COAST GUARD

PROCEEDINGS

OF THE MERCHANT MARINE COUNCIL

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IN THIS ISSUE . . .

Ship Operation (Tankers) . . .

M/V Thorstream Fire . . .

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PROCEEDINGS

OF THE

MERCHANT MARINE COUNCIL

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CONTENTS

FEATURES

DEPARTMENTS

COVERS

FRONT COVER: The SS *Valley Forge* underway. This chemical tanker is equipped with a modern foam system to combat fire in polar solvents. *Courtesy Keystone Shipping Co.* The system is described in the article beginning on page 187.

BACK COVER: Safety cartoon by G. Seal, *Pacific Maritime Association.*

DIST. (SDL NO. 87)

A: abcdew(2); fghijklmnopqrstuv(1)
B: n(40); c(16); e(5); f(4); gh(3); bdikmpq(1)
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E: d(1)
F: p(1)
Lists 141M, 111, 203

From an address before the 1967 Marine Section, of the National Safety Congress and Exposition.

A PC–50 monitor station, discharging foam solution at a rate of 500 g.p.m. This station is a part of a foam system used aboard the *Mobil Acme*.

SHIP OPERATION (TANKERS)

Fire-Fighting Techniques With Polar Solvents

John R. Williams

National Foam Systems, Inc., West Chester, Pa.

PROGRESS AFFECTS OUR lives in many ways. Without automobile assembly lines and modern refining, most of us could neither afford an automobile nor the luxury of running one. From elementary economics we learn that large scale use tends to lower prices and, conversely, lower prices tend to increase consumption. How does this fit into the topic of fire-fighting techniques to combat polar solvent fires? As recently as 10 years ago, large bulk shipments of polar solvents—also called water soluble liquids—were very rare. As the demand grew and larger plants were built, managers desired to avail themselves of lower cost shipment. The chemical tanker carrying a mixed cargo is the result.

Fire Aboard, a 476-page book published in 1961, devotes a large portion of the chapter on fire-fighting equipment to foam but fails to recognize the problem that regular type foam will not extinguish polar solvent fires. In 1961 this was not a serious oversight, but today it could be disastrous.

Tankers are commonly carrying methanol, ethanol, oxo-alcohols.

In a comparison test, Aer-O-Foam 100 and a 3 percent regular foam (not an "alcohol type") were applied to an isopropanol fire. Above, left, is the result of one-half cover of the fire using Aer-O-Foam 100 at an application rate of 0.06 g.p.m./ft.^{2} To the right, after the same application time and at the same rate, the regular foam had no effect on the burning polar solvent.

esters, and monomers all of which are completely destructive to regular foams. In fact, the "alcohol type" foams available prior to 1964 are not effective against fires in these materials when aboard ship because the alcohol type foams must be applied by Type 1 or gentle application. Since shipboard devices are limited to nozzles, this is not practical.

With the conventional "alcohol type foams" the concentrate is mixed with water, causing an equilibrium shift and precipitation of an insoluble soap. Preferably, the reaction is timed so that the precipitation takes place mainly in the bubble wall. If the particles agglomerate before the solution is foamed, little polar solvent stability is obtained. When the foam is applied to the surface of the fuel, some of the cells break down, causing surface dilution. The foam then rides on this diluted surface and extinguishes the fire. If the foam is not applied in an extremely gentle manner, the surface in contact with the foam is continually being renewed and surface dilution cannot protect the advancing foam. Breakdown is rapid and complete, until the entire tank becomes sufficiently diluted to support a foam blanket.

John R. Williams holds a B.S. degree in chemical engineering from Pennsylvania State University and an M.S. degree from the University of Delaware. He is a registered professional engineer in Pennsylvania and is presently Development Director of National Foam System, Inc., a company he has served for 12 years. Mr. Williams has written papers on foam, firefighting, and related topics. He is a member of the National Fire Protection Association (NFPA), the NFPA Subcommittee on High Expansion Foam, the American Institute of Chemical Engineers, and the American Chemical Society.

The key to the foam breakdown is the affinity of the polar liquid for water. As water is removed from the bubble wall, the surface tension in the bubble changes until the force is sufficient to rupture the cell. This process is very rapid, and under actual conditions it may appear as if the foam disintegration is instantaneous.

In view of the known weaknesses of the conventional "alcohol" foams, especially their sometimes doubtful effectiveness on fires in depth, a new foam agent, National Aer-O-Foam 100, was developed and formulated specifically to overcome the limitations of the conventional foams. The initial incentive to develop Aer-O-Foam 100 was derived from a requirement for a foam effective on the lower water-soluble amines. These are severely destructive to the conventional "alcohol-type" foams.

The new foam, trade named National Aer-O-Foam 100, works on an entirely different principle than that outlined above for the "alcohol type" foams. The new foam solution contains a low molecular weight polymer. This is injected into the water stream in conjunction with a catalyst. The catalyst increases the molecular weight of the polymeric material and a semigelled solution is formed. This is then foamed with the standard

mechanical foam makers and discharged through Type II outlets. When the foam comes in contact with a polar solvent, a portion of the water is drawn out of the foam. Instead of the bubble collapsing, as with "alcohol" foam, an even tougher bubble is formed, causing an impervious polymeric foam to blanket the hazard. The foam is not rigid like solid-foam plastics, but is fluid and rapidly rejoins and seals after a void has been cut in the blanket. Again, whereas the hydrophylic character of a polar solvent tends to destroy "alcohol" foams, this same characteristic performs a useful and stabilizing function with the new foam.

It should be noted here that the new polymeric foam is also unconventional in that it is used in higher concentrations, that is, 20 percent of the concentrate and three percent of the catalyst; however, this apparent disadvantage is offset by the volumetric efficieney of the new foams when compared with conventional "alcohol" foams.

Since the polymeric foam can be stored as a premix solution, it is obvious that premix or transit time is no problem.

Starting in 1958 with the SS *Ft. Fetterman* tank vessels carrying hydrocarbons have been protected by means of deck foam systems using monitor mounted and portable nozzles in conjunction with approved regular mechanical foams. Such systems have been mandatory on U.S. Flag vessels contracted for on or after January 1, 1962.

A deck foam system consists essentially of a foam liquid storage and proportioning station (usually located aft convenient to the engineroom and/or living quarters) feeding a foam main running the length of the cargo deck. Water for the foam system is supplied by the ship's fire pumps. Monitor nozzles and hose valves for portable nozzles are located at intervals along the foam main so that foam can be applied from the first accessible station or stations, aft of the fire.

