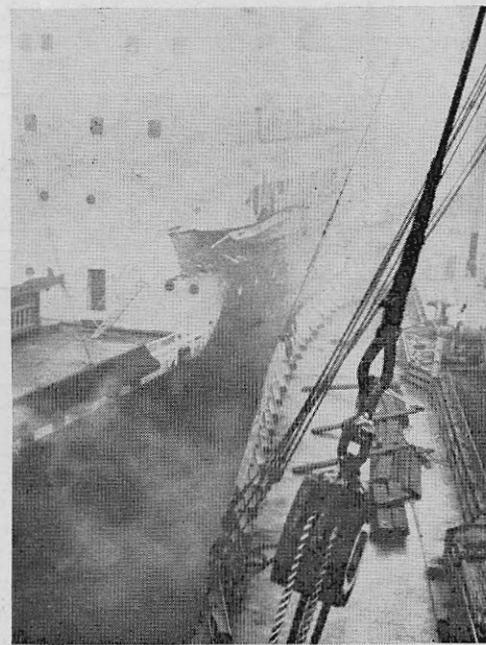
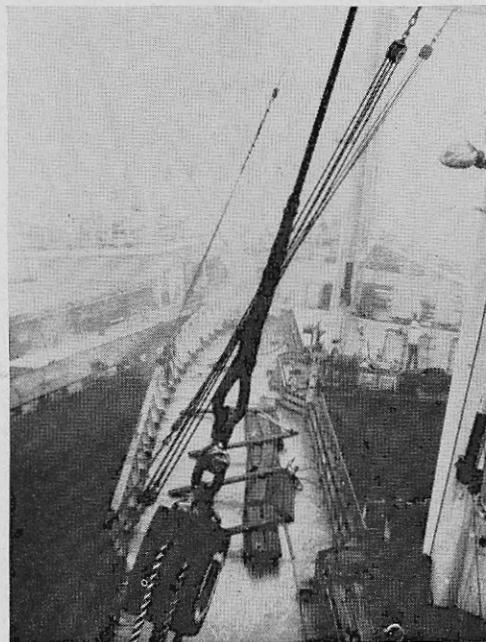
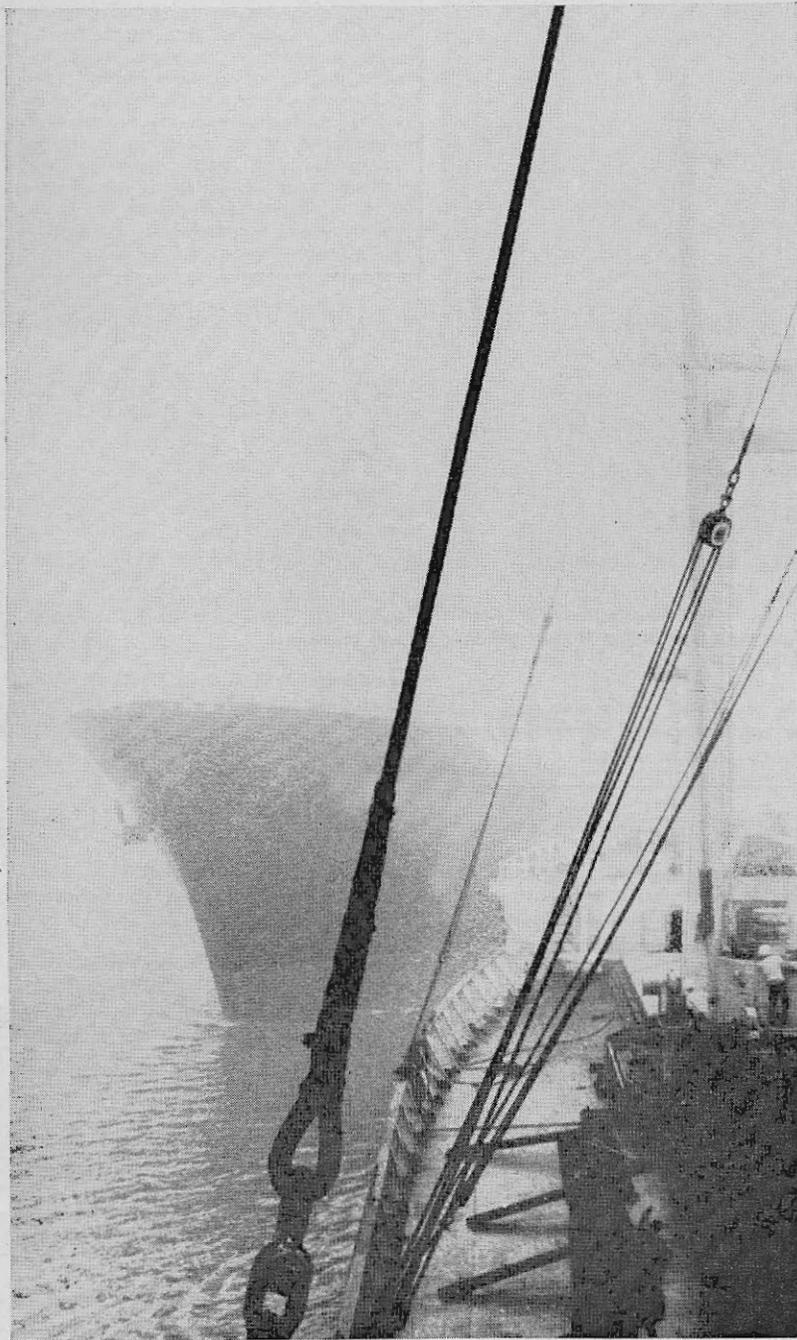


