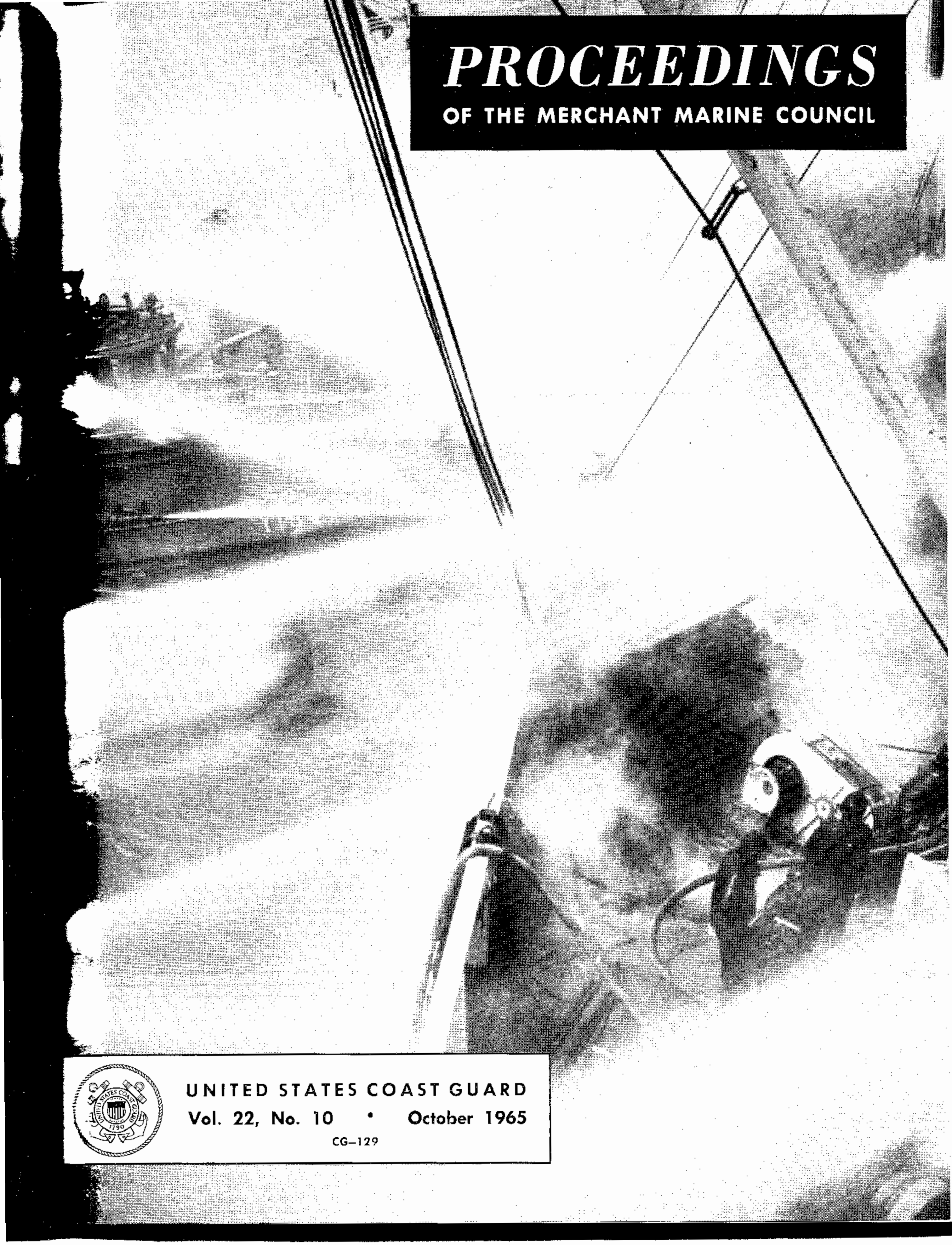
PROCEEDINGS
OF THE MERCHANT MARINE COUNCIL



UNITED STATES COAST GUARD
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IN THIS ISSUE . . .

Marine Fire Safety is examined.

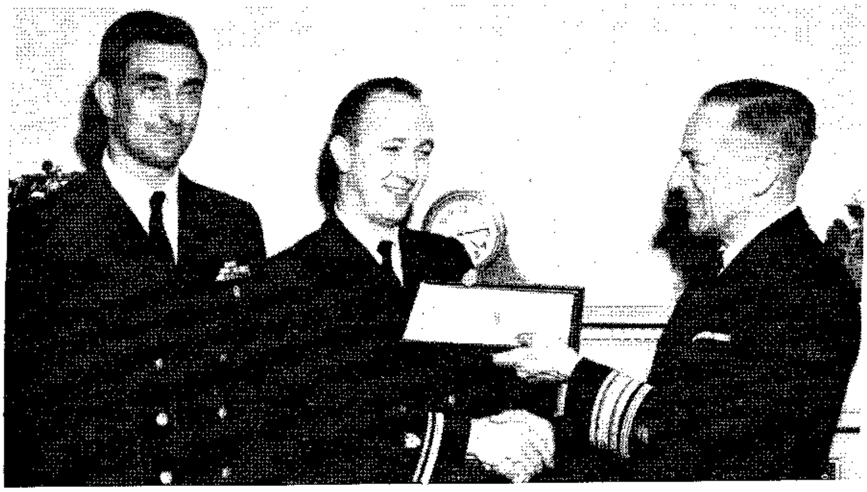
An article on updating fire prevention techniques, which has already brought its young author commendations, is featured beginning page 219.

How a progressive land based fire company would most probably do battle with a shipboard fire begins on page 223.

Experiments with very high expansion foam are reported on by one of the Navy's experts in the field beginning page 226.

Two more merchant marine training programs are carried on page 229.

SAR Seminar papers by participants from Great Britain begin on page 230.



LTJG DALE E. McDANIEL, USCGR receives the Secretary of the Treasury Commendation for Achievement Award Ribbon for his efforts in collecting information and experience relating to the design, operation, and maintenance of fixed firefighting systems aboard ships, and compiling this data into a technical publication. His work, which took up a large amount of his off-duty time to accomplish, should contribute greatly to merchant marine safety.

Presenting the award is Rear Adm. Charles P. Murphy, USCG, Chief, Office of Merchant Marine Safety. Pictured at left is Comdr. Robert I. Price, USCG Chief, Hull Arrangement Branch of the Merchant Marine Technical Staff. Lt. (jg.) McDaniel has written the feature article for this issue of the *Proceedings.*

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

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COVERS

FRONT: U.S. Navy firefighters from the U.S. Naval Damage Control Center battle blaze aboard SS *Polanica* near Philadelphia (*U.S. Navy*).

BACK: Coast Guard C–130 long-range SAR aircraft locates the burning French cargo ship MV *Marquette* 800 miles SE. of Newfoundland.

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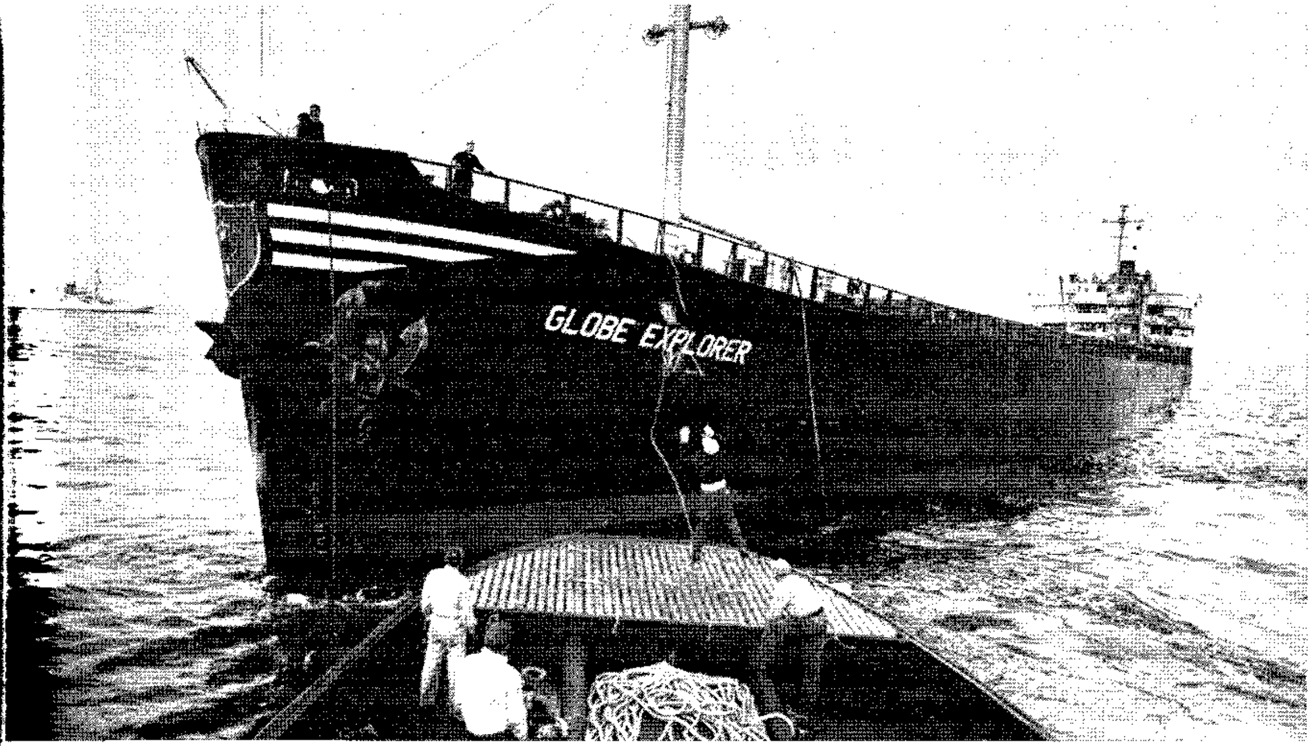


Jeff Blinn Photo Courtesy Moran Towing

Blackened bridge, fire disabled *Globe Explorer* is taken in tow.

Marine Fire Safety Today

Dale McDaniel

Utilization of computers to store and analyze fire data looking toward averting major fire casualties by "anticipating" them is the theme of this novel article by one of the Coast Guard's Fire Protection Engineers.

"FIRE AT SEA!" No seaman hears these words without a twinge of fear. Somewhere, he knows, a small group of men is pitted against an ancient and implacable enemy. They have no refuge in the limited world of their ship. Their choice is simple. Either they must control and extinguish the fire using their own courage and resourcefulness, or risk a hostile sea in open boats and rafts.

The problem may be further complicated by the cargo which the ship carries. Transportation of hazardous cargoes, particularly chemicals, is on the rise—many of these cargoes can cause difficult firefighting problems. When the cargo is people, the problem is even more complex. In this case, the crew must attack the fire and at the same time pacify the passengers to avoid outbreak of panic.

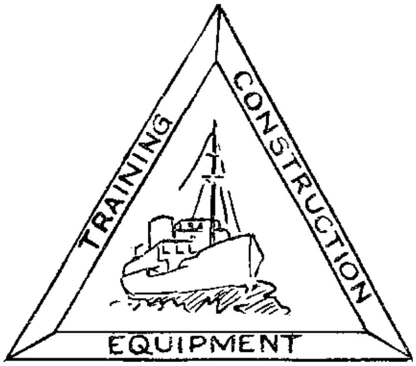
Elements of Proper Fire Protection

To provide a vessel's crew with every reasonable protection against fire, a three-pronged effort is necessary, dealing with:

(1) Construction of the vessel

(2) Adequate firefighting equipment, and

(3) Proper training of the officers and crew.



"Extinguishment Triangle"

All three are essential. To better illustrate this point, I will utilize an adaptation of the classic "fire triangle". As will be remembered, the three sides of the "fire triangle"—heat, fuel, and oxygen—represent elements *necessary for a fire to occur.* In my adaptation, the "extinguishment triangle", the three sides represent elements *necessary to eliminate fire.* If any leg of this triangle is removed, extinguishment of fire aboard ship becomes difficult if not impossible. A safely constructed ship with a well trained crew is helpless against fire without the proper equipment. Good equipment and a safe ship fall prey to fire without proper training. Good training and equipment are not enough to contend with a blaze on a highly combustible vessel.

Historical Development of Regulations

Until disaster drove the lessons home, past efforts to provide proper fire protection aboard vessels developed in a rather haphazard fashion, without a coordinated central effort to increase safety. However, in order to understand the historical developments more fully, they will be categorized according to the three sides of the "extinguishment triangle": construction, equipment, and training.

Construction

The intent of present regulations governing the construction of vessels is to:

a. Protect the means of escape,

b. Contain and extinguish the fire in the space of origin,

c. Isolate accommodation spaces from fire in cargo or machinery spaces, and

d. Limit the amount of combustible material.

Emphasis on the construction of vessels may be traced back and found to rest primarily on past maritime tragedies. Of these, the *Morro Castle* disaster was perhaps the most important single incident in terms of present requirements.

On September 8, 1934, the passenger vessel, *Morro Castle,* burned off the coast of New Jersey, within sight of shore. A combination of circumstances contributed to the tragic loss of 125 lives. The vessel had combustible linings and trim throughout the interior of the ship. Stairways were open from one deck to the next. Fire doors were not self-closing. There were also human errors which compounded the loss. The Senate of the United States conducted a hearing subsequent to that event and found, among other things, that the highly combustible construction of the vessel and open stairways played a significant role in the holocaust.

One of the consequences of the *Morro Castle* disaster was the formation of a Technical Committee on Safety at Sea. The Technical Committee, which was appointed by the newly created Senate Subcommittee on Department of Commerce and Merchant Marine, was formed to conduct what research was deemed necessary for the establishment of regulations. In 1936 and 1937, under the cognizance of the Technical Committee, a series of fire tests were conducted aboard the Steamship *Nantasket,* a vessel then in the laidup fleet. In the words of the committee,

> The dominating function of the entire program was the reproduction, in variously constructed enclosures, of an actual shipboard fire in such a manner that the extent and variety of its effects might be observed. The principal aim of the committee was the use of the resulting observational data in determining the safety or hazard value of various structural, functional, and decorative materials . . ." Following the tests it was concluded that with proper construction but without a fixed fire extinguishing system in the space, "any shipboard fire, no matter where its origin, could be confined indefinitely within a limited zone, thereby obviating the necessity for abandoning ship.