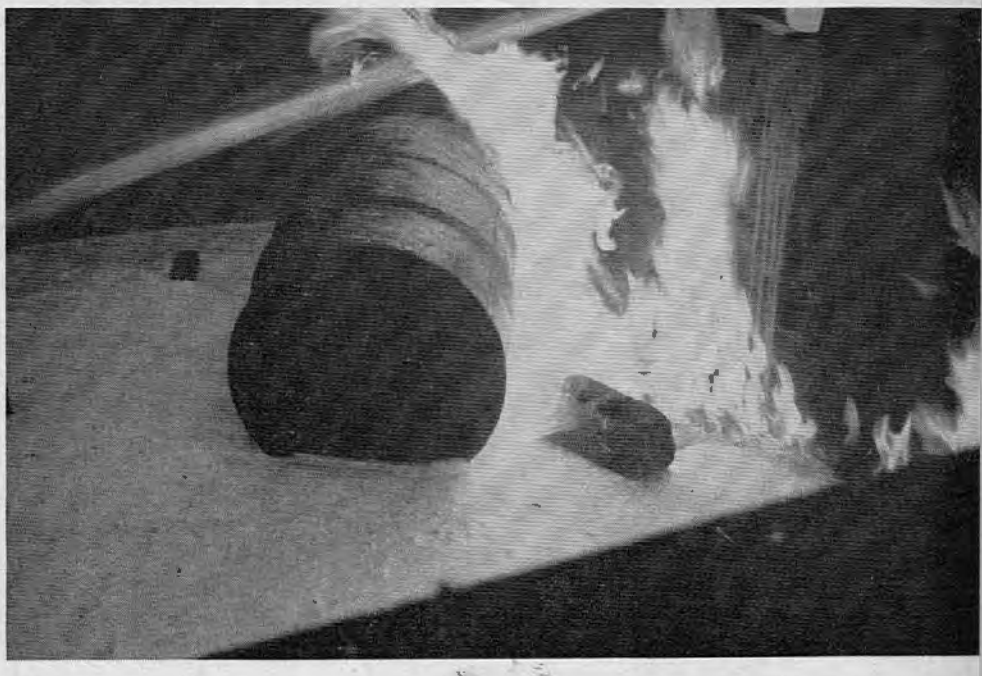
When the carriage of polar solvents was first proposed, it was recognized that ordinary "alcohol type" foams could not be applied effectively to these solvents in depth, by means of nozzles.

Several ideas were proposed for converting standard Type I devices for shipboard; however, all were rejected as too cumbersome or vulnerable for marine use.

When Aer-O-Foam 100 was developed, it was found that it could be applied to polar solvents in depth by means of nozzles, and that it was compatible with the existing nozzles and other foam making devices. The present regulations state: "Whenever unusual arrangements exist or special cargoes are carried upon which the vessel's normal fire-fighting equipment will be ineffective, additional fire-fighting equipment of approved type shall he carried". So a foam with these capabilities is needed in order to meet the intent of the regulations, as well as to provide effective protection. Aer-O-Foam 100 is the only polar solvent foam tested and approved by the U.S. Coast Guard at this time.

The U.S. Coast Guard has specified both rates and application times for this type foam. The specifications are based on tests conducted in December, 1963, where critical application rates were determined for several classes of hazards. Minimum acceptable application rates were then estahlished using a necessary safety factor over the eritical application rate. Unlike petroleum products, the application rate varies considerably with the product.

Aer-O-Foam 100 can also be used on normal petroleum products, as it is here in extinguishing a gasoline fire. Note fluidity of the foam.



For example, the lower molecular weight alcohols, such as methyl and ethyl alcohol, are easily extinguished by nozzle application of Aer-O-Foam 100 at a 0.06 g.p.m. ft. application rate. Therefore, the design rate for a system would be of the same order of magnitude as for regular foams on gasoline. However, some of the partially water soluble solvents, such as butyl alcohol or butyl acetate, require a higher application rate. If the same safety factor is to be applied, application rates will be proportionately higher. Where mixed cargoes are anticipated, judgment will be necessary in consideration of application rates depending on the amount and characteristics of the various hazards.

The test data with Aer-O-Foam 100 on various polar solvents indicate that the design rate for systems will be in the neighborhood of 0.032 g.p.m. of solution per square foot of total tank area, or perhaps higher where the more hazardous chemicals are involved.

In Aer-O-Foam 100 systems the quantities of foaming concentrate and catalyst to be stored will be based on 5 to 15 minutes operation at the actual solution rate expected, depending on the tanks or compartments in which the polar solvents will be carried. In a case where the polar solvents may be restricted to certain tanks or compartments always bordered by hydrocarbons, the quantity of foaming concentrate may be based on 5 minutes operation, with a 15-minute supply of three percent regular catalyst to permit coverage of the adjacent hydrocarbon tanks. Obviously, training of the crew is most important if the supply is limited to 5 minutes. Where polar solvents are to be carried throughout, a 15-minute supply of both foaming concentrate and catalyst will be necessary.

A limitation which does affect shipboard use is the 40° to 80° F. recommended storage condition. This generally means the storage area should be in the air-conditioned section of the ship. The Aer-O-Foam 100 system is recognized for use to 120° F.; however, the 80° F. recommendation is to maximize the storage life of the concentrate.

Proportioning for shipboard systems must be completely automatic, requiring only the opening of discharge valves and the starting of pumps. This is a necessary requirement by the U.S. Coast Guard.

Standard foam discharge devices are listed for use with Aer-O-Foam 100. These include the PC–50, PC–31, RP–12, and RP–6 Nozzles. The PC–100, 1,000 g.p.m. at 150 p.s.i., has just become available and the PC–150 is currently on the drawing boards. Nozzles of this size are required on the new second generation supertankers in order to get the required rate and coverage range.

Two chemical tankers are currently using Aer-O-Foam 100—the *Valley Forge* and the *Mobil Acme;* several more are under consideration at the present time. These ships now have a modern and effective polar solvent protection system. Hopefully they will never have to use it, but it is available if needed.

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2. National Fire Protection Association, *Standard for Foam Extinguishing Systems,* Pamphlet 11.

3. D. N. Meldrum, J. R. Williams, C. J. Conway "Storage Life and Utility of Mechanical Fire-Fighting Foam Liquids." *Fire Technology* 1, 2. May, 1965.

4. Underwriters' Laboratories, Inc., File EX 2334, Assignment 6481530. January, 1965.

5. Proceedings of the Merchant Marine Council, U.S. Coast Guard, Vol. 15, No. 10, October, 1958.

6. Rules and Regulations for Tank Vessels. U.S. Coast Guard, CG–123. May 2, 1966.

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8. Proceedings of the Eighth Annual Marine Chemists Association, August, 1966. ⚓

EMPTY CO_2 FIRE EXTINGUISHER

During a recent fire drill, it was decided to activate a 15 lb. CO_2 portable extinguisher for training purposes. The extinguisher was taken from the nearest fire station, but when "activated" it was found to be empty. A check of the inspection tag showed that the extinguisher was dated as having been weighed and sealed just one month before.

Coast Guard regulations require that CO_2 fire extinguishers shall be check-weighed once every 12 months. This is considered a minimum requirement. The inspection date must be entered and initialed by the ship's inspector on the inspection record tag. Failure to make the required inspections and/or making a false entry on the inspection tag is really "playing with fire".

Ships are urged to periodically demonstrate actual use of portable extinguishers during drills. Be sure to use the proper type of extinguisher on each class of fire. You might let different crewmembers select the proper extinguisher for the class fire to show that they know how to use it properly. This practical training demonstration may help to keep little fires from getting to be big ones, for we learn much better by "doing". ⚓

Courtesy MSTS Damage Control Bulletin

M/V THORSTREAM FIRE

The National Transportation Safety Board and the Commandant have announced their Actions on the Marine Board of Investigation convened to investigate the fire on board the Norwegian M/V *Thorstream* while loading cargo at Buffalo, N.Y., on 2 June 1967 with loss of life.

NATIONAL TRANSPORTATION SAFETY BOARD'S ACTION

This accident was investigated by the U.S. Coast Guard under the authority of R.S. 4450 (46 U.S.C. 239) and the regulations prescribed by 46 CFR 136. The Marine Board of Investigation convened at Buffalo, N.Y., beginning June 6, 1967. A member of the National Transportation Safety Board attended the proceedings. The Coast Guard report [1] of the investigation of the accident and the Commandant's action thereon are included in and made a part of this report.