PROCEEDINGS

OF THE MERCHANT MARINE COUNCIL



UNITED STATES COAST GUARD
Vol. 22, No. 11 • November 1965

CG-129

IN THIS ISSUE . . .

The year's marine casualties are examined by the chief of the vessel inspection division beginning page 243.

What the Coast Guard is doing to improve its rescue equipment is bared beginning page 248.

A special six-page section of marine casualty statistics begins page 252.



RECIPIENTS of the 1964 Jones F. Devlin Award and other top safety awards of the Marine Section of the National Safety Council gather around Mr. Devlin (2d from left) and R. Adm. I. J. Stephens, Commander of the Coast Guard's Eastern Area with their highly prized trophies. Story on the winners is in the Maritime Sidelights section of this issue.

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

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PROCEEDINGS

OF THE

MERCHANT MARINE COUNCIL

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The Merchant Marine Council of The United States Coast Guard

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The Smith Voyager lists heavily after grain cargo shift.

Marine Casualties Reviewed

Capt. William C. Foster, USCG

How does the Coast Guard go about the business of reviewing marine casualties? Who is involved? How do the statistics for 1965 compare with previous years? These and many other marine casualty questions were answered by the Chief of the Coast Guard's Merchant Vessel Inspection Division in an address at the fall meeting of the National Safety Council, adapted here.

A REVIEW OF recent significant marine casualties has become a recurring part of the Coast Guard session of the National Safety Conference. You are aware that the Master of the vessel involved in a marine casualty is required to make a report to the Coast Guard and the case is investigated to determine the cause to the extent possible. Upon completion of the casualty investigation involving a commercial vessel, the local marine inspection office forwards the record of the investigation to the Commandant. The Casualty Review Branch within the Merchant Vessel Inspection Division of the Office of Merchant Marine Safety is directly responsible for the custody and review of these records. Its primary function is the analysis of the accident and the com-

pilation of statistics for use in the development, improvement, and enforcement of materiel and operational standards. After abstracting and coding the varied information from the reports for automated data processing procedures, the cases are reviewed for content, accuracy, and policy in conformance with established laws, regulations, and merchant marine safety directives. They are also reviewed to determine what further action, if any, should be taken.

If the investigative report reveals a technical or engineering problem involving electrical equipment, boiler or other machinery equipment, lifesaving appliances, hull structures, or doubtful stability, it is referred to the Merchant Marine Technical Division. A rather recent addition to this Divi-

sion is the Chemical Engineering Branch which concerns itself with the problems enumerated in the transportation of chemicals in bulk. Similarly, if it concerns the inspection or manning of vessels, it is referred to appropriate personnel within the Merchant Vessel Inspection Division. If it involves personnel action concerning licensed or documented seamen or state pilots, it is referred to the Merchant Vessel Personnel Division. In addition, it may be referred to the Office of Operations if it concerns cargoes within the purview of the Dangerous Cargo Regulations. Information from these reports is often referred to various advisory panels of the Merchant Marine Council and to industry associations. The Casualty Review Branch also maintains liaison

with many governmental agencies which have a direct interest in vessel operations and allied marine industries.

The frequency rate of marine casualties has remained fairly constant for a number of years. During the past year, however, there has been an encouraging reduction in the number of casualties which have resulted in loss of life. Although sheer coincidence may account for a portion of this reduction, there is evidence that the increased use of bridge-to-bridge radio, inspection of aging vessels conducted by the Traveling Inspectors, and greater utilization of the information gained through the investigation of marine casualties have played a significant part. Further, the use of automated data processing has permitted problem areas to be scrutinized on a recurring basis.

FISCAL YEAR 1963

You will notice that there were 2,134 vessel casualties such as collisions, foundering, fires and explosions, and groundings reported and investigated by the Coast Guard Marine Inspection Offices during fiscal year 1963. Of these casualties there were 84 cases in which a total of 230 American or foreign persons lost their lives. It is readily apparent that deaths as a result of casualties to fishing vessels and towing vessels, 68 and 58 deaths respectively, are most significant. Foundering and capsizings of fishing vessels accounted for 47 of the 68 deaths. The most notable fishing vessel foundering was that of the *Midnight Sun* which alone accounted for 11 lives. Foundering and capsizings of towing vessels accounted for 18 deaths with the foundering of the *Gwendoline Steers* on Long Island Sound claiming 9 of these lives. Towing vessels colliding with pleasure vessels remains a problem on our inland waterways with nine of these collisions accounting for 13 deaths, while other collisions involving towing vessels accounted for 24 lives. The most notable collision involved the Norwegian tank vessel *Boheme* and the uninspected tug *Bonnie D* pushing 4 tank barges in the Mississippi River wherein 20 crewmembers on the flame engulfed tank vessel perished.