The experiments aboard the *Nantasket* served as the basis for establishing new construction regulations and revising existing construction regulations with respect to fire. They are also the basis of current Coast Guard structural fire protection regulations.

Equipment

Impetus for providing proper firefighting equipment was also a product of marine tragedy, notably the *Morro Castle.* Early regulations required sprinkling systems aboard passenger vessels when combustible materials were installed. As additional fire hazards were recognized, requirements were gradually expanded to protect all of the more dangerous spaces aboard ship. Today, aboard U.S. vessels, one may find fixed extinguishing systems employing carbon dioxide, sprinklers, foam, and water spray in addition to portable and semiportable extinguishers and an installed fire main system.

Research has also been significant on the equipment side of the triangle. Outstanding work concerning maritime fire research was done by the Coast Guard Fort McHenry Fire School during World War II. This school has since been closed. Here, tests were conducted on the extinguishment of fires in both cargo and machinery spaces. The guinea pigs were actual vessels which had outlived their economic usefulness. For example, one series of tests was conducted to measure the comparative effectiveness of carbon dioxide, steam, and water spray in extinguishing baled cotton fires in ships' holds. Another series was intended to develop techniques for extinguishment of machinery space fires by the use of water spray. Some of this latter work was incorporated into a book entitled "Attacking and Extinguishing Interior Fires" published by the National Fire Protection Association.

Training

Aboard ship, firefighting assistance is not as close as the telephone; the crew must be its own fire department. And yet, the training leg of the triangle has been the most neglected. Training merchant crews to fight fires reached its peak in the United States during World War II, when several well-attended firefighting sch were operated by the Maritime ministration. Lack of interest f the closing of most of these sch Today, the Maritime Administr has an agreement to use the M firefighting schools in New Jerse San Francisco. These are the two merchant schools in existe Merchant seamen may also a Naval Firefighting Schools at P delphia or Treasure Island wi cost for the training. It has estimated that approximately third of the licensed personnel g to sea have attended firefigh school. The majority of that g are sailing on subsidized vessels the tanker fleet.

Effectiveness of Present Approach

The effectiveness of attemp provide proper fire protection for sels, or to keep the three sides o "extinguishment triangle" closed. only really be measured by obse the current trends in vessel cons tion and by examining recent ca ties. Analyzing, again, the elem of construction, equipment, and tr ing, one fears that perhaps methods of approaching the prob of fire at sea will not suffice in future. Let's look at the facts.

Construction

It was noted that two elem tragedies and limited research, the major stimuli towards solving construction problem in the past.

Traditionally, the necessity changing regulations has been rec nized from reports of serious a dents. If a casualty, or casua pointed up a weakness of design, re lations were changed to preven recurrence. There was perhaps s reason for adopting a follow- tragedy approach to provide safe sels 30 years ago. It was the first the Government had made a c certed effort to increase the fire sa of American merchant vessels. Th were few facts upon which to dev a scientific approach to the probl This was also the era before speed, electronic calculators.

Today, with the capacity of c puters to store and analyze data, th is every reason to believe that ma casualties can be averted by ant pating them, using scientific meth Why not make maximum use of electronic equipment to help solve problem at hand? To use such approach would force abandonm of the idea of thoroughly investig ing only the major casualties to ga the facts needed. It would mean t the near misses would require much attention as the direct hits.

Here is a good example of the of feedback:

> A tanker had finished discharging cargo and was proceeding in a ballasted condition while completing a stripping operation on tanks which had been used for the carriage of gasoline. A new ventilation system had been installed in the pumproom less than a year before. Some hours after the stripping operation began, the turbine governor apparently malfunctioned, running-away, flying apart and shattering the housing. This apparently caused ignition of an overly rich (or overly lean) explosive concentration of gasoline vapors in the pumproom. The resulting explosion was minor, scorching paint on the pumproom bulkheads and causing $500 damage. A subsequent fire was easily extinguished and the event was dismissed.

This case deserved more consideration. Examination of several factors which combined to cause this minor casualty might have helped prevent a future disaster. Why did the governor malfunction? Was it of poor design? Was it improperly maintained? Why was there an explosive mixture in the pumproom when the power ventilation system was in continuous operation prior to the casualty? Was the system poorly designed? Improperly installed? Are the requirements for ventilation of pumprooms inadequate? The case points up the need for feedback through more detailed investigation.

Turning a moment to the effectiveness of past research, the kindest thing that can be said about it is that it was good as far as it went but that it didn't go far enough.

There is a deplorable lack of research on the prevention of fires in the marine industry. There is no lack of new ideas or proposals, but seldom is a comprehensive test program undertaken to demonstrate that the new proposals will provide a satisfactory degree of safety. The proposed use of aluminum is an example of this lack of research. As far back as the 1940's aluminum was proposed in areas where fire integrity of structure is essential. Fire testing of combinations of aluminum-insulation component systems has been very limited. One test, the Stateroom fire test, was conducted in 1950.

> It had been argued that since combustible materials had generally been eliminated as construction components of accommodation, safety, and service areas, Coast Guard requirements for containing a fire to the space of origin were overly safe. The Coast Guard contended that the regulations were necessary because the occupant of a stateroom brings his own fuel in the form of clothing, etc. In order to settle the difference, an "incombustible" stateroom, which contained clothing, bedding, etc. as the only combustibles, was constructed and set afire. The resulting blaze approximated the standard fire curve[1] for 30 minutes. This test answered the immediate problem, but did not provide any guidelines for future action.

Following the Stateroom fire test, almost no testing was undertaken. However, proposals for the use of aluminum continue; in fact, the number of proposals has increased recently. Hopefully, there is a happy ending to some aspects of this problem. Continuous encouragement by the Coast Guard has produced a scientific test program which will evaluate aluminum as a material for use in accommodation areas. There are other problems which the testing program will not cover, but it is a good start.

There is an additional factor which causes concern over using the traditional method of major casualty evaluation in the future. That is, that the people who experienced the initial trend toward fire-safe construction are no longer directly involved with the fire protection problem, but have risen in management or retired. At the same time the technical aspects of maritime safety have become much more diverse. There are other people involved, people who perhaps do not understand or appreciate all aspects of the problem because they did not do the research, and have not had to promulgate new requirements after a serious disaster. It is something like being given the answer (in the form of regulations) and then being asked to find out what the problem is. Those who are content to accept the solution given may find that when the problem changes, their answer is wrong.

It can be easily imagined how the lack of feedback and lack of research weaken the equipment side of the triangle as well as the construction side. Therefore, these elements will not be discussed in detail.

Instead, to better understand the rapidly changing nature of the problem, it is necessary only to look at the changing nature of the cargoes. As alluded to in the introduction, transportation of chemicals is on the upswing. Traditional firefighting equipment may well be ineffective in combatting fires in many of these chemicals. For example, the foam system required to be installed aboard tank vessels would be ineffective on alcohols, ketones and similar water-soluble commodities. Likewise, the carriage of liquefied inflammable gases such as propane, butane, ammonia, and even methane and hydrogen present new problems in providing the proper firefighting equipment. Even the nature of some package cargoes may require modification of traditional fire systems.

One final comment before leaving the equipment side of the triangle. When was the last time that a new fire extinguishing system for cargo holds was introduced? The "latest" in cargo hold protection is carbon dioxide. This system dates way before my time. Are we to assume this is the ultimate in fire protection? Is no progress possible?

Training

The best way to train people to fight fires is to fight fires. It is useful, and perhaps essential, to understand the nature of the cargoes carried and effectiveness of firefighting equipment. However, such understanding is of little value in an emergency if no one has previously practiced braving some smoke to man a hose stream. It was mentioned earlier that approximately one-third of licensed personnel sailing today have attended firefighting school. Is this enough to form a hard core nucleus for firefighting aboard ship? From examination of some recent casualties, the answer is *no*. It appears that the quantity of trained personnel will be inadequate in the future, if not today. In a recent report of a tanker fire the crew testified that their fire and safety training consisted of weekly safety meetings between the officers. What kind of training is that? The ship, by the way, was lost by fire following a collision.

Three additional casualties which illustrate concern over proper training also come to mind. All occurred recently aboard U.S.-flag merchant vessels. Attention is invited to the fact that these casualties also involve a lack of feedback which was previously discussed.

a. A tanker had just finished loading cargo when a heavy "gassy" smell was noticed in the pumproom. It was discovered that the steam exhaust blower was not operating even though the steam was turned on. During an attempt to repair the blower an explosive mixture of gas in the pumproom was ignited causing a flash fire. All of the crew was on board because the vessel was preparing to get underway. The fire was quickly extinguished when the chief mate released CO_2 into the space. However, in the meantime, of the 28 crewmembers aboard, 11 jumped to the dock and 11

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[1] The standard fire curve is one which reaches a temperature of 1000° F. in 5 minutes, 1,300° F. in 10 minutes, 1,550° F. in 30 minutes, and 1,700° F. in 1 hour.

climbed down the stern lines. Two fell from the stern lines, one was killed and the other seriously injured. Of the 6 who stayed aboard, 3 were asleep.

Admittedly, it is not a pleasant prospect to face a fire aboard a tanker, especially with the "safe" shore so close. But what if the vessel had been at sea? Was the crew unaware that a fixed carbon dioxide system was installed in the pumproom? Even if the CO_2 had not been 100-percent effective, extinguishment could have been accomplished if water spray applicators had been brought into play immediately. However, this could not be done effectively without the majority of the crew. Two crewmembers and the one shoreside operator aboard turned in a fine record of performance, but, the event does not speak very well of the crew's training. Here's another:

b. After discharging a portion of her cargo, a new cargo vessel was proceeding to another port. Cargo of baled rags, remained in the bottom of No. 4 hold. During a routine inspection of the No. 4 'tween-decks, from which cargo had been discharged, smoke was seen emanating from the lower hold. The smoke was coming through 1-inch gaps between sections of a hydraulically operated folding hatch cover. Ventilation was closed off and a charge of 1,800 pounds of carbon dioxide discharged into the hold. It was left there for 1 hour and 25 minutes, then the deck hatch was opened and it was determined that the fire was not extinguished. Hatches were reclosed and 3,700 pounds of CO_2 injected into the space over a period of 2 hours and 55 minutes. Again, the CO_2 was thought to have had little effect. The deck hatch was reopened, with fire hoses at the ready, and exhaust fans started. Shortly thereafter the lower 'tween-deck cover was opened and the smoldering fire burst into flames. It was attacked with hose streams and the burning bales were removed to deck. The fire was extinguished with very little resultant damage to the vessel. Source of the fire, while not positively identified, was thought to have been caused by a lit cigarette dropped into the lower hold while the 'tween-decks were being unloaded.

On the surface, this is a success story difficult to contest. Looking deeper, however, some interesting facts come to light. The quantity of carbon dioxide aboard the vessel would probably never extinguish a fire in baled rags. In cargo holds, the objective of the CO_2 system is not necessarily extinguishment but control of the fire. Proper operation of the CO_2 system is, usually, to seal the burning hold tightly, using tarpaulin if necessary, and inject an initial charge of CO_2, e.g., 1,800 pounds. This hold is then kept sealed and additional CO_2, e.g., 150 pounds, added at intervals of, say, 2 hours to maintain the concentration and keep the space cool. Watch is maintained to assure that bulkheads and decks do not become overheated, water spray being applied if necessary. This procedure is continued until the vessel can reach port and the hold opened and extinguishment with water[2] completed. Such a procedure aboard this vessel would have permitted maintaining the CO_2 concentration for approximately 2 days with only the CO_2 available aboard the vessel. It was dangerous to open the lower hold while the vessel was at sea and without immediate assistance available, although after most CO_2 had apparently been injudiciously used, it was probably imperative. Doing this under different conditions could cause loss of a vessel. Perhaps water spray could have been injected into the hold in lieu of opening the hatch cover if additional cooling was needed. Apparently, the proper function of a CO_2 system in such a fire was not appreciated by those on board.

Again there are questions to be asked. A smoke detecting system was installed, but the fire was discovered before the alarm sounded. Was the detecting equipment in satisfactory condition? Did the alarm ever sound? It seems a possibility that the fire occurred, not from a cigarette, but from a deep-seated fire started while baling the rags and which received the oxygen necessary to flare only after number four 'tween-deck had been unloaded. A final example:

c. A short while after leaving port, a grease fire occurred on a grill in the galley of a medium-sized passenger vessel. The cooks attempted unsuccessfully to combat the blaze with portable fire extinguishers. Failing, they retreated from the galley area and the fire alarm was sounded. Three hours and 15 minutes later the fire, which at one time was thought out of control, was extinguished. The galley was gutted and flooded. There was no loss of life, no serious injuries. Passengers had nothing but praise for the crew and the crew for each other. Reports glowed of the excellent firefighting efforts.

Excellent? Three hours and 15 minutes to extinguish a fire in which the galley was gutted, flooded, burned out?

Organized firefighting efforts confused and really didn't get un way until about 45 minutes after start of the fire. This could have b disastrous. A gas mask, instead oxygen breathing apparatus was u The emergency wiring system bu out because it ran through the gal Heavy smoke was on the deck ab the galley in the passenger qua within 10 minutes after the star the fire. But for the fact that screen doors were closed from bridge, and the automatic fire dam in the galley exhaust closed, the a good chance that the vessel m have been lost.

None of these three casua aroused a great deal of concern, parently because of the comparat minor damage and/or no loss of In no instances were there so recommendations by the officers. crew, or the investigators. And in retrospect, these cases were n misses. In each instance a trag was prevented only by a combina of fortunate circumstances.

On the other side of the coin th are many casualties which attes the timely and effective efforts of crew as well as the effectiveness equipment. The following case is example:

d. A cargo vessel was steam toward her destination when smoke detecting system indicated fire in the lower 'tween deck space No. 2 hold. Baled rags were sto in this space. Automobiles and o cargo were stowed in the upper 'tw decks, making any attempted insp tions impossible. The hold was sea and 1,100 pounds of CO_2 released i the lower 'tween decks. Tempera of surrounding bulkheads was pe odically checked by the ingeni method of lowering a thermome down the sounding tube and ad tional CO_2 released as necessary control the fire. The fire was c trolled in this manner until the ves safely reached port, unloaded ca from the upper 'tween decks and tinguishment of fire completed w hose streams as the burning cargo removed.