The National Transportation Safety Board has considered those facts in the Coast Guard report of this accident investigation pertinent to the Board's statutory responsibility to make a determination of cause. By publication of this report the Board does not adopt those portions of the Coast Guard report which are concerned with activities within the exclusive jurisdiction of the Department of Transportation and the Coast Guard.

The National Transportation Safety Board finds that the cause of this accident, involving the loading of oxidizing material, was inadequate supervision of the longshoremen working this cargo. There was a lack of specific knowledge on the part of ship and stevedoring company personnel and longshoremen as to the characteristic properties of this chemical and the caution to be exercised in handling it. This cargo was being handled in a careless manner and without regard for the caution marked on the labels attached to each container.

Loss of life was due to the resultant fire when several drums fell into the port deep tank and their contents spilled. The source of ignition is unknown.

REMARKS

Both stevedoring company and shipboard supervisory personnel were aware of the "yellow label" category of the cargo, but neither was familiar with the specific properties of calcium hypochlorite nor the precautions to be taken in handling it. No instructions were given to the longshoremen by the stevedoring supervisory personnel concerning the hazards of the cargo and the proper handling precautions to be observed.

Factors which the Board considered to indicate that this cargo was handled in a careless manner are as follows:

1. Palletizing of the drums without adequate strapping or other positive restraint to prevent the drums from falling off the pallets during loading maneuvers.
2. Opening of only one-third of the hatch cover of No. 3 hold which allowed insufficient clearance for lowering the pallets into the hold safely.
3. Using inadequate procedures and insufficient personnel to position the sling loads over the hold opening and to lower the pallets to the deep tanks with the required degree of care.

[1] Due to space limitations the Coast Guard report of the Marine Board of Investigation is not printed herein.

4. Continuing the loading operation without removing the damaged and spilled drums from the starboard deep tank, which preceded the fatal load.

5. Dropping the drums from the pallets in a "guided fall" while unloading the pallets in the deep tanks.

The Board concludes that the longshoremen were not adequately informed concerning the practices necessary to handle this dangerous cargo safely, nor familiar with the meaning of the labels used for the various classifications of such cargo. Refilling of a drum with its spilled contents in the starboard deep tank prior to the accident is evidence that the warnings on the labels were ignored.

The Board also notes that the cover of a drum came off in the starboard deep tank while the drum was being unloaded from a pallet in a "guided fall." This drum fell from a height less than that specified in the test required by the regulations for hazardous materials. In addition, the test is conducted on a concrete floor whereas the drum which spilled fell on wood flooring, producing a less severe impact than specified by the regulations for drop tests. The cover was secured on the drum with a lever locking ring authorized by the Bureau of Explosives. The regulations permit the Bureau of Explosives, a nongovernment agency, to authorize the use of closing devices equivalent to the bolted ring type specified by the regulations.

The lever lock closing devices used on these drums were not adjustable for tension, as are the prescribed bolted type covers. Manufacturing variations affect circumferences of the lid, the rim of the drum, and the clamp. An unfavorable combination of these variations could result in a loose cover and result in spillage or reduced resistance to opening on impact. The specified tests would not assure prevention of this condition unless tests were broadened to include the extreme range of manufacturing dimensions in the worst combination; as well as a means of insuring that the range did not change. While the spillage in the starboard deep tank cannot alone be considered as evidence that this was a causal factor in the fire, this accident has revealed a shortcoming which could have caused the fire and which could cause future fires.

The loading operation was under the supervision of stevedore personnel even though 46 CFR 146.02–17 specifies that dangerous cargo shall be handled or stowed on board vessels under the ". . . direction and observation . . . of a qualified person assigned for such duty. For foreign vessels, such person shall be an officer of the vessel assigned to such duty by the master." Noncompliance with this regulation did not directly cause this accident, but was symptomatic of lack of responsibility for supervising the loading operation, and a factor of carelessness.

Labels on the drums complied with the applicable Federal Regulations for oxidizing materials which warn "keep away from fire, heat, and open-flame lights; remove carefully the contents of broken packages; do not drop." Export labels marked "oxidizing agent" were also attached. Manufacturer's markings occupied the major surface area of these containers. In analyzing the information on the drums, the Board noted that the general public probably would not understand such descriptive words as "oxidizing agents, powerful oxidant, combustible organic material," and could not be expected to assimilate the cautionary handling information on the drums. Longshoremen without proper training ordinarily cannot be expected to understand the potential hazards of dangerous cargo, with the present marking system. In this accident, most of the stevedoring personnel noticed the yellow labels, but did not know what oxidizing materials were, nor the inherent dauger of the contents of the drums.

The Commandant remarked to the effect that it is inappropriate for the Marine Board of Investigation to make a conclusion in regard to the seniority system in force for the selection of longshoremen as various courts and other governmental agencies with primary jurisdiction are already involved in litigatinn and arbitration relative to waterfront hiring practices. The Safety Board considers it is appropriate for an accident investigation, including Marine Boards of Investigation, to inquire into and make conclusioos concerning hiring and employment practices where a question of safety is involved. The responsibility of accident investigative bodies to seek accident prevention factors is not superseded by the actions taken by other agencies for other pnrposes.

The Board recognizes that implementation of recommendations (5) and (6) would require additional personnel and funds for the Department of Transportation. However, based on this accident, we feel the Department should have the capability of issuing special permits to shippers who request authorization to deviate from existing Hazardous Materials Regulations, governing containers and closure devices for hazardous materials.

RECOMMENDATIONS

The Safety Board concurs in the recommendations of the Marine Board of Investigation as approved by the Commandant.

The Safety Board further recommends that: (1) the Department of Labor, working with appropriate stevedoring organizations, consider the implementation of an effective training program, and direct attention to existing regulation assigning responsibility to a qualified person

to direct and observe the handling of stowage of dangerous articles aboard vessels; (2) the Department of Transportation study the present Federal labeling requirements for dangerous articles, and manufacturers' markings currently used, to insure that the average person handling the container is warned concerning handling, as well as inherent hazards of the contents; (3) the Coast Guard study and review the actual practice used to direct the loading of dangerous cargo on board ship. If the provisions of 46 CFR 146.02–17 are not being followed, or are not understood, consideration should be given to amending these regulations in order to define the responsibility for safety more precisely and to make this responsibility clear to all appropriate persons; (4) the Department of Labor, in coordination with the Coast Guard, consider the need for regulations to require specific cargo handling apparatus which would prevent dangerous cargo from falling from sling loads. For instance, some of the equipment specified in 46 CFR 146.20–35 for handling explosives could be specified for use in handling other dangerous cargo; (5) the Department of Transportation reexamine the existing practice of delegating authority to nongovernmental organizations to perform regulatory functions such as the granting of authorizations and special permissions to deviate in some manner from the existing Hazardous Materials Regulations; and, (6) the Department of Transportation consider changing present procedures to require the Department to issue special permits to shippers who request authorization to deviate from the specific regulations concerning containers and closure devices, in lieu of authority presently delegated to nongovernmental organizations.

By the National Transportation Safety Board:

Adopted this 17th day of May, 1968:

/s/ JOSEPH J. O'CONNELL, Jr.,
Chairman.

/s/ OSCAR M. LAUREL,
Member.

/s/ JOHN H. REED,
Member.

/s/ LOUIS M. THAYER,
Member.

/s/ FRANCIS H. MCADAMS,
Member.

COMMANDANT'S ACTION

1. The record of the Marine Board of Investigation convened to investigate subject casualty has been reviewed and the record, including the Findings of Fact, Conclusions and the Recommendations, is approved subject to the following comments and final determination of the cause of the casualty by the National Transportation Safety Board.