The disappearance of the molten sulphur carrier, the *Marine Sulphur Queen*, accounted for the greatest single loss, with a total of 39 persons missing and presumed drowned. Explosions and fires on board tank vessels and tank barges killed 12 shore workers and 1 crewmember. Casualties involving freight vessels were insignificant with only 1 death as a result of a cargo fire and 1 death as a result of the material failure of a towing shackle while being used with a



Captain Foster is a 1940 graduate of the U.S. Coast Guard Academy. He saw World War II service on the cutters Champlain and Spencer, and the attack transport Joseph Dickman (ex President Roosevelt). After serving as executive officer of the cutter Androscoggin, he acceded to commands afloat on the icebreakers Storis and Northwind. He is a veteran of five Arctic voyages in connection with Dewline Operations in the Eastern, Central, and Western Arctic areas of North America. Captain Foster's experience in merchant marine safety is extensive, having served progressively in positions in that field at Baltimore, Seattle, and Cleveland, at the latter as Officer in Charge, Marine Inspection. He assumed his present headquarters position in 1963.

This article, extracted from an address Captain Foster gave before the Marine Section of the National Safety Council in Chicago this month, was accompanied with a rather remarkable motion picture of the foundering Smith Voyager taken from the rescuing cutter Rockaway, as well as some illuminating slides of this and other casualties.

nylon hawser. There were no passenger lives lost during this year as a result of marine casualties to large inspected passenger vessels.

FISCAL YEAR 1964

During fiscal year 1964 there were 2,308 vessel casualties such as collisions, foundering, fires and explosions, and groundings which were re-

ported and investigated by the Coast Guard. Of these casualties there were 93 cases in which a total of 191 American or foreign persons lost their lives. Once again deaths as a result of casualties to fishing vessels and towing vessels accounted for a high number of the total, 69 and 43 respectively. Twenty-seven cases of foundering or capsizings of fishing vessels accounted for 51 of these 69 deaths. On towing vessels foundering and capsizings accounted for 15 lives. The most notable was the disappearance of the *Meitowax* with the loss of 4 lives off the east coast. Severe weather conditions, the age of the vessel, lack of adequate watertight closures and lack of stability were contributing factors to the loss of this vessel. Collisions with pleasure vessels and other collisions accounted for 23 of the 43 lives lost in casualties involving towing vessels. The most noteworthy collision involved the *Rebel Jr.* wherein the unlicensed operator while on watch alone, in the middle of the night, lost consciousness, with the result that the tug and tow veered from the intended course and crashed into the Lake Pontchartrain Causeway. Immediately after, a bus plunged through the opening into the lake with the resultant loss of six lives.

Fires and explosions on tank vessels and tank barges accounted for 10 deaths. In addition to the 6 lives lost in the *Bunker Hill* and *San Jacinto* disasters, 3 more lives were lost on tank vessels and 1 life was lost on a tank barge. The small inland tanker *Newark* while loading a cargo of fuel oil suffered a flash fire and explosion causing fatal burns and injuries to 2 crewmembers. A large tanker, the *Cities Service Norfolk*, while discharging gasoline suffered an explosion and flash fire in the amidship pumproom. The resultant force catapulted an able seaman into a railing, killing him almost instantly. On the tank barge *Murray Mac* a shipyard worker was killed when an explosion occurred during hot work repairs to the bottom of a hollow skeg.

With reference to casualties involving freight vessels and barges, two casualties claiming 3 lives involved fires and explosions as a direct result of the ignition of paint vapors. Boiler explosions of steam boats with the attendant disastrous loss of life during the 1800's have all but disappeared from the marine scene today, however, one boiler casualty on the Great Lakes resulted in the loss of one life. The casualty record of small passenger vessels was marred during this fiscal year by the capsizing of the motorboat *Two Georges* with the resultant loss of 5 lives. It is significant to note however, that since these vessels came

within the inspection laws and regulations in July of 1958, the toll in death has been significantly reduced. Once again, there were no passenger lives lost during this year as a result of marine casualties to large inspected passenger vessels.