This was an excellent effort wh assured the maximum safety of b the vessel and the crew.

An additional reason for conc is that cargoes are changing and require different firefighting te niques. This is particularly aboard tank vessels on which the fo system is just now becoming comm place. A foam system requires so specialized training. Another portant factor which illustrates

(*Continued on page 228*)

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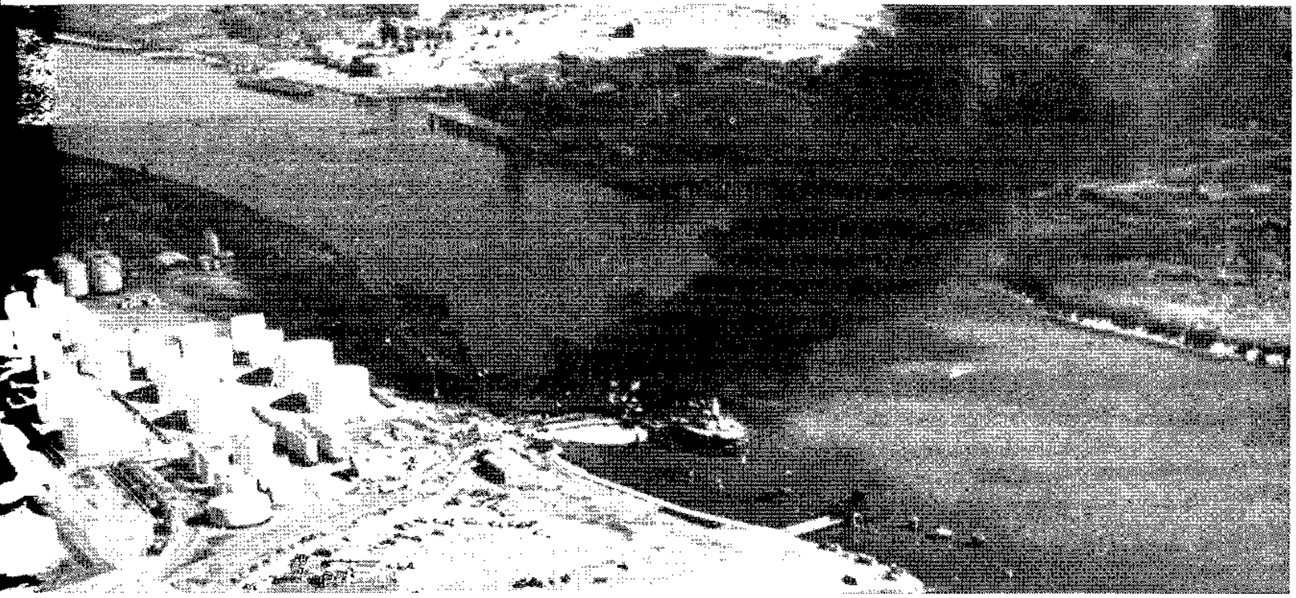
[2] Extinguishment can be completed in port by leaving the hold closed and adding sufficient CO_2 to reduce the oxygen concentration to almost zero. This method would probably require a considerable length of time to effect extinguishment.

Land Based Fire Companies

Fight Shipboard Fires

Curtis W. Volkamer
Deputy Fire Marshal, Chicago Fire Department

This issue we draw heavily from the enlightening Spring 1965 meeting of the National Safety Council, Marine Section. Like Mr. McDaniel's article on page 219, the accompanying work has been adapted, by the author's permission, from a presentation he made to that gathering.



FIREFIGHTING ABOARD ship, whether it be in drydock or afloat, is the exception rather than the rule for land based fire companies. Their training has more or less been patterned along definite lines, with a certain amount of latitude and flexibility so necessary to adjust to changing conditions. This is not to say that a like amount of latitude and flexibility would not be needed in fighting a fire aboard ship. But, it is to say that basic concepts may have to be altered somewhat in the approach to, and extinguishment of the fire, even to the point where cardinal rules of fire-behavior would be violated.

The most striking example of this lies in the dissipation of heat generated by the blaze. Here lies the major difference between the two methods of approach. First, we have a fire company in the process of extinguishing a fire in a large building, perhaps a warehouse. After the usual preliminary quick, but accurate, size-up which includes evaluating the life hazard, attention is focused on exposures and ventilation.

There may not be an exposure hazard, depending on just where the warehouse is located with reference to other buildings. The officer knows about the transmission of heat through conduction, convection, and radiation, causing—let's use the term—secondary fires. In this case, with the warehouse practically isolated, he can devote all his efforts toward making a direct attack upon the atmosphere through vents, such as doorways, windows, skylights, elevator shafts, and the other natural openings in the building, including whatever openings are made in the roof, or other places, by the firefighters themselves.

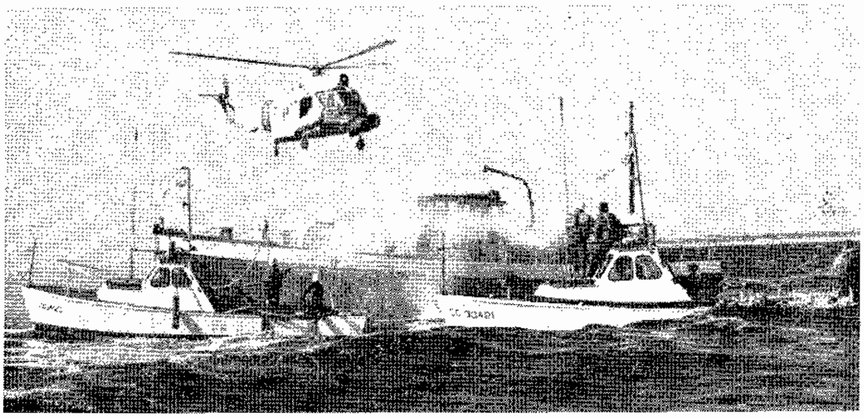
With ventilating effected, heat and noxious gases will be removed, and firefighters can advance to the seat of the fire, and by properly and judiciously applying water can reduce the temperature of the burning material below the ignition point. The material can no longer support combustion; the fire is extinguished. If, perhaps, more water is used than is absolutely necessary to extinguish the fire, the surplus can be drained off by various methods to relieve the floor load. It can be squeegeed down the stairs and out of the building, run out of windows by means of improvised chutes.

This building is essentially cement, brick, stone, and wood—the transmission of heat through these substances is retarded considerably, sometimes halted to the point where there are no secondary fires in materials stored in adjoining sections of the building, provided, of course, there is no break in the fire wall. You have heard the expression, "A chain is only as strong as its weakest link." This saying is never more accurate than when applied to a fire wall. There are many cases on record where a single brick, removed from a fire wall, perhaps to permit the passage of pipelines, was not replaced, causing extensive fire spread.

You will note that earlier I made reference to dissipating the heat *upward* into the atmosphere. Lest there be any misunderstanding, let me hasten to add that there can be dissipation of heat in other directions also, even downward under prescribed conditions; but under normal fire conditions, heated air and gases lighter than air tend to rise, and if provided with an avenue, will escape upward to the outside air.

Contrast the foregoing, if you will, with a fire in the hold of a ship. The heat generated by the fire cannot easily or readily be dissipated to the surrounding atmosphere, if indeed, it can be done at all. As a result, the heat is reflected back upon the burning material and adjacent structure, causing a rapid buildup which greatly accelerates the combustion process—a sort of chain reaction, as it were, where one thing begets another, or a combustion reaction, as in a furnace.

Metal structures, and these primarily are metal structures, transmit heat considerably faster than the material of which our hypothetical warehouse was constructed; namely, cement, brick, stone, and wood. Adjoining compartments will be subjected to quick and intense heat which will rapidly ignite fuel and materials. These secondary fires will in turn generate sufficient heat to be transmitted to adjoining compartments through metal barriers which are almost no barriers at all. In effect, the situation is one in which we have a huge area divided into compartments by metal plates which are relatively ineffective in offering substantial resistance to the passage of heat.



You may, under these conditions, look for the complete burning of all combustible materials if the fire is unchecked and sufficient oxygen finds its way into the hold. Even materials which are considered safe by many laboratory standards and tests will enhance propagation and spread of fire when confined within a ship's structure under conditions quite unlike those which prevail during a controlled and regulated laboratory test.

Another point in which these two types of fires differ is in the use of water to extinguish the blaze. In our warehouse fire, you will remember, we drained off the surplus water to relieve the floor load, squeegeed it down the stairs and out of the building, or ran it out of windows by means of improvised chutes. In the hold of a ship, there are no stairways leading to the outside; you can't run the water out of the window (in this case it's a porthole) if the porthole is below the water level. The fire itself won't sink the ship; but the firefighters can and have in some cases, by introducing copious and ineffective amounts of water into the hull structure, and neglecting to remove the accumulated water by ignoring a common precept in shipboard firefighting:

Never pour more water into a ship than you can pump out.

The modern ship that is operative is equipped with the latest fire-detection and alarm systems; smoke detectors, fixed-temperature, and rate-of-rise detectors. Fire prevention has been uppermost in the minds of shipbuilders in recent years. Shipbuilders are becoming more and more fire-conscious, and operate on the premise that the best way to put out a fire is not to have one. But we in the fire service know that, in spite of all the precautions which are taken, fires do happen; and they happen when our common enemy, uncontrolled fire, attacks us at our weakest point; the human element. About 90 percent of all fires are caused by carelessness, which is another way of saying that the human element has succeeded in blocking our efforts at fire protection in spite of all we can do to defend ourselves. If we are to be honest in our appraisal, we must admit that the human element will be with us forever; we can never eliminate it—*but* we can reduce it to an irreducible minimum; to a point where its potential is almost nil.

To this end, manufacturers of detection and extinguishing systems have gone to great lengths to outdo one another in placing on the market a product as foolproof as it can possibly be. They have come a long way from the time when, in some instances, fire-detection and fire-extinguishment consisted of a plodding, aged watchman, flashlight in hand, trudging endlessly up this stairway and that, down that corridor and back up this aisle. Upon discovering a fire, this watchman invariably did the following things: He looked for a portable extinguisher, probably breathing a silent prayer that he could put it to work; spent a few precious seconds reading the directions; after activating the extinguisher, he aimed the nozzle and discharged the contents in the general direction of the blaze. Then he went to the nearest telephone and

called the Fire Department. Q
often, by this time, the fire had ga
considerable headway and prese
a real problem to the firefigh

Today's industrialists, howeve
not place their reliance on such a
or-miss procedure; and when I
the word "industrialist," I mean
to include shipbuilders and
owners. They employ the latest
best methods of fire-detection
fire-extinguishment — total floo
with carbon dioxide, inert gas syst
foam systems, different types
sprinkler systems, high-press
water spray, and of course the la
in portable fire extinguishers, a
iary fire pumps to supply wate
standpipes and hose reels.

To detect the presence of heat
smoke we have a tremendous a
of devices, limited only by the
genuity of man; devices which sp
into action if the temperature of
room rises only 5 degrees in 20
onds, or if a predetermined amou
smoke is present, or if the heat of
room reaches a certain tempera
Some devices combine several fea
so that they detect fast and smo
ing fires. Another device used
tensively in another country, w
shall remain nameless, uses a ra
active material as its componen
react to the invisible products of c
bustion and detect fire itself, e
though there is no visible smoke, h
or flame. While most detectors f
tion only when the fire has progres
enough to produce smoke or hea
both, this device detects fire, pure
simple, sounds an alarm, and activa
extinguishing equipment long be
the operation of conventional the
or reflected-light-principle devices
believe this somewhat revolutio
departure is all the more remark
when you contrast the usual area c
ered by some conventional detec
(about 225 square feet) with its p
tection area (about 1,000 square fe
and when you realize that the ra
active component has a half-
measured in hundreds of years.

As yet, we have had no spectac
ship fires in Chicago, inasmuch as
are just recently accommodating s
going vessels; but you may be s
that in such an event, our Sno
(A high-lift personnel-bucket c
not unlike those mounted on t
bodies to facilitate high line and
work by electric and telephone c
panies) units will be brought
play. Whether the fire is in
superstructure or confined in the h
you may be sure that this versa
unit will be brought into the pictu
and we offer the Snorkel or a sim
unit for your serious consideratio

Fighting a fire in the superstruc
of a ship would present prob

which could be compared with fighting a fire in a high-rise building. The value of this 85-foot extension unit becomes apparent at once. With a ladder at the eighth- or ninth-floor level, and with a reach of stream of over 100 feet, there is hardly a spot which could be out of range. It can be seen that laterally, too, this type of equipment can be used to good advantage. According to accepted practices, fires in superstructures must not be permitted to extend below deck, and fires in holds of ships must be confined so that extension to superstructures is not permitted.

Except when smothering a fire through an installed carbon dioxide system, fires which involve the cargo in the hold of a vessel must be fought through ventilators, hatches, portholes. It may be that an opening must be made, and there you would resort to cutting torches or like equipment. In this category, there is a relatively new saw, the K 12, equipped with special abrasive cutting wheels, carbide-tipped blades, etc., to cut through bulkheads or deck to facilitate firefighting operations.

We know that water poured indiscriminately into the hold of a ship may cause the ship to sink. Let us consider the use of foam instead—not ordinary foam with a ratio of expansion of 8 to 10 to 1, but high-expansion foam with ratios from 200 to 1,000 to 1.

High-expansion foam itself is not new; it has been used as far back as 15 years ago. Years ago, it was used in Great Britain with good results in coal mine fires. However, its application in industry is rather new, actually only in recent years.