2. At or about 0850 e.d.s.t. on 2 June 1967 while the Norwegian M/V *Thorstream* was in the Port of Buffalo, N.Y. loading cargo, a fire resulting in the death of four longshoremen occurred as a pallet of steel drums containing a calcium hypochlorite compound was dropped as the pallet was being lowered into number three port deep tank. Dry calcium hypochlorite compounds are classified oxidizing materials by 46 CFR 146.22–200, Table E. Table E requires a yellow shipping label and gives the required conditions for transportation. When the material is heated to a temperature of 350 degrees F. a self-sustaining decomposition will be initiated with consequent evolution of heat, oxygen, and a fine white powder resembling smoke. The oxygen produced will greatly increase the burning rate and intensity of flammable and combustible materials.

3. The M/V *Thorstream,* a 479 foot freight vessel of 5,754 gross tons was scheduled to load part of the cargo consisting of 7,000 drums of the calcium hypochlorite compound, weighing 100 pounds each, into number three deep tanks. Number three hatch was fitted with a conventional cover with three rows of hatch boards. Only the after row of hatch boards was removed to load the cargo. This provided an opening of 8.7 ft. by 22.3 ft. The openings of number three port and starboard deep tanks located at the 'tween deck level measured 7.7 ft. by 9.2 ft. Standard pallets measuring 4 ft. by 6 ft. were used to load the cargo.

4. The longshoremen commenced loading at 0820. Each pallet held 24 drums placed symmetrically on their ends in two tiers of 12 drums each. The pallets were lowered alternately into the port and starboard deep tanks. Although there was conflict in the testimony regarding the exact sequence of loading, the events are, for the purpose of this investigation, adequately described in Findings of Fact 16–18. Essentially it was found that the first draft was lowered into the starboard #3 deep tank and that the second draft was lowered into the port #3 deep tank without incident. As the third pallet was being lowered into the starboard deep tank it caught on a structural member about two feet above the bottom of the tank. All of the drums were dumped off the pallet

but no calcium hypochlorite was spilled. The second mate, at the request of the longshoreman hatch boss, had the starboard boom repositioned slightly to correct the condition that led to the dumping of the third pallet load. Two lines were also attached between the wires of the sling to further assist in holding the drums on the pallet. Loading was resumed and, although the pallets tended to rotate, about two more loads were lowered alternately into the port and starboard deep tank without incident. As the drums were being removed from a pallet that had already been received in the starboard deep tank one of them struck the deck on its side and the lid came off, spilling approximately one-half of the contents on the bottom of the deep tank. The drum was set upright and most of the spilled material was scooped up and returned to the drum.

5. As the loading continued, one of the pallets (approximately the sixth) was not square with the main deck hatch opening and its corner caught on the hatch coaming. The load was raised and after several more attempts were made to lower it through the opening the pallet caught on the forward side of the main deck hatch opening and two drums fell from the after side of the pallet. At least one of these drums ruptured and spilled its contents as it struck the bottom of No. 3 port deep tank. The pallet tipped forward and two more drums fell. This was followed by the fall of several more drums from the pallet. As the third drum struck one of the drums already on the bottom of the deep tank and "skidded" away, flames and dense white smoke ensued from the pile of spilled calcium hypochlorite compound. Four men perished due to the fire in the tank. Ship's fire hoses were utilized to fight the fire until 0905 when the first unit of the Buffalo Fire Department arrived and assumed control. The fire was extinguished at 0943 by the use of water.

REMARKS

1. Concurring in the conclusions of the Board it appears that the probable cause of the casualty was a reaction of the calcium hypochlorite compound which was dropped and spilled during cargo loading operations. It is considered, however, that the spillings were due to carelessness and lack of supervision rather than inadequate longshoring experience and training. The record would support a conclusion that the drums of calcium hypochlorite compound were properly marked as yellow label cargo and that information concerning its hazards was available to supervisory personnel. Present regulations require that dangerous cargo "shall be handled or stowed on board vessels under the direction and observation of a qualified person assigned to such duty."

2. With respect to conclusion 5, there is no evidence in the record that anyone was smoking in the deep tanks or that a lighted cigarette was present in number three port deep tank. While a burning cigarette, had there been one present, was a possible source of ignition for the fire there are other equally possible causes. Therefore the essence of conclusion 5 is that a specific cause of the fire cannot be determined.

3. The conclusion of the Marine Board of Investigation in regard to the seniority system in force for the selection of longshoremen for a particular cargo handling operation is inappropriate in this case as various courts and other governmental agencies with primary jurisdiction are already involved in litigation and arbitration relative to waterfront hiring practices.

4. The conclusions concerning the heroic efforts of fireman Paul Hennigan in extinguishing the fire and of Mr. George O'Donnell in aiding his fellow workers are concurred in. Their actions will be made the subject of letters of commendation.

ACTIONS CONCERNING THE RECOMMENDATIONS

1. A copy of this report will be furnished the U.S. Department of Labor as proposed in Recommendation 1. It should be noted, however, that Coast Guard Regulations, 46 CFR 146–147, as well as Department of Labor Regulations, contain rules pertaining to the handling of cargo. Advisors and interested parties from both the Coast Guard Hazardous Materials Division and the U.S. Department of Labor were present at the Marine Board of Investigation and additional consultations have been undertaken.

2. Studies to further ascertain the characteristics of calcium hypochlorite compounds have been initiated in accordance with Recommendation 2. It should be noted, however, that the dangers associated with dropping of drums of the calcium hypochlorite compound were quite adequately set forth on the drum labels as well as in Coast Guard Regulations.

5 February 1968

P. E. TRIMBLE,
Vice Admiral, U.S. Coast Guard,
Acting Commandant.

SHIPBOARD FIRE SAFETY TEST FACILITY PLANNED

Preliminary plans have been set for the establishment and operation of a permanent shipboard fire and safety testing facility at Mobile, Ala. The Coast Guard is in the process of making arrangements necessary to bring the facility into being.

The facility will be used in research efforts to achieve improved shipboard fire protection. A tanker will be located in a slip dredged in Little Sand Island near Mobile, Ala. The ship will be placed in the slip and then physically isolated from the adjacent waterway by a dam. This will preclude any possibility of water pollution from the facility. A series of fire tests, possibly four per year, will be undertaken.

The city of Mobile and State of Alabama have indicated their readiness to support the project. Coast Guard personnel have met with Mobile Chamber nf Commerce personnel, who gave the project their endorsement. Recent negotiations between the Coast Guard and the State of Alabama, owner of Little Sand Island, have resulted in a lease to permit Coast Guard use of the site for creation of the facility. One laid-up diesel-powered tanker is to be assigned to the site. The Maritime Administration has provisionally designated the 8,500-ton tanker *Rhode Island* for assignment to the facility. The tanker is presently in layup in the Naval Reserve Fleet in Mobile. When the *Rhode Island* has been destroyed by tests, in perhaps 3 to 5 years, it will be scrapped and arrangements made for another vessel to take its place.

A small coordinating group under Coast Guard direction will agree on tests to be conducted, review test procedures, supervise instrumentation for the performance of tests, analyze results, and prepare a report. The group will consist of expert representatives of all aspects of maritime and fire protection technology. It is expected that each test will have a sponsor to bear the entire cost of conducting that phase of testing. All tests will require approval by the coordinating group, which must be convinced that the tests would be a significant addition to the understanding of marine safety. Test results will become public information. It is intended that the facility be used for testing of concepts and arrangements rather than proprietary equipment, although proprietary equipment will be used in the work.