FISCAL YEAR 1965

Notably significant are the casualty figures for fiscal year 1965. There were 2,179 vessel casualties such as collisions, founderings, fires and explosions, and groundings which were investigated by the Coast Guard. This means that there were fewer casualties than the previous year and about the same number of casualties as in fiscal year 1963. The greatest difference is found in the casualty and death rate involving all vessels which is considerably less than for prior years. During 1965 there were 56 cases in which a total of 125 American or foreign persons lost their lives. This compares with 93 cases and 191 lives lost during 1964 and 84 cases with 230 lives lost during 1963. The deaths as a result of casualties to fishing vessels continue to remain relatively high with a total of 41 deaths. Fourteen cases of founderings and 1 capsizing accounted for 30 of these 41 deaths. Deaths as a result of casualties involving towing vessels have decreased; however, collisions continue to waste lives. One life was lost when a towboat was operated despite knowledge that there was a crack in the stern area. The tug subsequently flooded, took a severe trim by the stern entrapping one crewmember in the pilothouse. The others were fortunate enough to be rescued during the dark night by a Naval vessel which happened to be in the vicinity. Three more lives were lost as a result of founderings or floodings while 3 lives were lost as a result of fires and explosions involving towing vessels.

This year there were only 3 lives lost as compared to 10 reported during 1964 and 14 during 1963 as a result of fires or explosions involving tank vessels or tank barges. These 3 crewmembers were killed as a result of a flash fire while working on piping in cargo tanks and using portable extension lights for illumination. With reference to casualties involving inspected freight vessels, 2 casualties which were investigated by Marine Boards took a total of 14 lives. These casualties were the foundering of the SS *Smith Voyager* with the loss of 4 lives and the collision involving the SS *Cedarville*—M/V *Topdalsfjord* with the loss of 10 lives. There were no passenger lives lost during this year as a result of marine casualties to large inspected passenger vessels or small inspected passenger motorboats.

VESSEL CASUALTIES WITH DEATH 1963 TO 1965*

Casualties such as collisions, fires, and groundings reported and investigated by Coast Guard Marine inspection offices totaled 2,134 in 1963, 2,308 in 1964, and 2,179 in 1965.

Of these casualties there were 84 cases in which a total of 230 American or foreign persons lost their lives in 1963, 93 cases in which a total of 191 American or foreign persons lost their lives in 1964, and 56 cases in which a total of 125 American or foreign persons lost their lives in 1965.

	1963	1964	1965
A. Casualties involving fishing vessels:			
Founderings	40	44	28
Fires and explosions	15	3	3
Collisions	1	2	3
Capsizings	7	7	2
Groundings	4	2	2
Material failures	1	1	—
Alaskan earthquake	—	10	—
Heavy weather	—	—	3
(Total deaths)	68	69	41
B. Casualties involving tank vessels:			
Explosions and fires	14	10	3
Collision	—	—	1
Material failure	—	—	1
Foundering	39	—	—
(Total deaths)	53	10	5
C. Casualties involving freight vessels—barges:			
Fire	1	—	—
Towing shackle failure	1	—	—
Boiler explosion	—	1	—
Paint vapor explosion and fire	—	3	—
Cargo shifting—Alaskan earthquake	—	3	—
Cargo poisoning	—	2	—
Foundering	—	—	4
Collision	—	—	10
Material failure	—	—	1
(Total deaths)	2	9	15
D. Casualties involving passenger vessels:			
Collision—small passenger motorboat	1	—	—
Capsizing of small passenger motorboat	—	5	—
(Total deaths)	1	5	—
E. Casualties involving foreign vessels:			
Collisions with fishing vessels	17	5	—
Other collisions	4	4	—
Foundering	—	—	1
Fire	—	—	2
Grounding	—	—	32
(Total deaths)	21	9	35
F. Casualties involving towing vessels:			
Founderings	13	13	4
Fires and explosions	1	2	3
Collisions with pleasure vessels	13	7	6
Collisions	24	16	5
Material failure	1	—	1
Capsizings	5	2	—
Groundings	1	1	—
Towline failures	—	2	—
(Total deaths)	58	43	19
G. Casualties involving miscellaneous vessels:			
Founderings	6	5	5
Fires and explosions	2	31	1
Capsizings	11	4	1
Material failure	6	2	3
Collisions	2	—	—
Groundings	—	1	—
Auto driven off ferry	—	1	—
Heavy weather	—	2	—
(Total deaths)	27	46	10

*All fiscal year figures, July 1 to June 30.

The most serious casualty involving loss of life involved a foreign freighter when it ran aground in U.S. waters. The total crew of 32 persons perished when the Liberian freighter SS *San Patrick* grounded on the southeastern tip of Ulak Island, Alaska. This vessel was a total loss and broke in half with the bow twisting back over the forward part of the hull.