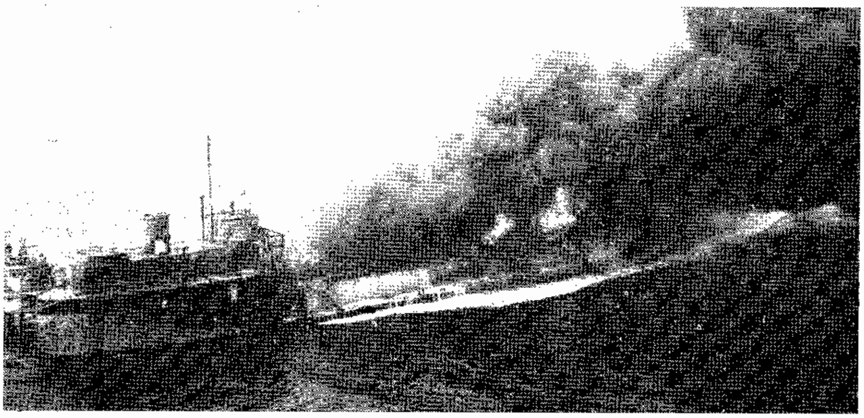
In the simplest sense, high-expansion foam is air-filled water bubbles—air wrapped up in water. To use high-expansion foam, an enormous number of these bubbles are made continuously, producing thousands of cubic feet of foam per minute. Manufacturers determine the materials used and the size of the bubbles produced.

Many tests have been conducted which have established that high-expansion foam is feasible, practical, and useful. Of course, we know it is not the answer to all of our problems; but it does have a place in firefighting.

Basically, high-expansion foam can be made by spraying a foam concentrate-water solution evenly over a net. Air is blown through the solution and net to form bubbles, which can be enormous in number, depending on the size of the equipment. The foam is directed or channeled by means of cloth flexible tubes. Again, regardless of whose foam it is, or what name it has, the concentrate itself is a wetting agent-base chemical.

Usually, firefighting foams have an expansion ratio of from 8 to 10 to 1. These are generally unsuitable for fighting deep-seated class A type fires. The foam which we are discussing has a ratio of 1,000 to 1; hence the term high-expansion foam, very relative and general, meaning that the liquid is expanded on the order of 1,000 times in volume by blowing air into it to form bubbles.

High-expansion foam is very light and fluffy. A piece the size of a living room couch would weigh only about a pound. Because it is light and fluffy and can be produced in huge quantities, it is well-suited for volume filling, that is, filling an entire fire area or even an entire building. This is not only possible, it is entirely feasible and practical. In fact, it has been found that in most cases of fire in which the foam was used, filling the room could hardly be avoided.



We mentioned earlier that in shipboard firefighting we have no opportunity of runoff or excess water shed except possibly through scuppers.

High-expansion foam, introduced into burning compartments, completely filling same, and if need be, adjoining compartments, where steel bulkheads may be dangerously conducting heat to a second source of ignition, be it cargo, building supplies, or scaffolding obviates dewatering. The weight problem is nil, too; and fire, if not completely extinguished, will have reduced temperature to the point where handlines may be advanced for any deep-seated fires. In this respect, it acts much as carbon dioxide but without the associated life hazard due to possibilities of asphyxiation.

After the use of this foam, a natural question might be, "How do you get rid of a building or compartment full of suds, to say nothing about what the suds may be doing to the contents?"

Actually, there is very little to worry about in these areas, and the reason is simple. A fairly large house probably has a volume of about 15,000 to 20,000 cubic feet. Filling it completely with high-expansion foam would put about 20 cubic feet of water in it, really not very much when spread around a whole house and its furnishings. In other words, the undesirable effects of the water in the foam would be practically nil in the majority of cases; or, at least, the effects would be within acceptable limits.

If a 100,000-cubic-foot area were filled with high-expansion foam and closed up, within a few hours, or certainly by the next day, there would be very little evidence of the foam. It would have broken down, and most of the 100 or so cubic feet of water that was in it would have been absorbed and evaporated; there might be no more evidence of water than a few small puddles, if even that.

A few years ago, a test was conducted to determine the fire-extinguishing quality of high-expansion foam. The building chosen, approximately 150,000 cubic feet, provided an unobstructed flow. Two test fires were set, one in wood and the other in gasoline.

The 150,000-cubic-foot test building was filled with high-expansion foam at a generating rate of about 50,000 cubic feet per minute, taking, in all, about 3 minutes to fill the building. This foam-generating test confirmed the claim that the foam could be made in huge quantities, and it put out both fires. The results would have been the same at a lower generating rate, except that more time would have been required.

Incidentally, another test was conducted which involved a huge pile of rubber tires in a crib, a very difficult type of fire to extinguish, as any one in the fire service can attest. High-expansion foam extinguished the fire of rubber tires in an extremely short time.

What caused these fires to go out? Actually, there are several reasons.

(*Continued on page 238*)

Investigation of a Relatively New Procedure for Shipboard Firefighting

Using High-Expansion Foam On Hydrocarbon Fires

By Milton Lambert

Reprinted From FIRE ENGINEERING, April 1965

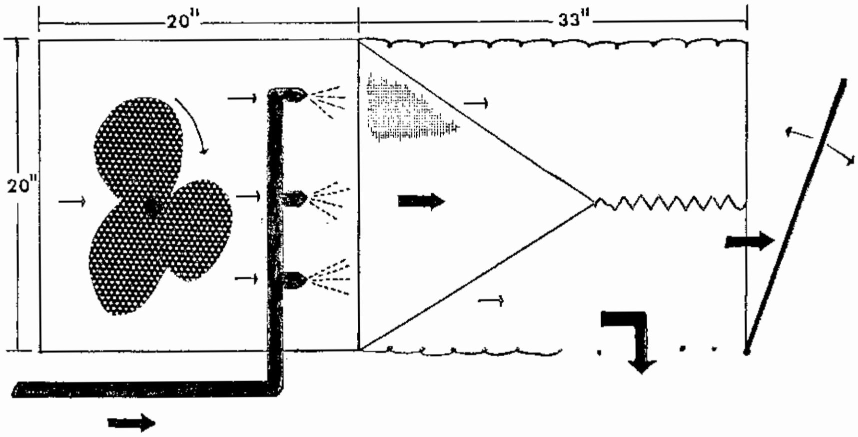


FIGURE 1. *NASL portable high-expansion foam generator.*

EXTINGUISHING any compartment fire presents a difficult problem. The problem is greatly increased aboard ship because of the difficulty of access to the area and the obstacles presented by machinery and equipment. These factors led to a study of high-expansion foam extinguishing methods as a possible solution.

In current Navy firefighting practice, standard foam which expands to approximately nine times the original volume of the solution, is used. This provides a relatively durable blanket which suffocates any hydrocarbon fire. Although this agent is highly efficient, it has the disadvantage of being relatively viscose, and must be applied directly on the fire. This limitation requires that the firefighters at least partially enter the compartment in order to be able to bounce the foam off a bulkhead to reach parts of the enclosure not directly in front of or beneath the access hatch.

Another disadvantage of this type of firefighting lies not in the foam itself, but in the nature of many shipboard fires, particularly engine room fires. These are usually hydrocarbon fires which produce voluminous smoke that obscures the exact location of the source, and which radiate intense heat. This makes even partial entry into the compartment extremely uncomfortable.

The U.S. Naval Applied Science Laboratory has been studying foams with expansion ratios of up to 500 to 1. At this expansion, and using the solution at the rate of 30 g.p.m., 2,000 cubic feet of foam are generated every minute. This is enough to fill the engine or boilerroom of a destroyer in a few minutes.

Equipment design

A portable generator was developed by the laboratory to study the foam. It measures 20 by 20 by 20 inches, weighs 65 pounds and can easily be passed through ship passageways by two men. A fan delivers 5,250 cubic feet of air per minute. As shown in figure 1, a pressurized mixture of foam agent and water is discharged through the foam generator's spray nozzles wetting a cloth screen. The foam is generated as air flows through the screen. A spring-loaded collapsible discharge device automatically extends to position the screen, prevent snagging, and direct the foam either horizontally or vertically. The horizontal and vertical openings in the device fit the standard 18-inch ship scuttle. The unit takes 27 gallons of solution per minute at an inlet pressure of 40 pounds per square inch.

The tremendous volume of bubbles produced is pushed into the fire area where control takes place in three separate and distinct manners. First, unburned fuel is engulfed in foam and thus inactivated; second, oxygen is removed from the fire by displacement, because when foam is pushed into the area, an equal volume of air is displaced; third, when the foam hits the fire, it is converted into steam displacing still more air. The oxygen content of the fire area may be reduced sufficiently to inhibit combustion. The high-expansion method of firefighting is a means of increasing the throw of an extinguishing agent. The main feature of the method, however, is that it allows the firefighter to operate from a safe position outside the compartment.

Test procedures

Tests were conducted with six formulations of high-expansion foaming agents most of which had a lauryl-sulfate base. Special formulations were prepared for use with sea water. Expansions as high as 500 to 1 were obtained.

For the 20-by-20-by-8-foot compartment, high-expansion foam entered from the generator positioned adjacent to the compartment, with its cloth screen inside an opening near the bottom of the side wall. Temperatures were recorded on a multistation recorder by means of thermocouples located 1 foot below the roof. Tests simulated open-flame fires, shielded-flame fires, and fires caused by a jet of fuel impinging on a hot surface.

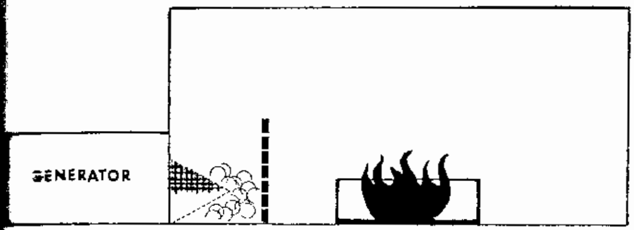
The start of foam application began when the temperature 1 foot below the roof of the compartment reached 600° F. and was continued until approximately 15 seconds after the fire had been extinguished. Observation was continued until the temperature had dropped below 300° F.

Three parameters were measured: The time required to arrest the flames; the quantity of agent applied per minute; and the time required for the temperature below the roof to drop to below 300° F.

The effectiveness of the foam was judged on the basis of these data.

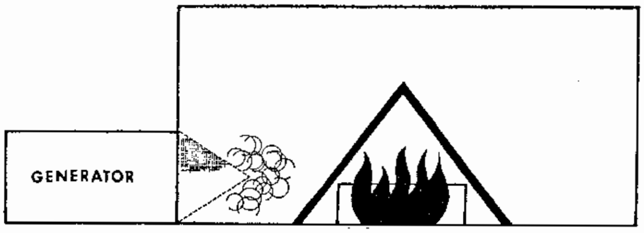
Open compartment fire

In one arrangement, the fire in the compartment was confined to a 3-



Arrangement	Fire Ext. Time Min.: Sec.	Temp. Reduc. 600°F to 300°F Min.: Sec.
Open	0:59	1:25
Shield	1:05	1:55

FIGURE 2. *Compartment fire (open).*



Fire Ext. Time Min.: Sec.	Temp. Reduc. 600°F to 300°F Min.: Sec.
1:25	1:45

FIGURE 3. *Compartment fire (shielded).*

[illegible]-by-18-inch-high open tank in the center of the room. In some of the tests a shield was placed in front of the entering foam as shown in figure 2. The foam flowed onto the deck and rose at a rate between 2 and 3 feet per minute. In some cases the inlet for the foam was located 6 feet above the deck. This experimental setup simulates a high-intensity fire in which the foam can flow directly into the burning fuel. The high-expansion foams were successful in extinguishing the fire and no reflashing occurred. The fire was extinguished within 30 seconds after the foam started flowing over the fuel, and the overhead temperature was reduced to 300° F. in approximately 1 minute. The shield did not materially affect the time required for extinction.

Shielded compartment fire

In another arrangement, shown in figure 3, the flames were well-shielded in a vented steel tent. This type of fire simulates fuel burning in an inaccessible area with low-intensity flames. High-expansion foam again used successfully and no reflash occurred. The results showed the fire to be extinguished approximately 1½ minutes after the start of the flow of foam, and the overhead temperature was reduced to 300° in approximately 2 minutes.

For comparison, low-expansion foam, water, dry powder, and CO_2 were also used on compartment fires. With these agents it was essential that they be applied directly on the fire in order to extinguish it.

Broken fuel line fire

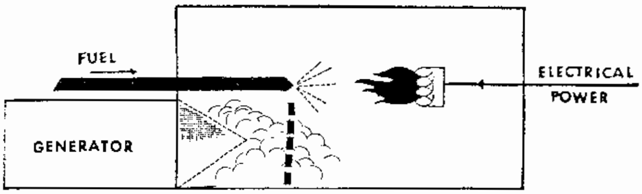
In a third series of simulated compartment fires, fuels impinged on a hot surface with flames either shielded or open to the extinguishing agent, to create a condition such as might come from a leaky or broken pressurized fuel line (fig. 4). All fuels except gasoline were preheated and discharged from a spray nozzle at temperatures between 120° and 190° F. Fuel discharge pressures were between 40 and 60 p.s.i., with discharge rates of approximately 0.6 g.p.m. Foam application was started 15 seconds after the entire 5-foot length of the fuel spray was burning, and continued for about 15 seconds after the application of the foam became effective. Fuel application continued for 30 seconds and the coil remained energized for 1 minute after the application of foam ceased. Sufficient current was applied to the igniter coil so that it was hot enough to ignite the sprayed fuel immediately. The coil remained glowing throughout the test.

MILTON LAMBERT is the principal investigator of the Naval Applied Science Laboratory's program on fire engineering problems, and has done fundamental and applied research on fire extinguishing agents and systems. He holds several patents relating to fire extinguishing equipment.

These fires were not generally extinguished by high-expansion foams. However, the intensity of the burning was considerably decreased and ignition of the unburned fuel on the deck was prevented. After the application of foam was discontinued, full-intensity burning started in 1 minute.