A primary purpose of the testing facility will be to evaluate methods of preventing and fighting shipboard fires. Matters to be considered could include:

- New fire fighting systems (such as high expansion foam, bromotrifluromethane, and alcohol foam) and fire detecting systems.
- Special purpose systems, like dry chemicals for liquefied flammable gas and explosion suppression systems.
- Structural materials, such as aluminum superstructures and tanks, fiberglass hatch covers.
- Protection for lifesaving equipment, including water spray at launching areas and fire screening of lifeboat access.
- New materials for critical systems, such as cargo lines and overboard discharges.
- Improvement of techniques for using fire extinguishing systems, and of designs of such systems.
- Spill containment and clean-up techniques.

It is likely that the facility will be used for fire testing of material and equipment for other transportation modes. One example would be possible fire tests of containers, the results of which could be equally applicable to land, sea and air transport. At a later date the testing facility might be used for training personnel.

Coast Guard sponsorship of the facility is an outgrowth of the thinking of several dedicated men in the maritime industry. A great deal of effort, over a two-year period, was devoted to attempting establishment of this facility through low cost, joint industry-government agreements. These efforts were carried on by Capt. Kent Savage (National Fire Protection Association), Mr. Paul Hammer (Marine Consultant), and the late Mr. Charles Culver (Atlantic Refining). Because of his work in the maritime safety field, consideration is presently being given to appropriate means for paying tribute to Mr. Culver through the facility.

The proposed test facility is being developed to fulfill a long-existing need. Fire aboard ship has always been one of the calamities most dreaded by seamen. To eliminate this enemy, through case experience, is a long, slow process. The greatest advances in shipboard fire safety have come for the most part from experiments conducted aboard actual vessels, e.g. the *Nantasket* tests in 1934 and tests at Fort McHenry during the 1940's. Since the 1940's there has been very limited shipboard fire test work, all of it being undertaken on a small scale. It is difficult, if not impossible, to make comprehensive judgments based on the observation of all the factors affecting a shipboard blaze, unless extensive tests are performed. Testing conducted in an actual ship permits complete evaluation of new techniques and methods of fire protection under realistic circumstances.

The proposed testing facility at Mobile would be the only one of its kind in the world. For this reason, the project is expected to generate considerable interest internationally as well as at home. ⚓

Ship Safety Awards

Courtesy The Weekly Underwriter

Thirty-two ship safety contest winners were honored at an awards presentation luncheon held May 16 at the Downtown Athletic Club in New York City. Admiral Willard J. Smith, Commandant, United States Coast Guard, presented three National Safety Council 1967 Safety Contest awards (ocean-going division) and 29 American Merchant Marine Institute Jones F. Devlin Awards. Shown here are representatives of some of the winners. They are, left to right, first row: Robert E. Kratzert, Oglebay Norton Company; Capt. John R. Lange, United Fruit; Capt. Philip Neal, Mobil Oil Corp.; and Capt. Clarence Lee, Humble Oil. Second row: R. J. Weigede, United States Lines; Capt. George B. Foster, United Fruit; John I. Mingay, Texaco, Inc.; Wm. T. Morris, Lykes Bros.; Capt. Gilbert Hinchcliff, United Fruit; Admiral Smith, and Joseph Andreae, general chairman of the Marine Section of the National Safety Council. Other award winners included Alcoa, American Oil, Getty Oil, Marquette Cement, Sun Oil, Sinclair Refining, and Pure Oil.

Rules Published

The American Bureau of Shipping has just published its 1968 edition of the "Rules for Building and Classing Steel Vessels." The rules, which are revised and published annually, this year incorporate several major changes and additions. One is an addition to the hull rules which makes provision for the application of higher strength materials. Another important change involves the hull and machinery sections which have been revised so that they now are in agreement with the international load line convention of 1966.

The 1968 rules cost $12.50, and may be ordered from bureau offices throughout the world or from Publications' Department, American Bureau of Shipping, 45 Broad St., New York 10004. ⚓

Undersea Generator

The U.S. Naval Oceanographic Office at Suitland, Md., has received an undersea radioisotope generator which will provide power for a buoy platform moored off the coast of Puerto Rico. The platform is to beam scientific data to ships, planes, and satellites.

Sensors attached to the platform will supply data on ocean currents, wind velocities and wave conditions. This data will be transmitted to a "Nimbus-B" satellite as it passes overhead twice a day, and will be stored by the satellite for playback to a ground station at Fairbanks, Alaska. If the system is successful, similar data-gathering stations will be placed in remote parts of the oceans to supply information for the most sophisticated navigational aids. ⚓

Merchant Marine Detail Saigon

A new Merchant Marine Detail was established on 1 July 1968 at the American Embassy in Saigon. This two-man unit under the command of Commander William T. Sode, USCG, has the responsibility for investigating any personnel problems or casualties which arise on U.S. vessels plying Southeast Asian waters. The unit is primarily concerned with disciplinary problems arising on U.S. vessels engaged in the Vietnam sealift; however, the area of responsibility includes the major ports of Singapore, Bangkok, Hong Kong, and Manila.

Prior to 1 July 1968 the unit was known as the Coast Guard Shipping Advisory Unit and was assigned to the U.S. Navy Military Sea Transportation Service (MSTS). Commander Edward F. Oliver, USCG, commanded the original unit, which was opened December 1966. Since the establishment of the Shipping Advisory unit in Vietnam, the Coast Guard investigators traveled over sixty thousand miles to handle shipping problems. They ranged the one-thousand miles of South Vietnam coast line from Da Nang to the Mekong Delta by airplane, helicopter, Navy Swift Boats, and native sampans. Many times, in order to reach a vessel at anchor off some stretch of isolated coast, it was necessary to fly over or travel by road through territories under fire from hostile forces. The investigators often had to travel up and down the Long Tau River through areas occupied by the VC to board ammunition ships anchored at the Cat Lai and Nha Bhe.

The Merchant Marine Detail can be contacted as follows: Radio message traffic should be sent c/o American Embassy Saigon or c/o MSTS Saigon; the mailing address is American Embassy, 4 Thong Nhut, Saigon, R.V. ⚓

U.S. Coast Guard Academy Annual Competition

The U.S. Coast Guard Academy has announced that the next annual competition for appointment as Cadet, USCG will commence with the December 7, 1968 administration of the College Entrance Examination Board (CEEB) tests which are given in over 3,000 test centers in the United States and overseas. Applications are now being accepted.

Appointment to the Academy is obtained solely through competitive examination; there are no congressional appointments or geographical quotas. The competition consists of the candidate's high school rank, his performance on the December CEEB (1) Scholastic Aptitude Test, (2) English Composition Achievement Test, and (3) either Level I or Level II Mathematics Achievement Test, and his leadership potential as demonstrated by his participation in high school extra-curricular activities, community affairs, or part time employment. Most successful candidates rank in the upper half of their class and demonstrate a high degree of proficiency in the mathematical and scientific academic areas. However, any high school senior or graduate, who will have reached his 17th but NOT his 22d birthday by July 1, 1969 and who is a citizen of the United States, unmarried, and of good moral character is eligible to compete for an appointment.

Coast Guard cadets obtain an excellent undergraduate education at no personal cost, and, in addition, receive pay and allowances fully adequate to fulfill all of their ordinary living expenses. The constantly updated Academy curriculum offers liberal arts, engineering, and professional subjects, with a choice of either an engineering-physical science, social science, or marine science-oceanography emphasis. These areas of academic interest, combined with the varied elective courses, establish a solid foundation for a challenging career. Graduates of the Academy are awarded a Bachelor of Science degree and are commissioned as Ensigns in the U.S. Coast Guard. Selected officers may pursue further postgraduate education and specialized training in many leading civilian and military graduate or professional schools in such fields as aviation, business administration, electronics, engineering, law, naval architecture, and oceanography.