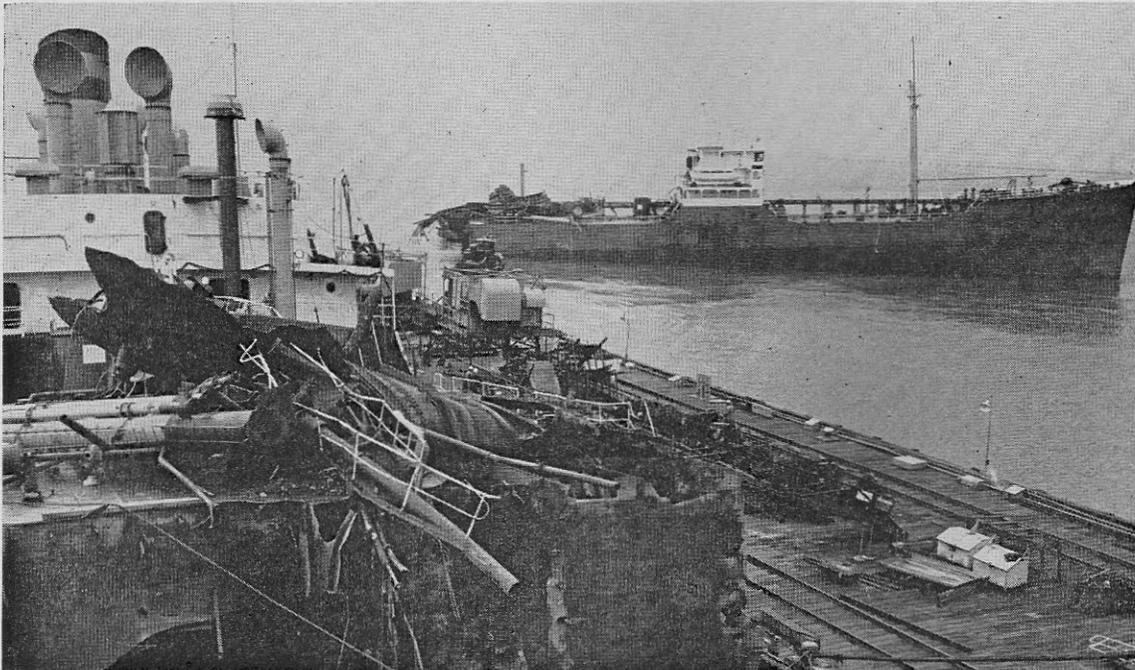
The use of Automated Data Processing assists in determining problem areas and provides information which

guishment of fires are sufficiently adequate.

During the past 3 fiscal years, there have been numerous cases in which LIFEBOAT FALLS have parted. Of these only one involved manila falls. In reviewing these cases, it was found that weight testing a boat every 2 years does not of itself insure that wire falls are in good condition. In one case the vessel was undergoing inspection. The boat had been swung out, weight tested, and the weights

Marine Boards involving explosions and fires.

SS San Jacinto. During the night of 25 March 1964 a violent explosion occurred in the No. 8 tanks of the modified T-2 type tank ship *San Jacinto*. As the result of the explosion, the vessel was blown in two and one crewmember died of a heart attack. At the time of the explosion, the vessel was en route to a shipyard for dry-docking and repairs. Throughout the day, prior to the explosion, the crew



Salvaged stern and bow sections of tanker *San Jacinto*.

may be helpful in preventing further accidents. Let us examine two of the areas in which it is considered that problems exist: Fires and Lifeboat Falls.

Fire on board ship is still one of the worst hazards facing the mariner. A great deal has been done in the design of vessel structures to contain and isolate fire to the compartment in which it originates. Fixed firefighting systems and portable firefighting equipment are, in most cases, adequate and serve the purpose for which intended. However, firefighting equipment is no better than the men who use it. A study of recent fire cases reveals that the training of crewmembers on board merchant vessels in firefighting techniques needs to be improved. Operators should take practical steps to insure that the education and training of masters, officers and seamen in the use of equipment and methods for the prevention, detection and extin-

removed but while being returned to the stowed position, a wire fall parted. It has been learned, however, that the length of time the falls have been in use is an important factor. In several cases, it was apparent that through the years the falls had been slushed down regularly, but this maintenance was restricted to that portion of the boat falls which was readily accessible and those portions over blocks or behind safety guards had not been serviced. In order to reduce casualties of this nature it is necessary that vessel operators maintain adequate records with regard to the age and maintenance of boat falls to insure that they are renewed on a regular basis, and that maintenance reaches those portions which are not easily accessible.

Although not occurring during the past fiscal year, there have been three significant casualties investigated by

was engaged in gas freeing the cargo tanks. At the time of the explosion, No. 8 center tank had been water washed but not gas freed. The Board in its report concluded that the explosion was most probably caused by a magnesium anode falling in the tank creating an incendiary spark. As the result of this casualty, the Commandant promulgated regulations to prohibit the installation or use of sacrificial anodes of a type capable of producing a spark as the result of falling in tanks used for the carriage of inflammable or combustible liquids.