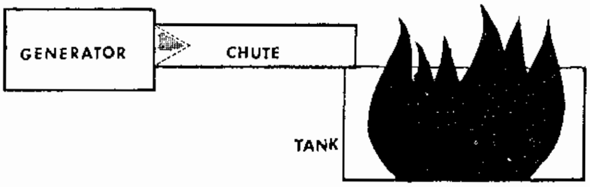
In addition to tests in compartments, one test was undertaken to determine the effectiveness of high-expansion foam in controlling large-scale fires in an open area. One hundred gallons of gasoline were ignited in a 10-foot-square, 3-foot-deep open-top tank. Thirty seconds after ignition of the fuel high-expansion foam was applied to the burning fuel

FIGURE 4. *Leaking fuel line fire.*

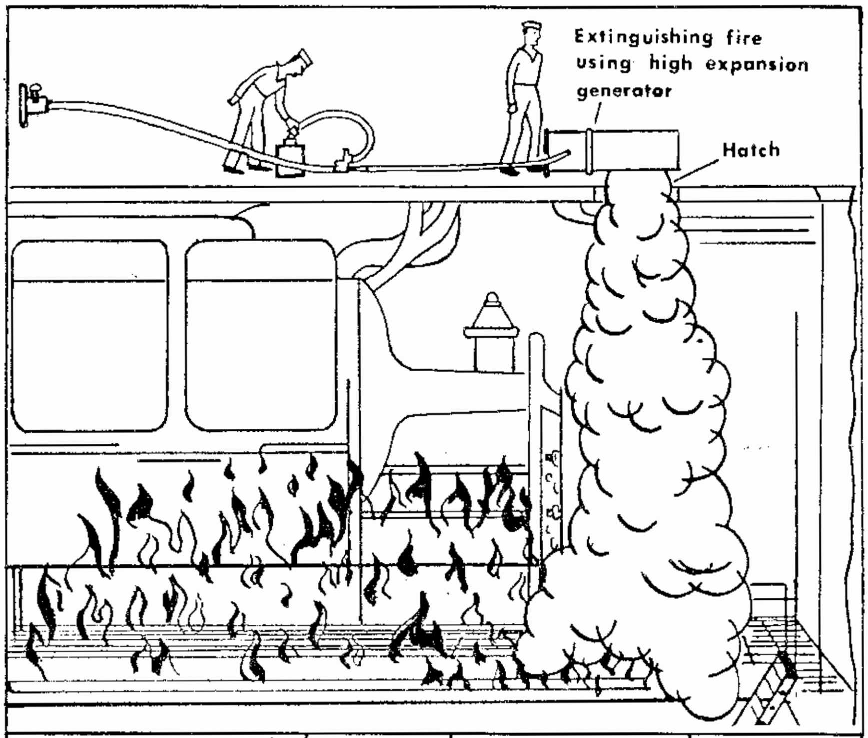


Arrangement		Fire Ext. Time Min.: Sec.	After Application
High Exp. Foam	Open	Control Only	Full Intensity in 1 min.
	Shield	Control Only	Full Intensity in 1 min.

FIGURE 5. *Large-scale open area fire.*



	Foam Rate ft/min.	Extinguishment Min.: Sec.	Blanket Height Inches	Sealability
2–4% Foam Agent	6–8	0:18–0:3	24	Abt. 4 min.



	Expansion	Extinguishment Min.: Sec.	Remarks
3–4% Foam Agent	4:00	2:00	No Reflash

FIGURE 6. *Mockup boiler-room fire.*

through an 18-inch-diameter duct 10 feet long leading from the generator to the top edge of the tank (fig. 5). With a rate of application of foam between 6 and 8 cubic feet per square foot of burning area per minute, the results showed that the high-expansion foam controlled the fire in less than 20 seconds and extinguished it in less than 30 seconds.

Although the tests in the 20-foot compartment were highly satisfactory, it was felt that tests should be made under full-scale conditions. A mockup boilerroom was used which was 38 feet long, 33 feet wide, and 20 feet high. It had a free deck space between boilers 18 feet by 30 feet (fig. 6). One hundred and fifty gallons of diesel fuel were poured into the bilge between the boilers. The foam was applied from a hatch 20 feet above the surface of the burning fuel. The same portable generator used in the compartment fires was placed adjacent to the hatch, with the discharge device over the hatch. One minute after ignition of the fuel, the high-expansion foam was injected. The results showed that without entering the compartment, the fire could be extinguished in 2 minutes, with no reflash.

The investigation showed the advantage of the high-expansion foam to be its fluidity and ability to roll over itself, resulting in quicker coverage and more rapid extinction of the fire. Some types of foam investigated piled up adjacent to the bulkhead giving some control, but did not extinguish the fire.

Analysis of the data obtained in the tests in the boilerroom showed that, for successful extinction of a hydrocarbon fire by high-expansion foam, it is necessary for the foam to be resistant to mechanical rupture, flow readily, and roll over obstacles. The less viscous foams were the most effective in extinguishing large-area fires because of their rapid coverage, despite the fact that these foams lose their water rapidly and disintegrate faster than more viscous foams. In the initial stage, the stability of the foam has no great significance. Conversely, the more viscous foams, although having lower rates of water drainage, do not perform as well because of their lack of fluidity.

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McDANIEL

(Continued from page 222)

need for training is the trend to automated vessels. If the numbe crewmembers is reduced, it bec essential that those aboard be tra in good firefighting practices.

Suggestions for Improvement

It has been implied that the elements of construction, equipm and training to prevent fire ab ship require a new approach in future. The following sugges outline work which would be us in establishing this approach.

Construction

a. Increase the feedback of te nical information on casualties. do this casualty investigations develop more information on the te nical aspects of the casualty. De opment of a check list type of which itemizes technical details to investigated would be the logical proach. Such a form would indic to the investigators the type of te nical information which is requi Information from this form can be readily recorded and analyzed anticipate areas requiring correc measures.

Equipment

b. Continue the research wh was ably begun with the *Nantas* tests. This might be accomplished obtaining a vessel to be scrapped a studying the effectiveness of var fire detection and extinguishing s tems as well as such factors as ven tion, smoke, etc.

Training

c. Organize a program which train all merchant seamen and m chant officers in practical firefigh techniques. Such a program sho include a familiarization with types of fire extinguishing syste usually found aboard ship and tec niques in their proper use. Perha the best way to approach a progr which would train all personnel wo be through an organized program the maritime unions. This could incorporated as a portion of the e cational and training program. Op eration of the program could be un the auspices of the Maritime Adm istration.

These suggestions cross numer lines. Implementation would inv the Coast Guard, the Maritime A ministration, marine unions, and p sibly professional societies such as Society of Naval Architects a Marine Engineers and also insura carriers. Everyone stands to ga from improved records of fire at se

Let's attack the age-old problem fire at sea with the most mod weapons at our command.

At Beaumont and Paulsboro

Mobil Fire Schools

When fire breaks out aboard a tanker, the best insurance against panic and fear is confidence in the equipment and methods preplanned to fight it.

To give the Mobil fleet and shore personnel this valuable assurance, a firefighting school has been established at the Beaumont refinery under the supervision of its fire and safety experts. Since the opening day some months ago, over 200 ocean and inland workers have signed in for instruction.

The 2-hour training course, under the direction of the Beaumont, Mobil Refinery Safety Supervisor, deals with both the theory and practice of putting out fires. The typical class has been instructed in the quenching power of the equipment they have in their hands, and they are now being taught how to direct it against live flames without injury to themselves. All types of possible shipboard fires—manifold, paint locker, electric panel, tank hatch, and deck spill—are ignited and the "students" called upon to regard them as actual emergencies and deal with them accordingly.

Firefighting training sessions for the U.S. Inland Waterways Operations are held extending over a 4-week period at the Company's Paulsboro, N.J., training center. The sessions include a 1-day refresher course in the use of all types of firefighting equipment and materials available on tank vessels and tugboats.

Various types of class A, B, and C fires are presented as problems for the combat teams. The types of fires include small pan installations, open flanges, tanks, leaking flanges, valves, pump packing, paint locker, and machine fires.

Instruction at these refresher training sessions is based on three principles: (1) men must know their equipment, (2) they must know how to use it, and (3) they must know how to protect themselves and their shipmates, particularly in the event of a major fire.

Experience teaches that a man who has actually felt the heat of a petroleum fire and extinguished one through modern chemical methods will be sufficiently assured so that in an emergency he will take proper action to save himself and his fellow workers, as well as to prevent excessive property damage.

More on Merchant Marine Training

Foam is applied through the ports of a firefighting structure by cadets of the Maine Maritime Academy during a special course they attended at the U.S. Naval Damage Control Training Center, Philadelphia, Pa. Not only do merchant mariners train at this facility, but many companies, like Mobil, operate their own training centers.

At New York

Masters, Mates and Pilots Upgrade

Located in Local 88, New York, a new navigational upgrading school was opened in March 1965. The school is sponsored by the Department of Labor under its Apprenticeship and Training Act and operated by MM&P.

The objectives of the school are to prepare licensed officers of the U.S. Merchant Marine for the next higher U.S. Coast Guard examination and serve as refresher training for those members who already hold master's license. In addition, the school provides information and knowledge on various aspects of automation and labor relations.

Classes are held Monday through Friday during a 6-week period and cover such subjects as: Navigation, Nautical Astronomy, Stability, Seamanship, Cargo, Area and Volume, Firefighting, Lifesaving, Signals, Rules of the Road, Labor Relations, Automation and Fuel Conservation.

Field trips and guest speakers enhance the practical worth of the school. Field trips to the U.S. Merchant Marine Academy to study all phases of electronic navigation are scheduled, as well as a trip to the SS *American Racer* to examine all aspects of automation and cargo handling.

The following organizations furnish guest lectures: Cargocaire on cargo care and ventilation; American Merchant Marine Institute on semi-automated ship operation; National Cargo Gear Bureau on bulk grain handling; U.S. Weather Bureau on weather analysis and weather reporting at sea. Lectures by attorneys on labor regulations are also scheduled.

Student participation is solicited through the *Local 88 Bulletin*, newspapers, and ships' bulletin boards. More than 25 licenses have been upgraded as a result of participation in this new school. The facilities can accommodate 25 students; and average class to date has been 16. Study materials for study and review at sea are also provided.

Capt. Milton Rutstein directs the school. ⚓

The United Kingdom's
SAR Organization in The North Atlantic

Extracts from SAR Seminar papers presented by participants from the United Kingdom are featured this month. The views stated do not always necessarily represent those of the U.S. Coast Guard. Commander Coast Guard Eastern Area sponsored the event in New York in May.

WHEN A CASUALTY occurs in the North Atlantic, and according to the circumstances in which it occurs, some or all of the following British authorities will be involved:

H.M. Coast Guard, Coast Radio Stations (C.R.S.), Royal Navy, Royal Air Force, Rescue Coordination Centres (R.C.C.'s), Royal National Lifeboat Institution (R.N.L.I.), Lloyd's and Ocean Weather Ships (O.W.S.).

H.M. Coast Guard is the focal point of the search and rescue operations when a ship is in distress, while the R.C.C.'s perform a similar function in relation to aircraft casualties.

When a C.R.S. receives a distress message from a ship in distress:

It retransmits the message on the international distress frequencies (2182 kc/s radiotelephony and 5 kc/s radiotelegraphy) to ships at sea. These transmissions are preceded by the appropriate alarm signals to alert radiotelegraphy ships that may not be keeping human watch and to focus attention on the radiotelephony broadcast. If the vessel in distress is not within the normal Medium/Frequency range (i.e., within 300 miles from the coasts of the United Kingdom) or within range of another European Coast Station, and it is not clear that the case is being dealt with satisfactorily by the appropriate coast station, the message is also retransmitted on High Frequency by Portishead Radio. This station broadcasts the message on all answering frequencies in use at the time and on broadcast frequencies at the next routine, i.e., traffic broadcast, roll call, foreign traffic list or warnings schedule. Broadcasts are repeated until effective assistance has been rendered or it becomes clear that another coast radio station is dealing satisfactorily with the incident.

The CRS passes the message by telephone or teleprinter to:

The Coast Guard, provided the casualty is within the area bounded by latitudes 43° and 68° north, and longitude 30° west and the coastline of Western Europe, or 8° east (whichever is nearer to the coastline of the United Kingdom);

The Naval Commander-in-Chief of the area in which the CRS is situated; and to Lloyd's.

CRS controls all radio signaling in the area, maintains communications with the casualty and rescue vessels and keeps the casualty informed of action being taken to assist her. It keeps the Coast Guard and other shore authorities informed of all signals received from the casualty and from lifeboats and merchant vessels going to the assistance of the casualty. When casualty communications cease, it informs all authorities to whom the distress message was sent.

On receipt of a distress message from a CRS the Coast Guard takes

H.M. Coast Guard saves still more lives in a time honored manner from a small freighter hard against English cliffs.

following action, as appropriate, ss the CRS has confirmed that search and rescue action is being taken by another country:

Pass the information to the appropriate lifeboats and ask them to launch.

Ask the RCC to send aircraft or helicopter assistance.

Keep in close touch throughout the incident with the various authorities concerned so that they the Coast Guard) have a comprehensive picture of the action being taken to assist the distressed ship.

Ocean Weather Ships

An OWS is under the same obligation as any other ship to render assistance to any ship in distress in the vicinity, but before proceeding to give assistance she advises the appropriate Air Traffic Control Centre (ATCC) that she is vacating her station.

If the position of a ship in distress uncertain, an OWS may be directed by the ATCC to assist in the search and may be used as the "directing ship" during the search and rescue operation in view of her comprehensive radio and navigational facilities. But on some occasions it is preferable for the OWS to remain on station and to act as a general focal point and directing centre for search aircraft and searching ships.

Other authorities

Normally, Lloyd's are the first to learn that a ship is missing or overdue. They make their own inquiries and initiate broadcasts to shipping through the Coast Radio stations.

Lloyd's inform the Coast Guard.

Any replies received by the CRS are passed to the Coast Guard as well as to Lloyd's.