Should you know of a young man, perhaps your son or neighbor, who is interested in the above mentioned fields, inform him of this outstanding educational opportunity offered by the U.S. Coast Guard Academy. Any young man coming within the prescribed age limits who believes he meets the scholastic, physical, and character standards and is interested in a professional career as a Coast Guard officer is encouraged to make application.

Applications and additional information may be obtained by writing to Director of Admissions U.S. Coast Guard Academy, New London, Conn. 06320. ⚓

ACETYLENE FIRES

Once in a while an acetylene cylinder will catch fire. Very few cases involving burning cylinders are exactly alike; each fire creates its own conditions, some of which may be totally new even to experienced firefighters.

There can therefore be no single set of rules to cover every acetylene cylinder fire. The following recent incident, though, suggests that this might be a good time to review the general procedures to follow in case such a fire should happen aboard your ship.

In this case, an engineer was burning steel in a passageway with an oxyacetylene torch. An extra cylinder of acetylene was standing about 8 feet from him. A spark from the burning operation flew to the extra cylinder and ignited acetylene leaking from the bottom. The cylinder rose about 6 inches off the deck, then settled back down; but the escaping acetylene continued to burn.

Because the fire was a small one the engineer was able to put it out.

Although each situation differs from the last, the following general procedures are recommended—always keeping in mind that your own judgment is the ultimate guide:

Determine, if possible, the location of the leak. If it is a small leak, try to extinguish the fire quickly, before the fusible metal safety plug melts out. If it can be stopped by closing a control valve, do this immediately—provided, of course, that the valve can be reached safely. If this does not work, use a dry chemical extinguisher on the fire.

When a small fire has been put out, close the control valve, if possible, to stop the leak. If water is available, cool the cylinder with a water spray. If the cylinder is inside, take it outside and continue to cool it. If leaking goes on, secure it in an isolated area topside until it can be removed from the ship. Post "No Smoking" signs nearby.

Now, instead of the small type of fire just described, suppose you are confronted with a large flame. If this happens, or if you have a small fire that cannot be extinguished, evacuate everyone from the area except those few men who may be required to control the fire.

If there is a large flame around the cylinder, or if a fuse plug has melted, it might be best not to attempt to put out the fire. Reason: If unburned acetylene escapes, mixes with air and is ignited, there will be an explosion. This danger is particularly serious below decks, where ventilation may not be good. The fire may be the lesser of two evils. In such situations, consider the following as a plan of action:

COOL THE AREA

Let the cylinder burn where it is, getting water on it from a hose as rapidly as possible. Wet down and cool the surrounding area to prevent the spread of fire and to minimize heat damage.

Water in spray form is best for these purposes. Be sure to water-cool any other compressed gas cylinders in the area that are exposed to the heat.

When most of the gas in the burning cylinder has burned and the fire has died down, follow the procedures outlined for small acetylene fires. ⚓

Courtesy The Safety Valve

FIRE HOSES SHOULD BE FIRE READY

Shipboard fire hoses can be counted among those pieces of equipment most liable to wear and deterioration. Because of this and because they are among the most important for firefighting they should be given very special care.

The following suggestions are offered for keeping these valuable hoses in good condition:

1. Unroll and then reload unused hose monthly in order to change the location of the bends so that the possibility of permanent set in the

lining at these points will be reduced. (For rubberlined hose.)

2. When cleaning or polishing hose couplings and fittings, care should be taken to see that no cleaning or polishing compound comes in contact with the fabric of the hose. Such chemicals could easily damage the hose fibers.

3. To prolong the life of unlined firehose (this type, incidentally, is not permitted by the Coast Guard to be used in machinery spaces), after each hydrostatic test the hose should be arranged so that all water will drain out. Before being replaced in the rack, the hose should be examined very carefully to insure that it is actually dry.

The natural fibers will deteriorate rapidly if not thoroughly dried out after the hose has been wetted.

4. The hose station valve should be checked frequently to make sure it is tightly closed. Even if only slightly open, it permits leakage, allowing water to drain into the hose and cause rapid deterioration.

ACID DEPOSITS

5. Rubber-lined hoses should likewise be drained and dried after use (or washing) to minimize the possibility of acid formation in the rubber tubes and mildewing of the fibers. (Water stagnating in undrained hose may carry sulfur-forming bacteria and form a solution of sulfuric acid.)

NOTE: Hoses should never be dried in direct sunlight; the sun's radiation and reflection are damaging to jacket fibers and accelerate aging of the rubber linings.

6. If the hose is to be rolled for storage, make sure that the male coupling is inside the roll to protect the threads.

7. Hose couplings should be checked to make sure that they are tight and not "out of round," that the threads are in good condition and that the swivel on the female coupling is free. If necessary, a small amount of graphite can be used on the threads and swivel as a lubricant (oil and grease should not be used).

8. Nozzles should be removed and inspected periodically for foreign objects. If they are the adjustable type, operate the mechanism to make sure it is not stuck. Hose gaskets at the nozzle and couplings should also be inspected and replaced when flexibility diminishes or other defects are noted. ⚓

Courtesy The Safety Valve

OIL SPILL FIRE IN ENGINEROOM

Shipyard workers doing repairs on a hydraulic system in the engineroom fiddley allowed oil to spill down and saturate the lagging of the steam pipe below. The excess oil on the surface of the lagging was wiped up, but the oil-soaked lagging was ignored. Heat generated by the operations of the boiler then caused the oil-soaked lagging to catch fire. Ship's force brought the fire under control in 7 minutes, but the ship's damage control organization wisely turned in an alarm to the city Fire Department in the early stage of the fire.

The fire was officially reported as a "minor fire" from a "minor hydraulic oil spill". It is questionable whether an oil fire in an engineroom, out of control for only a few minutes, leading to a call for professional help, can be called a "minor" fire.

This incident emphasizes the fact that a close watch must be kept over *all* repair work, not simply "hot work". In the engineroom especially, a sloppy repair job can soon become a very "hot problem". Ship's officers must constantly check for careless workmanship, and "blow the whistle" when they see it. As always, fire prevention beats everything. ⚓

Courtesy MSTS Damage Control Bulletin

STORES AND SUPPLIES

Articles of ships' stores and supplies certificated from August 1 to August 31, 1968, inclusive, for use on board vessels in accordance with the provisions of Part 147 of the regulations governing "Explosives or Other Dangerous Articles on Board Vessels" are as follows:

CERTIFIED

Blankenship Marine Chemical Co., Inc., P.O. Box 590, Morristown, N.J. 07960: Certificate No. 823, dated August 20, 1968, #444 Liquid Detergent Tank Cleaner; Certificate No. 824, dated August 20, 1968, DBC–999 Double Bottom Cleaner; Certificate No. 825, dated August 20, 1968, #666 WIPE UP; Certificate No. 826, dated August 20, 1968, #777 Liquid Rust and Scale Remover; Certificate No. 827, dated August 20, 1968, SOUGEE.

West Chemical Products, Inc., 42–16 West St., Long Island City, N.Y., 11101: Certificate No. 828, dated August 26, 1968, SUPER-CIDOL.

AFFIDAVITS

The following affidavits were accepted during the period from July 15, 1968 to August 15, 1968:

K & F Machine & Manufacturing Co., 1500 Southeast 89th St., Oklahoma City, Okla. 73149, VALVES.

NIBCO, Inc., Elkhart, Ind. 46514, FLANGES.