SS Bunker Hill. On 6 March 1964, while en route from Tacoma to Anacortes, Wash., a series of explosions occurred in the No. 9 tanks of the T-2 type tank vessel *SS Bunker Hill*. This resulted in the vessel breaking in two and within less than an hour all major parts of the vessel sank. Of the 31 persons on board, the master and 4

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crewmembers who were in the midship house, are missing and presumed to have been lost. Prior to the explosion, the crew had been involved in cargo tank washing operations in preparation for the loading of a petroleum cargo and to assure that there would be no cargo contamination. The No. 9 tanks across had been water washed, stripped and dried by use of the vessel's gas exhauster. The gas exhauster is a device operating on the venturi principle utilizing auxiliary steam under pressure to draw liquid and vapor from a tank via its cargo suction and discharge lines. The Board in its report concluded that the use of the gas exhauster probably lowered the petroleum vapor-air concentration to the critical range for explosion. It further concluded that the source of ignition was probably a magnesium anode or a piece of the no longer used chemical wash pipe system falling in the center tank.

Drilling Barge *C. P. Baker*. During the early morning hours of 30 June 1964, the *C. P. Baker*, a catamaran type offshore drilling barge was at anchor and drilling a well when the drill penetrated a shallow high-pressure gas pocket. The well blew out, enveloping the barge with gas which ignited and burned fiercely for about thirteen hours. When the well blew out, the water geysered up between the two hulls, struck the drilling platform and cascaded down onto the vessel, entering the hulls through opened deckhouse doors. The vessel sank in less than an hour while the crew abandoned the vessel over the bow of the port hull. Of a crew of 43 men, 8 are dead and 13 are missing and presumed to be dead. The drilling procedure being followed by the *C. P. Baker* was substantially the same as that used for many previous wells. Federal regulations require a blowout preventer to be installed at 3,000 feet. The *C. P. Baker* planned to install this device at 750 feet; however, the well blew out at about 680 feet. Concurring with the Board's Recommendations, the Commandant in his Action has referred this case to the Offshore Oil Panel of the Merchant Marine Council for further study with regard to safety procedures on Offshore Oil Drilling Rigs. There were four major marine casualties investigated by Marine Board during the past fiscal year.

SS *Santa Maria*—M/V *Sirrah* collision. On 19 October 1964, the United States tankship SS *Santa Maria* was in collision with the Dutch tankship M/V *Sirrah* in the harbor at Anchorage, Alaska. The collision occurred during daylight hours with excellent visibility. The weather played no appreciable part although a 3-knot cur-

THE CASUALTY REVIEW BRANCH MAY CALL UPON THE EXPERTISE OF MANY ORGANIZATIONS

MERCHANT MARINE TECHNICAL

Electrical Engineering
Marine Engineering
Equipment
Hull Arrangements
Hull Scientific
Chemical Engineering

MERCHANT VESSEL INSPECTION

Vessel Inspection
Vessel Manning
Rules of the Road

MERCHANT VESSEL PERSONNEL

Complaint
Records and Welfare
Licensing and Certifying

MERCHANT MARINE COUNCIL (Panels)

Chemical Transportation
Motorboat and Yacht
National Offshore Operations
Oil Pollution
Rules of the Road
Western Rivers
State Officials

LEGAL DIVISION

TRAVELING INSPECTORS
MARINE INSPECTION SCHOOL
CONGRESSIONAL LIAISON
SPECIAL COMMITTEE ON CASUALTIES
INTERNATIONAL MARITIME SAFETY
COORDINATING STAFF

DATA PROCESSING

Statistical Reports and Analysis

OFFICE OF OPERATIONS

Search and Rescue
Aids to Navigation
Port Security
Law Enforcement
Recreational Boating
C.G. Auxiliary

GOVERNMENTAL AGENCIES

Naval Oceanographic Office
Coast and Geodetic Survey
Corps of Engineers
Department of Labor
Department of Agriculture
Department of Justice
U.S. Public Health Service
Federal Communications Commission
Interstate Commerce Commission
Senate Commerce Committee
House Merchant Marine and Fisheries Committee
Maritime Administration
Military Sea Transportation Service
Bureau of Mines
Bureau of Customs

INDUSTRY ASSOCIATIONS

National Fire Protection Association
National Fisheries Institute
National Academy of Sciences
American Petroleum Institute
American Pilots' Association
American Waterways Operators
American Merchant Marine Institute
Pacific American Steamship Association
Pacific American Tankship Association
Marine Chemists Association
Manufacturing Chemists Association
Lake Carriers' Association
AFL-CIO Maritime Committee
Shipbuilders Council of America
Other—Industry Associations

rent is considered to have contributed to the casualty. The *Sirrah* which was in the process of shifting from the anchorage to the unloading dock, was weighing anchor and had two tugs alongside in attendance. The *Santa Maria*, approaching the anchorage, planned to pass the *Sirrah* and anchor

to await its turn at the dock. The Board in its report concluded that the tidal current caused the *Santa Maria* to set down on the anchored *Sirrah* in such a way that the starboard wing tanks came in contact with the bow of the *Sirrah*. Although the collision was little more than a glancing blow, the side shell plating of the *Santa Maria* was fractured beneath the water line and an intense and uncontrolled fire followed immediately. There was no loss of life on the M/V *Sirrah*. All of the crewmembers of the *Santa Maria* were rescued except one who is missing and presumed to have perished while attempting to abandon the burning vessel. The fire on board the *Sirrah* was quickly extinguished; however, the *Santa Maria* burned for many hours. Although the engine room and the after quarters of the *Santa Maria* were severely damaged, only the gasoline cargoes in Nos. 9 and 10 starboard wing tanks were lost and approximately 105,000 barrels of cargo were salvaged with little or no contamination. Since the fire did not spread to adjacent tanks, it is considered that the safety devices such as PV valves, flame arresters and steam smothering served their purposes.