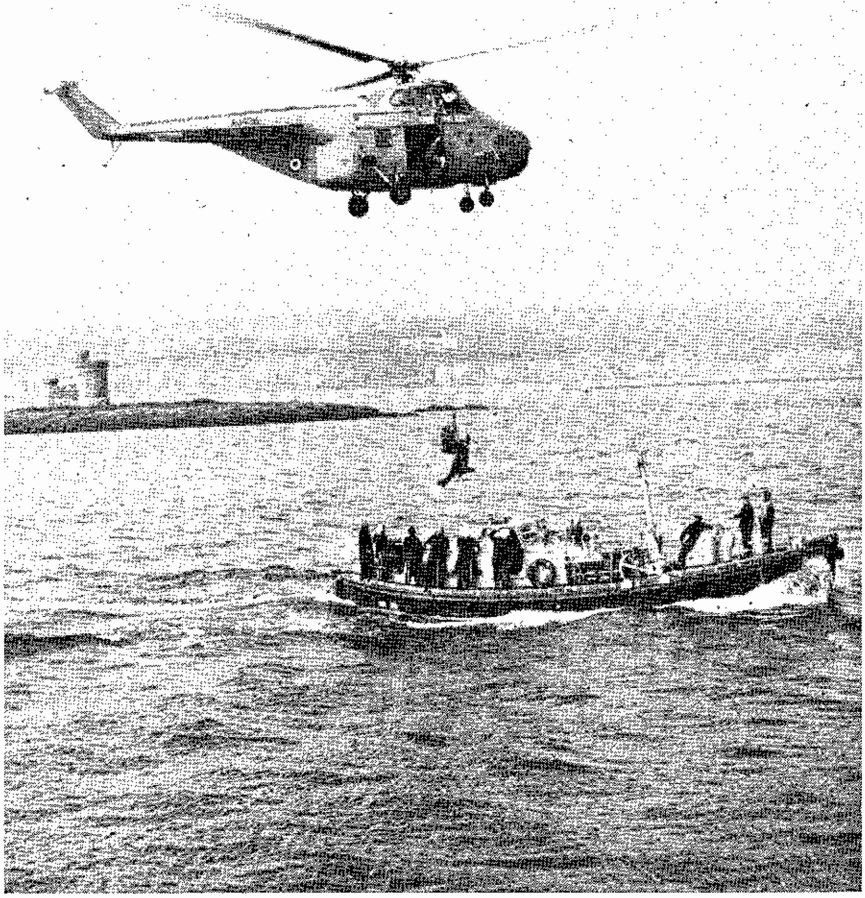
If no information is received about the missing ship, or if the information is inconclusive, the Coast Guard proceed as follows in consultation with Lloyd's:

Seek the advice of the Naval Commander-in-Chief on the desirability of a search by aircraft and naval vessels, and arrange for this to be done, if necessary.

Arrange further broadcasts to shipping as necessary.

Coast Radio Stations

There are 12 Coast Radio Stations in the United Kingdom. The CRS at Burnham/Portishead is a long-distance radio station with practically a worldwide range. Ten stations keep continuous watch on the distress frequencies of 500 kc/s and 2182 kc/s and one keeps watch on 2182 kc/s only. The normal daylight range of a CRS is 300 miles on W/T and 150 miles on R/T, but these ranges may be greatly exceeded at times, especially during darkness.



RAF Rescue helicopter and RNLI lifeboat perfect rescue techniques.

Royal Air Force

The Royal Air Force normally provides search and rescue facilities for all military aircraft and civil aircraft in the ICAO search and rescue regions, for which the United Kingdom is responsible. They also assist ships in distress. Their RCC's at Edinburgh and Plymouth coordinate search and rescue operations.

Search and rescue operations are carried out by maritime aircraft and SAR helicopters and, where necessary, by other military aircraft and marine craft.

Royal Navy

The Royal Navy has always played a prominent role in assisting ships in distress and the Naval Commanders-in-Chief are accustomed to giving assistance both by surface vessels and by aircraft to all types of casualty at sea.

Royal National Lifeboat Institution

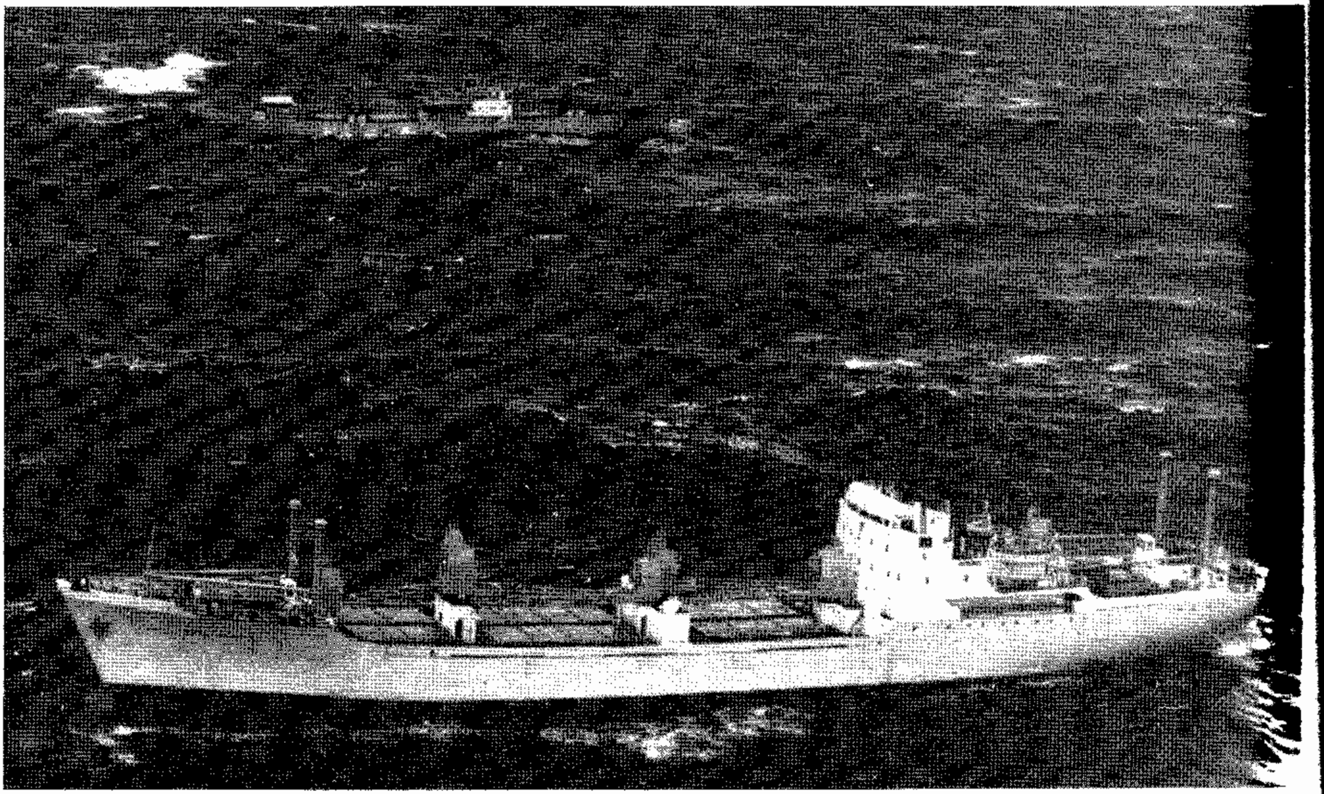
The RNLI is a private organization. The institution maintains 148 lifeboats around the coast of the United Kingdom, Irish Republic, Isle of Man and Channel Islands. The type of boat varies, but the average boat has a speed of about 8 knots, with a capability varying from 125 to 350 miles at full speed, and can accommodate 50/100 persons. Each boat is fitted with R/T equipment, and when on service maintains constant loudspeaker watch on the distress frequency 2182 kc/s. All but a few lifeboats are also equipped with a VHF radiotelephone which enables them to communicate direct, with military search and rescue aircraft.

The RNLI work in the closest collaboration with the Coast Guard, who inform the RNLI of shipping and aircraft casualties at sea within range of the lifeboats. ⚓

United Kingdom looks at

Maritime Distress Incidents From the Shipping Viewpoint

By the Chamber of Shipping of the U.K.



The British merchantman *Nova Scotia* (bottom) maneuvers past the sinking Norwegian freighter *Lionne* searching for two remaining survivors 740 miles SW. of Greenland in May. The British liner *Sylvania* and the Norwegian tanker *Raila* had earlier picked up 24 survivors.

THE EXPRESSION "MARITIME DISTRESS" denotes any distress incident which occurs at sea, whatever type of craft may have originally been concerned. Survivors will eventually have to be taken from the sea or, if they are more fortunate, from the craft in distress, but the character of the latter does not have any significant effect in principle on the situation which will confront the master of a merchant ship going to the rescue.

The problems with which he is faced in these circumstances may not be generally realized and it may be a good approach to the subject to describe the progress of a distress incident as it may appear to him. The successive stages of the incident may be as follows:

Notice of the Incident

The ship may be alerted through hearing either the radiotelegraph or radiotelephone alarm signals, by hearing a distress message by radiotelegraph or radiotelephone or by a message addressed to the ship. There are, of course, other possibilities such as seeing visual distress signals by aircraft making significant maneuvers, or finding a boat or survivors without having had previous warning, but the details of these will probably fit in with the general picture to be drawn of the incident which begins with the radio message.

Having received notice of a distress, it is the master's statutory duty to proceed with all speed to the assistance of the persons in distress unless he is unable or, in the special circumstances of the case, considers it unreasonable or unnecessary to do so. He may, of course, be released from the obligation through the compliance of ships better placed than his own. If he is proceeding to the rescue he should endeavor to inform the craft in distress.

Proceeding to the Scene

While proceeding to the scene the ship will naturally set watch on any radio channels likely to provide information in addition to her normal distress watch. This will include the [illegible] Telephone distress wave, 2182 [illegible] and VHF channel 16 if this is fitted. By one or more of these means she may be able to learn a great deal of the situation before she arrives on the scene.

She is likely, firstly, to hear other ships reporting their positions and their intentions. Secondly, she may obtain further details of the incident and may hear search aircraft (2182 kc/s) proceeding to the scene, searching and even locating craft or survivors. During the approach the master will be making all the necessary arrangements for the recovery of survivors.

Homing on the Distress

Usually the distress information includes the position but it may be inaccurate and it may be several hours until when the ship arrives in the vicinity. However, various methods of homing have to be taken into consideration, the first of which might be using direction finding equipment to home on to the 500 kc/s transmission of a distressed vessel. If the distressed craft was an aircraft it would be safe to assume that it would not be afloat for long and that any homing radio signals would emanate from equipment in survival craft or in the water.

A survival craft from an aircraft is likely at the present time, to be able to transmit on 500 kc/s and, alternatively, either 121.5 or 243 mc/s. If the survival craft is from a ship on an international voyage it would be able to transmit on 500 kc/s for homing: if it had the most modern equipment it would be able additionally to transmit radiotelephony on 2182 kc/s. Ships survival craft radio could also use 8364 kc/s but this would not be of any value for homing. The value of 2182 kc/s for homing is not great because very few merchant ships have this facility on their direction finders.

In addition to survival craft radio equipment, an Emergency Position Indicating Radio Beacon is being developed internationally to provide facilities for ships and aircraft to home on to survivors. It seems likely that this beacon will be able to transmit a distinctive signal on 2182 kc/s and will have a VHF channel for aircraft homing.

Arrival on the Scene

The question paramount in the master's mind will be whether any rescuing vessel has arrived before him, and secondly, who is coordinating or should coordinate the surface operations.

Of course, if the craft in distress is a ship which has serviceable radio and a Command still functioning, she will do any necessary coordinating herself unless she wishes to delegate it to another vessel better equipped for the purpose.

If the distressed craft is no longer afloat, a wide search of the area may be necessary to locate survivors particularly if they have been in survival craft or in the water for several hours. This is the point at which good surface coordination will pay off, though it may prove difficult if all messages have to be passed by Wire/Telegraphy through ships' radio offices and probably more so if visual signaling has to be employed. It will obviously be most effective between ships which have control of radiotelephony on the bridge. A coordinator freshly arrived on the scene will have difficulty in discovering who will be his most effective collaborators, unless he has already established what communication facilities are available in the various ships. At the present time, this can only be done by enquiries on the spot.

A question which will arise is whether VHF or 2182 kc/s will be the better for organizing surface vessels for searching etc. VHF has an advantage in that it is almost always controlled from the bridge and is much less prone to interference. A further point in its favor for surface coordination is that 2182 kc/s will probably be the only channel available for communication with aircraft and a good liaison with the Air search coordinator may keep this channel busy. A ship may be able to operate Wire/Telegraphy on 500 kc/s and Radio/Telephony on 2182 kc/s and VHF simultaneously and will, therefore, be in the best position for controlling a search and receiving the latest information from the air.

The holder of the duty of surface coordinator obviously must depend on circumstances. The first ship on the scene may have to take the responsibility to begin with but may, of course, relinquish it to vessels better equipped and manned. The criterion seems to be the number of radio officers, the radio equipment and the number of deck officers available. It usually happens that ships that excel in these respects also have doctors and accommodation for survivors. Thus, of a group of merchantmen, a passenger vessel will probably make the best coordinator. On the other hand, if a weather ship is present she may be expected to undertake it because of her comprehensive communication equipment and contacts and her general preparedness for just this kind of work. The only ships likely to be able to improve on this will be warships.

The Air Search Coordinator is likely to be in a S.A.R. aircraft or some other military type. Obviously, close touch between Air and Surface Coordinators may be of crucial importance to the success of a rescue operation. However, not all S.A.R. aircraft are able to communicate on 2182 kc/s and fewer can transmit on 500 kc/s. The VHF systems used in ships and aircraft are not compatible. Hence, the possibility of direct air-surface collaboration will depend upon circumstances.

An important factor in connection with incidents involving ships in distress, for which no official arrangements appear to exist, is the collaboration of the shipowner. He has, of course, responsibilities towards passengers and crew and for the cargo and, since news of the distress will become public property almost at once, he will be expected to answer for them without delay. On the other hand, the owner's knowledge of the numbers of persons on board and of the survival craft carried may be of great importance to the searching craft, as may also the details of the nature and disposition of cargo, particularly if any of it is dangerous.

It is, therefore, highly important that the owner of a ship in distress should be kept in close and immediate touch with the situation. Apart from the considerations already mentioned he may be able to divert another of his ships to the area. The establishment of communications for this purpose should be an integral part of "on-scene" arrangements and it should be an international obligation.

As far as is known, no attempt has been made previously to describe the problems which may confront the master of a merchant vessel which becomes involved in a distress incident or to provide guidance for him in the wide variety of circumstances which may exist. Although much of what has been said may appear to technical experts to be straightforward and logical, the master has, on the whole, little to go on but his commonsense. In the end, the rescuing of persons from the sea becomes a matter for ships and the probabilities are that the merchant navy will provide the first and maybe the only ships on the scene. There are many technical matters such as forms of search to suit the circumstances, receiving the injured from helicopters and, of course, the communications complex which need explanation and which could perhaps be included in a well illustrated manual. A master may not be involved in an incident in twenty years and the roles of coordinator and collaborator cannot well be practiced. The guidance should, therefore, be available, clearly and concisely, when the moment arrives. ⚓

MARITIME SIDELIGHTS

PRESIDENT WILSON HONORED AGAIN

The American President Lines' transpacific passenger ship *President Wilson* has received the Ship Safety Achievement Award, sponsored by the Marine Section of the National Safety Council and the American Merchant Marine Institute.