Atlantic Metal Hose Co., Inc., 308 Dyckman St., New York, N.Y. 10034, FITTINGS.[1]

[1] Flexible metallic hose, and Bellows Expansion Joints limited to 15 psi.

MERCHANT MARINE PERSONNEL STATISTICS
MERCHANT MARINE OFFICER LICENSES ISSUED
FISCAL YEAR ENDING JUNE 30, 1968
DECK

Grade	July through September (1967)		October through December (1967)		January through March (1968)		April through June (1968)	
	Original	Renewal	Original	Renewal	Original	Renewal	Original	Renewal
Master:								
Ocean	87	393	48	384	53	427	51	386
Coastwise	13	16	4	18	12	29	7	26
Great Lakes		7		25	34	130	4	22
B.S. & L	4	61	2	64	7	71	13	81
Rivers	5	46	5	35	4	65	11	68
Radio Officer Licenses issued	55	86	52	62	57	75	48	63
Chief Mate:								
Ocean	55	100	57	80	68	130	81	101
Coastwise		21		4	0	2	1	4
Great Lakes	3		2	1	3	3	3	2
B.S. & L	4	4	2	17	1	10	4	3
Rivers	7	26	6	24	1	8	6	14
2d mate:								
Ocean	126	134	127	105	126	123	102	126
Coastwise		1	5	1	5	5	8	5
3d mate:								
Ocean	106	113	61	88	109	76	274	108
Coastwise	1	1		2	4	0	3	1
Pilots:								
Great Lakes	12	21	12	22	43	114	16	17
B.S. & L	31	86	43	105	50	124	55	120
Rivers	83	110	92	90	83	137	93	135
Master: Uninspected vessels	11	18	19	20	33	179	39	48
Mate: Uninspected vessels	3	4	11	8	16	34	13	7
Motorboat operators	254	548	166	410	258	670	593	842
Total	**860**	**1,796**	**714**	**1,565**	**1,076**	**2,412**	**1,425**	**2,179**
Grand total	**2,656**		**2,279**		**3,488**		**3,604**	

ENGINEER

Grade	July through September (1967)		October through December (1967)		January through March (1968)		April through June (1968)	
	Original	Renewal	Original	Renewal	Original	Renewal	Original	Renewal
STEAM								
Chief engineer:								
Unlimited	32	410	48	341	67	482	38	406
Limited	3	55	2	61	9	58	3	53
1st assistant engineer:								
Unlimited	80	149	84	143	102	190	79	154
Limited	1	16	6	19	3	27	5	16
2d assistant engineer:								
Unlimited	124	219	174	216	165	265	127	228
Limited	1	2	4	4	11	6		4
3d assistant engineer:								
Unlimited	82	290	80	189	128	204	328	233
Limited		6	4	1	6	2	5	3
MOTOR								
Chief engineer:								
Unlimited	13	75	12	63	13	81	7	68
Limited	18	127	20	122	23	143	44	92
1st assistant engineer:								
Unlimited	3	15	9	24	13	32	8	27
Limited	12	38	10	32	14	46	20	26
2d assistant engineer:								
Unlimited	3	39	10	38	20	42	12	29
Limited	1	4	4	8	5	7	4	3
3d assistant engineer:								
Unlimited	28	264	15	197	52	241	260	277
Limited	2	1	1	10	7	7	9	7
Chief engineer:								
Uninspected vessels	10	15	21	21	15	109	24	28
Assistant engineer:								
Uninspected vessels	11	2	6	3	11	16	7	20
Total	**424**	**1,727**	**510**	**1,492**	**664**	**1,958**	**980**	**1,674**
Grand total	**2,151**		**2,002**		**2,622**		**2,654**	

MERCHANT MARINE PERSONNEL STATISTICS–Continued

MERCHANT SEAMEN'S DOCUMENTS ISSUED

Type of document	July through September (1967)					October through December (1967)					January through March (1968)					April through June (1968)				
	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total	Atlantic coast	Gulf coast	Pacific coast	Great Lakes and rivers	Total
Staff officer	84	8	46	8	146	18	13	51	1	83	6	5	7	------	18	24	11	32	1	68
Continuous discharge book	------	14	------	------	14	------	20	------	------	20	------	17	------	------	17	1	66	------	------	67
Merchant mariner's documents	3,107	1,250	1,948	1,623	7,928	2,572	1,146	1,882	1,071	6,671	754	379	513	377	2,023	2,663	1,455	1,911	2,178	8,207
AB any waters unlimited	124	80	149	25	378	109	35	136	19	299	29	7	47	5	88	165	40	122	24	351
AB any waters 12 months	106	62	112	81	361	124	77	126	37	364	51	61	29	13	154	137	131	91	42	401
AB Great Lakes, 18 months	2	11	1	24	38	1	1	3	12	17	------	------	1	8	9	3	1	8	21	33
AB tugs and towboats, any waters	7	4	1	------	12	6	3	8	------	17	2	------	------	------	2	4	------	------	------	4
AB bays and sounds	1	------	1	------	2	1	2	------	------	3	------	------	------	------	0	------	------	------	------	0
AB seagoing barges	1	------	------	------	1	------	------	------	------	0	------	------	------	------	0	------	------	------	------	0
Lifeboatman	334	11	130	6	481	106	29	125	------	260	23	52	47	1	123	216	87	148	3	454
Q.M.E.D.	385	116	229	76	806	463	84	232	44	823	174	21	69	20	284	501	100	199	67	867
Entry ratings	2,958	1,191	1,832	1,561	7,542	2,391	1,080	1,753	975	6,199	657	331	489	347	1,824	2,411	1,392	1,797	2,083	7,683
Tankerman	23	93	14	56	186	39	85	9	90	223	16	34	9	33	92	44	109	28	90	271
Total	7,132	2,840	4,463	3,460	17,895	5,830	2,575	4,325	2,249	14,979	1,712	907	1,211	804	4,634	6,169	3,392	4,336	4,509	18,406

FIRE PREVENTION WEEK, 1968

By the President of the United States of America

A Proclamation

Fire is the third largest cause of accidental death in America—and deaths from fire increased again last year.

The cost of homes and businesses which went up in flames last year is estimated to exceed $2 billion.

These tragic deaths and huge property losses constitute a shameful waste—which can and must be reduced.

The Fire Research and Safety Act of 1968 was a first step toward better trained and better equipped firefighters and modern firefighting techniques. But while such legislation can provide the technical knowhow which will help to reduce our fire losses, fires can be prevented only when each citizen actively cooperates and earnestly supports the efforts of his community fire department.

NOW, THEREFORE, I, LYNDON B. JOHNSON, President of the United States of America, do hereby designate the week beginning October 6, 1968 as Fire Prevention Week.

I urge all groups involved in fire safety activities, such as the National Fire Protection Association, and State and local governments to observe Fire Prevention Week and to motivate all citizens toward year-round fire prevention activity.

I also direct the Federal Fire Council and all other Federal agencies to assist in this program so as to stop this shameful waste of lives and property caused by preventable fires.

IN WITNESS WHEREOF, I have hereunto set my hand this thirtieth day of July, in the year of our Lord nineteen hundred and sixty-eight, and of the Independence of the United States of America the one hundred and ninety-third.