SS *Daniel Pierce*. On 13 July 1964, the Panamanian tank vessel SS *Daniel Pierce* suffered uncontrolled leakage while loading sulfuric acid at the Port of Guanica, P.R. This resulted in contamination of the harbor and the closing of the port to all marine traffic. Because of the extreme danger of an explosion of hydrogen gases, it was necessary to temporarily evacuate the town and for the crew to abandon the vessel. It is common knowledge that the vessel was not equipped or designed to carry such cargoes, and that the gasket and packing material in cargo lines and valves was that which is ordinarily used in the oil trade. The approximate cause of this casualty, therefore, appears to be the attack by acid in the valve packings, flange gaskets, and brass trim of the valves of the cargo piping systems, ballast sea suctions and associated piping which allowed progressive and uncontrolled flooding of the cargo tanks and pump room with sea water.

SS *Cedarville*—MV *Topdalsfjord*, collision. On 7 May 1965 the Great Lakes self-unloader SS *Cedarville* was in collision with the Norwegian Freighter MV *Topdalsfjord* about 1 mile east of the Straits of Mackinac Bridge. The collision occurred during daylight hours under conditions of heavy fog. The *Topdalsfjord*, bound towards the St. Mary's River,

(Continued on page 257)



Buoyant Plastic Litter



Shipside rescue ladder suspended from deck edge grab rails

Developing Rescue Equipment

Lt. Comdr. Edwin L. Parker, USCG

What is the Coast Guard doing to improve rescue devices? Lt. Comdr. Parker outlined the Coast Guard's testing and development program in that area at the Search and Rescue Seminar at New York in May. Those devices most interesting to the Merchant Marine are reported on here.

THE U.S. COAST GUARD'S International and National responsibilities for Search and Rescue enjoin that facilities to carry out these responsibilities be maintained. In fact, the Coast Guard is the only United States Federal agency with a statutory responsibility for *developing* Search and Rescue facilities. The goal of the Search and Rescue development program is to apply new technology so that it will improve these facilities.

What are Search and Rescue facilities? The dictionary defines facilities as, "things that promote the ease of any action, operation, or course of conduct;" therefore, Search and Rescue facilities can be defined as a group of things that promote the ease of the Search and Rescue operation.

What must these facilities accomplish? In the most basic sense Search and Rescue facilities must be capable of performing four functions:

1. *Detect* or become aware of an incident of distress.
2. *Locate* the incident.
3. *Render* assistance as required.
4. *Return* to a readiness condition to await the next incident.

The last item is perhaps contrary to the Coast Guard adage, "you have to go out, but you don't have to come back," but from an economic standpoint, is much more realistic.

It would appear that the existing facilities provide a comprehensive and complete coverage of the Search and Rescue operation. This would be true,

if all incidents of distress included a radio signal, a radar target and occurred in fair weather in close proximity to an existing facility. With over 7 million small craft and pleasure boats operating within U.S. waters and the increased private and commercial air traffic, more and more cases involve a distress with no radio signal or radar target and visual searches are necessary. In addition, it has proven impossible to plan that the incident of distress will occur in fair weather or near an existing facility. Thus the broad areas of development included in the Search and Rescue Development Program are:

- a. Improved Search and Rescue Vehicles.
- b. Systems for Improved Search Techniques.
- c. Systems for Rescue of Survivors.

REDUCTION OF EXISTING SAR DATA TO A FORM ADAPTED TO ELECTRONIC DATA PROCESSING.

Assistance reports are prepared by each Coast Guard facility taking part in a Search and Rescue operation. This report provides information as to type of incident, location, type of facility used, hours underway, weather and sea conditions, etc., plus a narrative account of the operation. An average of 30,000 reports are submitted annually. In the past, these reports have been reviewed for content and any abnormalities and data extracted as to type of unit assisted,

type of assistance, number of persons involved, and value of property assisted. This form is currently being revised to permit electronic processing of all data to obtain incident rate versus area, number of incidents occurring within a given range of the facility, percentage of incidents occurring within a given environmental condition, types of incidents searched for, growth rate of incidents, etc. In other words, these data can be processed to develop a complete set of operational parameters which the search and rescue facilities must satisfy. Since the parameters will be based upon statistical information, it will be some time before sufficient data is gathered to provide an adequate data bank. To reduce the time required to provide this bank, it is planned to translate a portion of the 150,000 assistance reports (5-year period) currently on hand to the revised assistance report form. This will permit the development of operational parameters during calendar year 1965.