The APL liner earned her award in February, 1964, when she diverted from her regular course to assist the distressed freighter *Agia Erini L.*, which was foundering in a Pacific storm. Despite extremely difficult wind and sea conditions, Captain Cox maintained station and directed the operations of four other rescue ships which arrived at the scene. When the crew of the foundering cargo ship were unable to launch their own boats, a volunteer boat's crew from the *Wilson* went to their aid and brought 18 of them to safety on board the liner, while another 8 were saved by other ships.

MIO NEW LONDON TO BE SUBUNIT OF NEW YORK MARINE INSPECTION

The Coast Guard has announced changes affecting the Marine Inspection Office at New London, Conn.

Beginning September 1, 1965, this office, located at room 302, Post Office Building, will become a subunit of the New York City Marine Inspection Office. Lt. Comdr. H. G. Lyons, USCG, present officer in charge, will remain in this capacity.

Additionally, on October 1, 1965, the New London Office will no longer license and certify merchant mariners. This service, previously offered only 1 day weekly, will be carried out by the New York City Custom House Office.

The changes will not affect the inspection, investigative and shipping commissioner services now rendered.

COAST GUARD ASKS VHF RADIO USE

The Third Coast Guard District h broadcast an appeal to all pleas boatmen and merchant vessel rad officers, urging use of the Very Hi Frequency-Maritime Mobile (VHF-FM) band for marine communic tions.

The Coast Guard points out th shifting the bulk of ship-to-ship a ship-to-shore voice communicatio to this relatively interference-fr frequency band can greatly redu present congestion in the two to thr megacycles (mc/s) band, notably 2182 kilocycles (kc/s).

A recent Third Coast Guard Distr "Local Notice to Mariners" announc the Coast Guard is now maintaining continuous guard on the internation safety and calling frequency, 15 mc/s, from Watch Hill, R.I., to Fenwick Island, Del., including Long Island Sound and New York Harbo in addition to the international distress and calling frequency 2182 kc

The usefulness of 2182 kc/s (the international distress and calling frequency) is impaired by such handicaps as the large number of statio stations making unauthorized transmissions, and using transmitter pow in excess of that required for the operational area of the vessel. The use of 156.8 mc/s frequency wou help eliminate many of the problem now encountered on 2182 kc/s.

The SS *Bengal Mail,* of the American Mail Line fleet, has earned the company's annual Seamanship Safe award. Given to the ship with the best safety record, the award represents the vessel receiving the leas number of time-loss accidents for the year.

The average age of the world tank fleet by the end of 1964 was 7 year and 7 months. The U.S. fleet has a average age of 14 years and 1 mon

REAR ADM. C. C. KNAPP (second from right), Commander, 12th Coast Guard District, presented the 1965 Ship Safety Achievement Award for passenger ships to the SS *President Wilson.* Accepting the certificate and raising the familiar green cross burgee on the mast of the *President Wilson* is Capt. J. D. Cox (second from left), Master of the American President Lines liner. Also in the picture are Mr. L. C. Ford, left, President, California Shipping Co., and Capt. T. C. Conwell, right, Vice President, Operations, APL.

nautical queries

DECK

Q. CO_2 cylinders which remain continuously aboard a vessel are required to be discharged and hydrostatically tested every:

(a) Two years
(b) Four years
(c) Eight years
(d) Twelve years

A. (d) Twelve years

Q. A Class "A" bulkhead is so constructed that it will prevent the passage of flame or smoke in the standard fire test for 60 minutes:

(a) True
(b) False

A. (a) True

Q. State the three methods by which fire spreads and what should be done to prevent this in combating fires on board vessels.

A. Fire is spread by conduction of heat to adjacent surfaces, by direct radiation, and by convection.

The spread of fire is prevented on ships by cooling of surfaces adjacent to the fire or in some cases moving combustibles, by cooling of the burning material or shutting off its supply of oxygen, and by shutting down so far as possible ventilation.

Q. What should you know regarding the steam smothering pipes?

A. The location of all the valves, the outlets in the various holds and compartments, and that they are clear and unobstructed.

Q. Describe the applicators used with the All Purpose Nozzle for fighting fires.

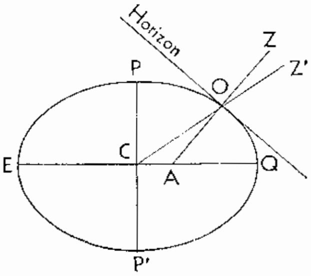
A. Applicators are made in three lengths as follows: 4-foot piece of 1-inch pipe with a 60° curve on the outlet end, a 10-foot 1-inch pipe with a 90° curve for the 1½-inch nozzle, a 12-foot 1½-inch pipe with a 90° curve for the 2½-inch nozzle. The fog head is screwed into the outlet end of the applicator. A bayonet joint holds the applicator in the fog outlet of the nozzle.

Q. In the event that the remote controls for release of CO_2 gas failed to operate for a fire, what provision does the regulations require be available?

A. Where provisions are made for the simultaneous release of a given quantity of carbon dioxide (by remote controls), provisions shall also be made for manual release in the event of failure of the remote control or automatic device.

Q. (a) Referring to the sketch below, distinguish between geodetic latitude and geocentric latitude.

(b) Is geocentric or geodetic latitude used in navigation?



A. (a) Geocentric latitude refers to angle Z' C Q or the angular distance between the Equator and the radius passing through the observer's position measured at the center of the earth. Geodetic latitude refers to angle Z A Q or the angle at their point of intersection between the plane of the Equator and the line through the zenith at right angles to the horizon.

(b) Geodetic latitude is used in navigation.

ENGINE

Q. Explain the precautions that should be observed in connection with blowing down the water wall header of a boiler?

A. The fires should be secured and the boiler taken off the line. Water wall headers should never be given a bottom blow while the boiler is steaming because the normal circulation of water in the tubes might be stopped, endangering the tubes. These valves should be labeled, warning against opening, and some method used to lock the valves closed and prevent their being inadvertently or accidentally opened.

Q. What specifications must be complied with when renewing or repairing the wrapper plates or back heads of fire tube boilers by welding?

A. Upon approval of the Officer in Charge, Marine Inspection, wrapper plates or back heads may be renewed or repaired as follows:

(a) Wrapper plates or back heads shall be cut between two rows of staybolts or on a line of staybolts where the thickness is approximately the same as the original construction. If welding is employed on a line of staybolts, the staybolts shall be fitted with a welded collar.

(b) The edges of wrapper plates riveted to tube sheets and back heads shall be removed by cutting out the rivets.

(c) The edges of existing plates and new plates shall be beveled so as to form a suitable groove whereby complete penetration of the weld metal will be obtained.

(d) The edge of the new plate shall be butt-welded and the plate shall be riveted to the flanges of the tube sheet and back heads and the staybolts renewed.

(e) Sections of wrapper plates of combustion chambers outside of stayed areas may be repaired by welding provided the welded joints are stress relieved by means of controlled heat and the joints are nondestructively tested.

Q. What are the usual causes of crankcase explosions in diesel engines?

A. Crankcase explosions usually only occur in engines which are in bad general mechanical condition. Some of the specific causes are as follows:

(1) Overheating and/or dilution of the lubricating oil.

(2) Crankshaft bearing or thrust bearing failures.

(3) Poor condition of the cylinder liners or piston rings.

(4) Cracked or seized piston.

Q. Why is it better to provide a large volume of cooling water with a slight temperature differential between the inlet and outlet cooling lines of the diesel engine rather than to provide a lesser quantity of colder inlet cooling water maintaining the same outlet temperature?

A. Using a large flow of cooling water will minimize the possibility of vapor pockets forming and local hot-spots occurring in the cooling system. With the higher velocity of flow there will be less chance of scale deposition. Maintaining a high inlet temperature also reduces the thermal shock on the cylinder liner and the small temperature differential reduces the amount of unequal expansion of the metal parts being cooled.

AMENDMENTS TO REGULATIONS

TITLE 46 CHANGES

MAJOR CHANGES MADE FOR BACKFIRE FLAME CONTROL ON GASOLINE ENGINES

Major changes concerning backfire flame arresters are published in the Federal Register of August 18, 1965.

Three specification subparts, designated 162.041 for backfire flame arresters, 162.042 for engine air and fuel induction systems, and 162.043 for engine air induction systems, which will supersede existing specification subpart 162.015.

Other miscellaneous amendments to 46 CFR 25.35–1 (uninspected vessels), 57.10–5 (marine engineering), and 182.15–7 (small passenger vessels under 100 gross tons) are included in this F.R. These amendments revise cross references or change the requirements to be in agreement with specifications and other actions set forth in this document.

The approvals of backfire flame arresters and the certificates of approvals bearing the basic Approval No. 162.015 and issued in accordance with the specification regulations in 46 CFR Subpart 162.015 are to be withdrawn as of January 1, 1966. All backfire flame arresters manufactured and approved pursuant to effective requirements in 46 CFR Subpart 162.015 prior to January 1, 1966, may be placed in service or continued in use so long as such backfire flame arresters are serviceable and in good condition.

With respect to the engine air and fuel induction systems and the certificates of approvals bearing the basic Approval No. 162.015 and issued in accordance with the specification regulations in 46 CFR Subpart 162.-015, the approvals are withdrawn as of January 1, 1966. All such systems manufactured and approved prior to January 1, 1966, may be placed in service or continued in use so long as such systems are serviceable and in good condition.

A new provision has been made for a pre-market approval of engine air induction systems where manufacturers wish to produce vessels having an integrated engine-vessel design. Such installations shall be tested and labelled in accordance with the specification regulations in 46 CFR Subpart 162.043 of Subchapter Q (Specifications), and shall be specifically approved by the Commandant.

For the convenience of the manufacturers holding type approvals and outstanding Certificates of Approvals bearing basic Approval No. 162.015, the Commandant (MMT) is reviewing all outstanding approvals, and those meeting specification requirements in Subpart 162.041 or 162.042 Subchapter Q (Specifications) of th chapter and other applicable requirements will have issued appropriate new Certificates of Approval, which will supersede existing approvals. However, this action does not relieve the manufacturer of responsibility comply with the applicable requirements governing backfire flame control devices for internal combustion engines offered for sale or use on motorboats or vessels subject to the inspection laws of the United States. a manufacturer of approved backfire flame control devices has not received information about his devices from the Commandant by October 1, 1965, it is recommended that he submit an inquiry direct to the Commandant (MMT), U.S. Coast Guard, Washington, D.C. 20226, about the status his approvals.

MORE TITLE 46 CHANGES

NUMEROUS MISCELLANEOUS AMENDMENTS PUBLISHED

An omnibus regulation change was published in the Federal Register of August 21, 1965.

The changes: The posting of form CG–802 "Persons Allowed in Pilothouse and on Navigation Bridge" and form CG–810 "Duties of Mates of Inland Steam Vessels" was found to be no longer justified. 46 CFR 2.20–1, 78.10–5, 97.10–10 and 157.35–5 are effected by this change.

Existing regulations in Specification Subpart 163.001 contain the requirements governing sliding watertight doors and door controls regardless of the type of vessel on which installed and provides for the design, installation and test for such equipment. A new regulation designated 46 CFR 92.01–13 adds an appropriate cross reference to the regulations covering construction and arrangement of cargo and miscellaneous vessels. An amendment to 46 CFR 167.65–50 revises the requirements regarding Form CG–811 which contains instructions for the use of breeches buoys and lifesaving signals as provided in the 1960 International Convention for Safety of Life at Sea.

Editorial amendments are also included in this Federal Register. An amendment to 46 CFR 73.10–5, regarding subdivision for passenger vessels to bring the regulations into agreement with the 1960 Safety of Life at Sea Convention is also published.

Proposals regarding physical examinations for applicants for original licenses as merchant marine officers and motorboat operators and pro-

FIRE PREVENTION WEEK, 1965

By the President of the United States of America

A Proclamation

Losses by fire—especially those resulting from fires which could have been prevented—constitute a tragic waste of human and material resources.

Much of this waste is avoidable. Community fire prevention programs, effectively conducted, have contributed substantially to local and national development by reducing sharply the number of destructive fires.

Further progress can be made if every individual recognizes his responsibility for eliminating fire hazards and for participating in community fire prevention programs and related activities.

NOW, THEREFORE, I, LYNDON B. JOHNSON, President of the United States of America, do hereby designate the week beginning October 3, 1965, as Fire Prevention Week.

I bid all citizens to support and promote the fire prevention and control efforts of their respective community fire departments. I urge State and local governments, the Chamber of Commerce of the United States, the American National Red Cross, and business, labor, and farm organizations, as well as schools, civic groups, and public information agencies to observe Fire Prevention Week, to provide useful fire safety information to the public, and to enlist the active participation of all citizens in year-round fire prevention programs. I also direct the appropriate Federal agencies to assist in this effort to reduce the needless waste of life and property caused by preventable fires.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the United States of America to be affixed.

DONE at the City of Washington this 14th day of July in the year of our Lord nineteen hundred and sixty-five, and of the Independence of the United States of America the one hundred and ninetieth.

[SEAL]

LYNDON B. JOHNSON

By the President:
DEAN RUSK,
Secretary of State.

ls regarding packaged, automat- controlled, auxiliary boilers were considered by the Merchant Marine Council on March 22, 1965. The Merchant Marine Council recommended adoption of the proposals which were revised in line with certain comments received. These, are adopted and set forth in this Federal Register.

This Federal Register effects the following portions of 46 CFR: 2.20–1; 22–1; 10.02–5; 10.20–7; 73.10–5; 10–5; 92.01–13; 97.10–10; 157.35–5; .001–3; 160.002–1 thru 7; 160.005–1, and 4; 160.013–1 and 6; 160.017–1, 3 and 10; 160.021–1 and 7; 160.022–6; .023–1 and 7; 160.024–1 and 7; .027–9; 160.028–1 and 7; 160.031–1, and 7; 160.032–3; 160.033–1; .034–1; 160.036–7; 160.037–1 and 160.040–1 and 7; 160.041–1 and 7; .044–6; 160.051–9; 160.053–1 and 6; .054–1 and 7; 161.008–1 and 162.001–9; 162.012–7; 162.013–7; .016–1 and 6; 162.017–6; 162.018– 162.026–1 thru 22; 164.009–2; 4.012–1; 164.013–1; 167.65–50; .10–15.