LYNDON B. JOHNSON

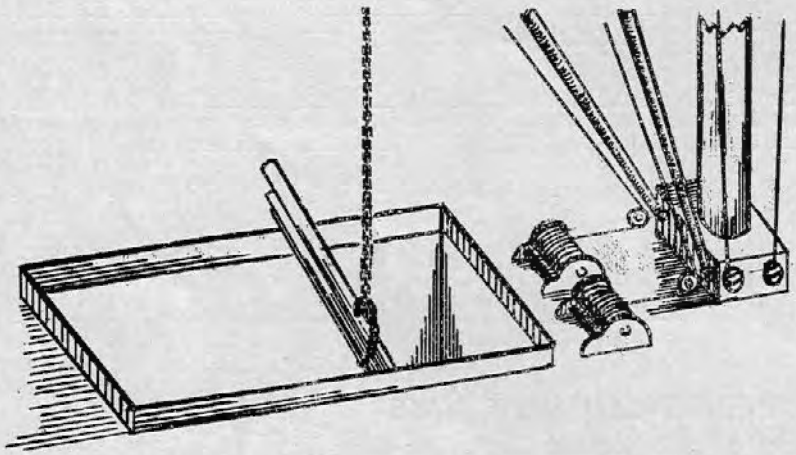
DECK

Q. What reasons other than the preventing of sweat makes ventilation necessary for many cargoes?

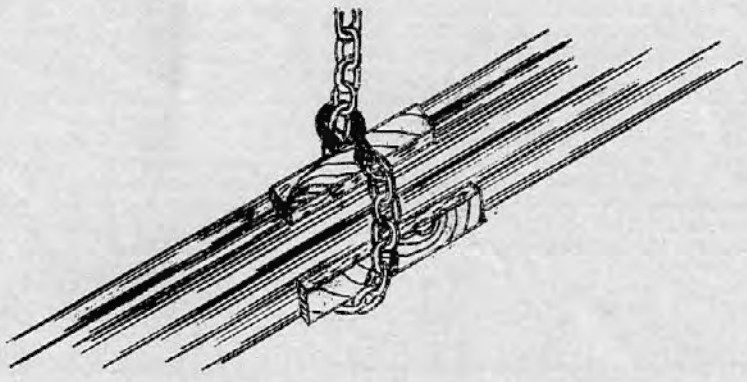
A. Ventilation is necessary for many cargoes not only to prevent the formation of sweat but also to dissipate heat that may be engendered within the cargo and to prevent any hazardous accumulations of gas that the cargo may give off.

SINGLE CHAIN SLING

Q. When loading long reinforcing rods, pipe, rails, or similar steel items using a single chain as sketched, what is the usual method employed to prevent the draft slipping out of the sling? Explain the reasons for this.



A. When using a chain sling as sketched, dunnage is usually added to the draft to prevent slipping. The dunnage increases the coefficient of friction between steel sling and steel draft and by increasing the diameter of the draft increases compressive force of sling which assists in preventing slipping.



ENGINE

Q. 3. If your fireman pulled a "live burner" and the oil caught fire, you would first:

(a) Secure ventilation
(b) Secure main engine
(c) Secure fuel-oil system
(d) None of the above

A. (c) Secure fuel-oil system

Q. 3. Which of the following is a true statement with respect to alkaline-type batteries?

(a) While not being used they will maintain a charged condition without injury for longer periods than the lead-acid type

(b) The voltage per cell is normally maintained at 2.5 volts

(c) Precautions against electrolyte burns are not required

(d) Explosive gases are not generated

(e) All of the above are true

A. (a) While not being used they will maintain a charged condition without injury for longer periods than the lead-acid type

Q. Detail the effects of improper warming up of a turbine.

A. If the rotor casing is not evenly heated, unequal expansion, resulting in distortion of the rotor or casing or both will take place. The result of this distortion is not very noticeable in small turbine installations, but in larger installations, the accumulative effects of this distortion due to temperature change, unequal expansion, and difference in the coefficients of expansion are very noticeable, and unless extreme care is taken to warm up large installations properly, serious damage such as rubbing of blades and diaphragm packing, etc. will be done.

MERCHANT MARINE SAFETY PUBLICATIONS

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

The Federal Register may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Subscription rate is $1.50 per month or $15 per year, payable in advance. Individual copies may be purchased so long as they are available. The charge for individual copies of the Federal Register varies in proportion to the size of the issue but will be 15 cents unless otherwise noted in the table of changes below. Regulations for Dangerous Cargoes, 46 CFR 146 and 147 (Subchapter N), dated January 1, 1968 and Supplement dated July 1, 1968, are now available from the Superintendent of Documents, price: basic book $2.50, Supplement: 20 cents.

CG No.	TITLE OF PUBLICATION
101	Specimen Examination for Merchant Marine Deck Officers (7–1–63).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (5–1–68).
115	Marine Engineering Regulations and Material Specifications (3–1–66). F.R. 12–6–66, 12–20–67, 6–1–68.
123	Rules and Regulations for Tank Vessels (5–2–66). F.R. 12–6–66, 12–9–67, 12–27–67, 1–26–68, 1–27–68, 2–10–68, 4–12–68, 6–1–68.
129	Proceedings of the Merchant Marine Council (Monthly).
169	Rules of the Road—International—Inland (9–1–65). F.R. 12–8–65, 12–22–65, 2–5–66, 3–15–66, 7–30–66, 8–2–66, 9–7–66, 10–22–66, 12–23–67, 6–4–68.
172	Rules of the Road—Great Lakes (9–1–66).
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (3–2–64).
175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3–1–65).
176	Load Line Regulations (1–3–66). F.R. 12–6–66, 1–6–67, 9–27–67, 7–12–68.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
184	Rules of the Road—Western Rivers (9–1–66). F.R. 9–7–66, 12–23–67.
190	Equipment Lists (8–1–66). F.R. 9–8–66, 11–18–66, 2–9–67, 6–6–67, 6–14–67, 6–30–67, 8–29–67, 10–7–67, 4–16–68, 4–17–68.
191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (5–1–68).
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (5–1–67), F.R. 3–30–68.
220	Specimen Examination Questions for Licenses as Master, Mate, and Pilot of Central Western Rivers Vessels (4–1–57).
227	Laws Governing Marine Inspection (3–1–65).
239	Security of Vessels and Waterfront Facilities (5–1–68).
249	Merchant Marine Council Public Hearing Agenda (Annually).
256	Rules and Regulations for Passenger Vessels (5–2–66). F.R. 12–6–66, 1–13–67, 4–25–67, 8–29–67, 12–20–67, 1–27–68, 4–12–68.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (1–3–66). F.R. 4–16–66, 12–6–66, 1–13–67, 12–9–67, 1–26–68, 1–27–68, 2–10–68, 4–12–68, 6–1–68.
258	Rules and Regulations for Uninspected Vessels (3–1–67). F.R. 12–27–67, 1–27–68, 4–12–68.
259	Electrical Engineering Regulations (3–1–67). F.R. 12–20–67, 12–27–67, 1–27–68, 4–12–68.
266	Rules and Regulations for Bulk Grain Cargoes (5–1–68).
268	Rules and Regulations for Manning of Vessels (5–1–67). F.R. 4–12–68.
270	Rules and Regulations for Marine Engineering Installations Contracted for Prior to July 1, 1935 (11–19–52). F.R. 12–5–53, 12–28–55, 6–20–59, 3–17–60, 9–8–65.
293	Miscellaneous Electrical Equipment List (4–1–66).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (10–1–59). F.R. 10–25–60, 11–3–61, 12–28–61, 4–10–62, 10–13–62, 8–31–62, 4–24–63, 10–27–64, 7–29–65, 8–9–66.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (1–3–66). F.R. 12–6–66, 1–13–67, 12–27–67, 1–27–68. 4–12–68.
329	Fire Fighting Manual for Tank Vessels (4–1–58).

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