celestial observation.

ENGINEER

(1) You can test the canister type gas mask for a tight fit on your face by covering the

A. top of the canister and exhaling.
B. bottom of the canister and inhaling.
C. face piece and blowing hard.
D. relief valve and blowing hard.

(2) What action should be taken first to control an oil fire caused by the pulling of a "hot" burner?

A. Secure the fuel oil to that boiler.
B. Increase the forced draft air supply to that boiler.
C. Notify the engineer on watch that you must secure the boiler.
D. Activate the CO_2 fire extinguishers at once.

(3) The term "oil" as used in the pollution prevention regulations means

A. fuel oil only.
B. crude oil only.
C. oil of any kind.
D. liquefied petroleum gas.

(4) Oil is heated in a purifier before centrifuging in order to

A. boil off water.
B. prevent corrosion.
C. reduce friction.
D. improve purification.

(5) What type of packing is commonly used to seal the glands of an auxiliary turbine?

A. Flax
B. Asbestos
C. Rubber
D. Carbon rings

ANSWERS

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

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

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office or marine inspection office of the U.S. Coast Guard. 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 federal regulations are published in the Federal Register, printed daily except Saturday, Sunday, and holidays.) Following the title of each publication in the table below are the date of the most recent edition and the dates of the Federal Registers affecting each.

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
101-1	Specimen Examinations for Merchant Marine Deck Officers (2d and 3d Mate) (4-1-77).
101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (4-1-76).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). FR 7-21-72, 12-1-72, 6-18-75.
* 115	Marine Engineering Regulations (8-1-77). FR 9-26-77, 10-10-78, 12-4-78, 3-12-79.
* 123	Rules and Regulations for Tank Vessels (8-1-77). (Ch-1, 4-28-78). FR 8-17-77, 9-12-77, 9-26-77, 10-25-77, 12-19-77, 3-12-79.
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.
* 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.
174	A Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
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.
182-1	Specimen Examinations for Merchant Marine Engineer Licenses (2d and 3d Assistant) (2-1-78).
182-2	Specimen Examinations for Merchant Marine Engineer Licenses (First Assistant) (3-1-78).
182-3	Specimen Examinations for Merchant Marine Engineer Licenses (Chief Engineer) (3-1-78).
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.
* 190	Equipment Lists (5-1-75). FR 5-7-75, 6-2-75, 6-25-75, 7-22-75, 7-24-75, 8-1-75, 8-20-75, 9-23-75, 10-8-75, 11-21-75, 12-11-75, 12-15-75, 2-5-76, 2-23-76, 3-18-76, 4-5-76, 5-6-76, 6-10-76, 6-21-76, 6-24-76, 9-2-76, 9-13-76, 9-16-76, 10-12-76, 11-1-76, 11-4-76, 11-11-76, 12-2-76, 12-23-77, 4-4-77, 4-11-77, 4-21-77, 5-19-77, 5-26-77, 6-9-77.
191	Rules and Regulations for Licensing and Certification of Merchant Marine Personnel (11-1-76). FR 3-3-77, 8-8-77.
227	Laws Governing Marine Inspection (7-1-75).
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.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). FR 9-26-77, 9-29-77, 12-19-77, 3-12-79.
258	Rules and Regulations for Uninspected Vessels (4-1-77). (Ch-1, 3-17-78). FR 9-26-77.
259	Electrical Engineering Regulations (7-1-77). FR 9-26-77.
268	Rules and Regulations for Manning of Vessels (7-1-77).
293	Miscellaneous Electrical Equipment List (7-2-73).
* 323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (7-1-77). (Ch-1, 3-17-78). FR 9-26-77, 12-15-77, 12-19-77, 7-17-78, 3-12-79.
329	Fire Fighting Manual for Tank Vessels (1-1-74).
439	Bridge-to-Bridge Radiotelephone Communications (12-1-72). FR 12-28-72, 3-8-74, 5-5-75, 7-11-77.
467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
497	Rules and Regulations for Recreational Boating (7-1-77). FR 7-14-77, 8-18-77, 3-9-78.

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