APPROVED EQUIPMENT

COMMANDANT ISSUES EQUIPMENT APPROVALS

By Commandant's action of 27 July 1965 Coast Guard Approval was granted to certain items of lifesaving, firefighting, and other equipment. Included were approvals for Kapok and fibrous glass life preservers, embarkation-debarkation ladders, buoyant cushions, buoyant vests, plastic foam life preservers, boiler safety valves, flame arresters, packaged boilers, Bromotrifluoromethane-type fire extinguishing systems, and insulation materials. Those interested in these approvals should consult the Federal Register of August 4, 1965, for detailed itemization and identification.

STORES AND SUPPLIES

Articles of ships' stores and supplies certificated from August 1 to August 31, 1965, 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

Whale Chemical Co., 36 Belmont Pl., Staten Island, N.Y., 10301, Certificate No. 622, dated August 5, 1965, NS–118.

Penn Fishing Tackle Manufacturing Co., 3028 West Hunting Park Ave., Philadelphia, Pa., 19132, Certificate No. 623, dated August 17, 1965, PENN 38.

The Enequist Chemical Co., Inc., 100 Varick Ave., Brooklyn, N.Y., 11237, Certificate No. 629, dated August 25, 1965, OIL–SOL.

Gamlen Chemical Co., 321 Victory Ave., South San Francisco, Calif., 94080, Certificate No. 627, dated August 23, 1965, GAMLEN "D" SOLVENT, Certificate No. 628, dated August 25, 1965, GAMLEN COMPOUND #7.

DuBois Chemicals, Broadway at Seventh, Cincinnati, Ohio, 45202, Certificate No. 624, dated August 17, 1965, ACTUSOL T776, Certificate No. 625, dated August 17, 1965, CARBUREX, Certificate No. 626, dated August 17, 1965, ACTUSOL.

AFFIDAVITS

The following affidavits were accepted during the period from June 15 to August 15, 1965:

Rockwell Manufacturing Co., Valve and Meter Division, 400 North Lexington Ave., Pittsburgh 8, Pa., VALVES AND FITTINGS.[1]

New Jersey Meter Co., 89 Terminal Ave., Clark, N.J. 07066, FITTINGS.[2]

Kings Point Machinery, Inc., 439 Bryant St., San Francisco, Calif., 94107, VALVES & FITTINGS.

Union Steel Corp., P.O. Box 726, New Market, N.J., 08854, PIPING.[3]

Hyde, Division of Bath Iron Works Corp., Bath, Maine, VALVES, FITTINGS, & FLANGES.[4]

Anvil Products, Inc., P.O. Box 2323, Longview, Tex., 75603, FITTINGS.[5]

Valley Bolt Corp., 7333 Coldwater Canyon Ave., North Hollywood, Calif., BOLTING.

Packaging Services, 6875 Tujunga Ave., North Hollywood, Calif., 91605, VALVES.

WECO Division, FMC Corp., 10516 Old Katy Rd., Houston, Tex., 77024, VALVES & FITTINGS.

NOTE: The following manufacturers will be deleted from the currently approved affidavit section in the revised edition of CG–190:

Hinomoto Ben Kogyo Co., Std., NO676 Serikawacho, Hikone City, Japan, VALVES.

Ditta Bernardo Genisio, Port Canavesa, Roma 40, Torino, Italy, VALVES.

CIRCULARS

NVIC 6–65 CLARIFIES PERSONNEL QUESTION FOR DANGEROUS BULK LIQUID CARGO HANDLING

A circular designed to clarify the intent of new Sections 31.15–6 of Subchapter D and 98.03–40 of Subchapter I, promulgated in the Federal Register dated March 9, 1965, regarding qualification of personnel for handling certain dangerous bulk liquid cargoes, has been released.

The Coast Guard is not presently prepared to issue documents attesting to the qualification of personnel handling the dangerous commodities under consideration. Sections 31.15–06 and 98.03–40 were promulgated as interim regulations which provide for the acceptance of a person for handling such dangerous commodities on receipt of satisfactory evidence that he has been trained in and is competent to handle certain of these commodities. At such time as a permanent arrangement for verifying competence to handle specific dangerous liquid bulk cargoes is developed, permanent qualifying regulations will be proposed.

In the meantime, documentary evidence that a person is trained in and capable of performing competently the necessary operations which relate to the carriage and transfer of such cargo will be in the form of a letter addressed to the Officer in Charge, Marine Inspection, at the port concerned. The letter will be prepared by an employer or manufacturer who is acceptable to the OCMI as being qualified to make such attestation. It will remain on file at the Marine Inspection Office. No seaman's document or endorsement to existing seaman's document will be issued on the basis of such letters.

NEW RULES OF THE ROAD EXERCISES FOR DECK OFFICER LICENSE RENEWAL PUBLISHED

The exercises in rules of the road for deck officers license renewal have been changed to reflect the new 1960 International Rules of the Road, ef-

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[1] Change address only to: Rockwell Manufacturing Co., Rockwell Building, Pittsburgh, Pa. 15208.

[2] For pressures not exceeding 150 p.s.i.

[3] Welded stainless steel, conforming to ASTM A312 supplied for Class II applications. This pipe may be supplied for Class I applications only when a 100 percent radiographic inspection has been performed on all welded seams. (Approval by letter dated September 29, 1964 but not included in present listing.)

[4] Previously approved but omitted from listing.

[5] Approval is for Type SK2037–2 bulkhead compression seals only. For installation in locations where Coast Guard requirements for structural fire protection or subdivision exists, only Crane gaskets 1871 or 177AI may be used; and aluminum may be used only if protected by structural insulation.

fective September 1, 1965. These new exercises have been published in Navigation and Vessel Inspection Circular 7–65. The *Proceedings* will carry sets of these new exercises from time to time, but licensed deck officers are advised to review these exercises at an early date. You may do so by obtaining a personal copy of NVIC 7–65 at a local marine inspection office or by writing: The Commandant (CHS) U.S. Coast Guard, Washington, D.C., 20226.

MINIMUM TRANSPORTATION STANDARDS RECOMMENDED FOR CARBON DISULFIDE AND ETHYL ETHER IN NVIC 8–65

Current recommended minimum standards for the transportation of carbon disulfide and ethyl ether as bulk liquid cargoes are set forth in Navigation and Vessel Inspection Circular 8–65. These recommendations, developed in connection with plan review of specific vessel requests, may be obtained by asking for NVIC 8–65 at the local marine inspection office or by writing Commandant (CHS) U.S. Coast Guard, Washington, D.C., 20226.

CHEMICAL CARGOES REQUIRING INFORMATION CARDS LISTED IN NVIC 9–65

Cargoes which have dangerous characteristics in addition to flammability or combustibility and which are currently approved for bulk shipment by barge have been listed in Navigation and Vessel Inspection Circular 9–65.

These chemical cargoes requiring information cards, warning signs, and special manning standards are:

35.01–55(a)(1)
  (1) Hydrogen, Liquefied
  (2) Butadiene, inhibited
  (3) Methyl Chloride
  (4) Dimethyl Amine
  (5) Vinyl Chloride
35.01–55(a)(2)
  (1) Acetone Cyanohydrin
  (2) Allyl Alcohol
  (3) Aniline (Aniline oil)
  (4) Phenol (Carbolic Acid)
  (5) Epichlorohydrins and Crude Chlorohydrins
  (6) Methyl Bromide
  (7) Motor Fuel Antiknock Compound (Containing either Tetraethyl Lead, Tetramethyl Lead, or both)
  (8) Nonyl Phenol
35.01–55(a)(3)
  (1) Ethylene Oxide
98.03–35(f)(2)
  (1) Elemental Phosphorus (Yellow Phosphorus, White Phosphorus)
  (2) Sulfuric Acid
  (3) Hydrochloric Acid
  (4) Chlorine
  (5) Ammonia, Anhydrous

This list also appears in the Federal Register of August 6, 1965. NVIC 9–65 may be obtained from the local marine inspection office or by writing, Commandant (CHS) U.S. Coast Guard, Washington, D.C., 20226.

STABILITY DETERMINATION IN CAPSIZING OF UNINSPECTED VESSELS ASKED IN NVIC 10–65

The stability characteristics of vessels which have capsized should be determined in order to check the applicability of existing stability standards and to determine if a need for changes in these standards may be indicated. In the case of inspected vessels such stability determinations are required. In the case of certain uninspected vessels, stability determinations may also be made subject to the consent and with the cooperation of the owner. Provisions for these determinations are set forth in Navigation and Vessel Inspection Circular 10–65.

In capsizing cases, where the vessel is recovered, involving uninspected commercial vessels such as tugs 26 feet and over, documented fishing vessels, offshore supply and cargo vessels, and passenger motorboats or sail boats carrying six or less passengers, the Officer in Charge, Marine Inspection will advise the owner in writing as to the desirability of having the stability characteristics of that vessel determined. This letter will solicit the owners' voluntary cooperation to this end. The owner will be asked to furnish all available plans which the Officer in Charge, Marine Inspection will forward, along with any data related to the capsizing or to the vessel's stability, to the Coast Guard's Merchant Marine Technical Division for review. In some instances it may be possible for that Division to make a stability determination from the plans and data alone. In most cases, however, a stability test will be necessary. The owner will be advised that in such case the Coast Guard's Merchant Marine Technical Division will provide test supervision and other necessary technical service, and perform all required calculations.

VOLKAMER

(*Continued from page 225*)

First, there is water in the foam, very little compared to the air in it, but water just the same. It can and does wet things. Also, this water can and does turn to steam when it approaches the fire; this conversion to steam is very significant.

Starting with 1 part water and 1,000 parts air (which is what high-exp sion foam really amounts to), th will be, in terms of steam, 1,700 pa of water and 1,000 parts of availa air; or, in other words, because of steam, the atmosphere right at fire is being reduced to only about percent air, or about 8 percent o gen. These figures are not exact, they do not have to be—the idea that the heat of the fire begins cause its own inerting. Also, course, the fire is losing its heat in action.

Deputy Fire Marshal Volkamer is Supervisor of Training of the Fire Department for the city of Chicago. He is presently serving in his 30th year with that organization.

Second, under fire conditions, room air moves toward a fire, usually by low-level and nearly horizontal convection paths, to replace combustion gases which are rising vertically. Foam buildup impedes this air flow to the fire, thereby decreasing the intensity of the fire.

Still another point not to be overlooked is that the entering and accumulating foam, even at a distance from the fire, is helping out by sealing off openings through which air might otherwise flow into the fire area.

To summarize on high-expansion foam we find that buildings can be filled easily and quickly with practically no harmful side effects in the vast majority of industrial applications. The extinguishing action is primarily one of decreasing the oxygen content available for combustion both by generating steam in the fire area and by shielding the fire from natural air currents. Wetting does its share, too. High-expansion foam although not new in itself, is new as an extinguishing agent in industrial firefighting. It may be that marine firefighting will, whenever feasible, use this method to good advantage.

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, 1965 are now available from the Superintendent of Documents, price $2.75.

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 (8–1–62).
115	Marine Engineering Regulations and Material Specifications (9–1–64). F.R. 2–13–65, 8–18–65.
123	Rules and Regulations for Tank Vessels (4–1–64). F.R. 5–16–64, 6–5–64, 3–9–65.
129	Proceedings of the Merchant Marine Council (Monthly).
169	Rules of the Road—International—Inland (9–1–65).
172	Rules of the Road—Great Lakes (6–1–62). F.R. 8–31–62, 5–11–63, 5–23–63, 5–29–63, 10–2–63, 10–15–63, 4–30–64, 11–5–64, 5–8–65, 7–3–65.
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 (7–1–63). F.R. 4–14–64, 10–27–64.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7–1–63).
184	Rules of the Road—Western Rivers (6–1–62). F.R. 1–18–63, 5–23–63, 5–29–63, 9–25–63, 10–2–63, 10–15–63, 11–5–64, 5–8–65, 7–3–65.
190	Equipment lists (8–3–64). F.R. 10–21–64, 10–27–64, 3–2–65, 3–26–65, 4–24–65, 5–26–65, 7–10–65, 8–4–65.
191	Rules and Regulations for Licensing and Certificating of Merchant Marine Personnel (2–1–65). F.R. 2–13–65, 8–21–65.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (10–1–63). F.R. 11–5–64, 5–18–65.
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 (7–1–64). F.R. 6–3–65, 7–10–65.
249	Merchant Marine Council Public Hearing Agenda (Annually).
256	Rules and Regulations for Passenger Vessels (4–1–64). F.R. 6–5–64, 8–21–65.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (9–1–64). F.R. 2–13–65, 3–9–65, 8–21–65.
258	Rules and Regulations for Uninspected Vessels (1–2–64), F.R. 6–5–64, 6–6–64, 9–1–64, 5–12–65, 8–18–65.
259	Electrical Engineering Regulations (7–1–64). F.R. 2–13–65.
266	Rules and Regulations for Bulk Grain Cargoes (7–1–64).
268	Rules and Regulations for Manning of Vessels (2–1–63). F.R. 2–13–65, 8–21–65.
269	Rules and Regulations for Nautical Schools (5–1–63). F.R. 10–2–63, 6–5–64, 8–21–65.
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.
293	Miscellaneous Electrical Equipment List (6–1–64).
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, 4–10–62, 4–24–63, 10–27–64.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) 2–3–64). F.R. 6–5–64, 6–6–64, 8–18–65, 8–21–65.
329	Fire Fighting Manual for Tank Vessels (4–1–58).

CHANGES PUBLISHED DURING AUGUST 1965

The following have been modified by Federal Registers:

CG–190 Federal Register August 4, 1965.
CG–115, CG–258 and CG–323 Federal Register August 18, 1965.
CG–191, CG–256, CG–257, CG–268, CG–269 and CG–323 Federal Register August 21, 1965.

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