LEEWAY DATA FOR SAR

One of the most important factors in planning a search for a distressed craft offshore is the estimate of drift. Drift as defined for search purposes is the effect of the current, wind and sea on the position of the distressed craft expressed in terms of direction and speed.

At the present time reasonably accurate means are available to deter-

mine the current and its effect. The determination of leeway (the effect of wind and sea) is at the present time based upon the experience of the person planning the search. The wide latitude of what could best be called "guesstimates" have been of concern to Search and Rescue personnel for years. Various attempts have been made to eliminate the "guess" from "guesstimates." These attempts have been of a local nature utilizing various small craft to determine the effect of wind and sea, and have not provided sufficient data to permit correlation and reduction.

The objective of this project is to accumulate sufficient data of a statistical nature to permit correlation of the effects of wind and sea with representative types of craft, and reducing this information to a form usable to the search planner for accurately determining leeway. This project is currently in the data-gathering phase with all Districts of the Coast Guard cooperating.

SWEEPWIDTH TABLES

A large percentage of searches involve targets which cannot be located by using a radio direction finder or radar, such as small craft, rubber rafts, visual signals, and swimmers, and the human eye becomes the instrument of detection. The human eye as a detecting instrument is governed by the following characteristics of the target and its background, which determines whether detection can occur:

1. Brightness of the background.
2. Brightness of the target.
3. Color of the background.
4. Color of the target.
5. Size of the target.
6. Distance to the target.
7. Shape of the target.

In addition to these characteristics of the target, one additional condition must be satisfied before detection can occur, and that is the target must be in the field of vision of an observer.

Relating these characteristics and conditions to the over water search results in dependence of the following variables:

1. Brightness of the background.
 - Time of day.
 - Bearing of the sun.
 - Cloud cover.
 - Sea conditions.
 - Meteorological visibility.
2. Brightness of the target.
 - Time of day.
 - Intrinsic brightness of the target.
 - Bearing of the sun.
 - Cloud cover.
 - Meteorological visibility.
3. Color of the background.
 - Time of day.



Lt. Comdr. Parker is a 1954 graduate of the U.S. Coast Guard Academy. His shipboard service includes tours of duty as a deck officer and student engineer on several major cutters and engineer officer on the icebreaker CGC Northwind. He has served as Commanding Officer of a Loran Transmitting Station. In 1961 he was awarded the professional degree of naval engineer and a master of science degree in naval architecture and marine engineering from Massachusetts Institute of Technology. Lcdr. Parker is a member of the Society of Naval Architects and Marine Engineers. He is presently Chief of the Search and Rescue Branch of the Testing and Development Division at Coast Guard Headquarters.

Sea conditions.
Cloud cover.

4. Color of the target.
5. Size of the target.
6. Distance to target.
7. Shape of target.

In addition, the capability of the observers is influenced by the time of day, psychological condition, physiological condition, amount of area to be scanned and search speed.

Although this is not a complete listing of all variables that influence visual detection, it does contain the more important ones. Thus the probability of detection depends upon:

1. Time of day.
2. Bearing of the sun.
3. Cloud cover.
4. Sea conditions.
5. Meteorological visibility.
6. Intrinsic brightness of the target.
7. Color of the target.
8. Size of target.
9. Altitude.
10. Shape of target.
11. Horizontal range.
12. Number of observers.
13. Physiological condition of observer.
14. Psychological condition of observer.

Sweepwidth W is defined as the width of a sweep for which the scattered targets detected outside the sweep are equal to the number of targets which may be missed within the sweep. The current sweepwidth table gives sweepwidth as a function of target size, meteorological visibility and altitude. It omits the effect of the other variables. The most serious omission is that of sea condition (a white cap correction factor is provided, but it is based on limited data) and to a lesser extent color of target, shape of target and cloud cover, nor does the table consider search speed.

STANDARD SHIPBOARD RESCUE EQUIPMENT AND TECHNIQUES

This is a continuing project established for the purpose of developing standard rescue equipment for the Coast Guard's major cutters and the associated operational techniques for using the equipment. One phase of this project has been completed and resulted in the following recommendations which are currently being implemented.

It was recommended that a designated rescue station be established on all ship classes to centralize rescue activities at one point. Criteria for the rescue station to be:

- a. Large clear deck area.
- b. Clear rail.
- c. In full view of the conning station.
- d. Well clear of the screws.
- e. One side only (economic and centralization).
- f. Means of rapid hoisting.
- g. No flare to ship's side.

The purpose of designating a rescue station is to permit close control of all activity by the conning officer and officer in charge on deck, to avoid unduly hazarding persons in the water,



Diehl Basket

to permit assembly of equipment, to permit training and familiarization which closely resemble real conditions, and to integrate equipment into a rescue system.

The hoist unit must be rapid and under good control with an outreach from the ship's side to prevent possible contact with the ship when rolling. Although recommendations were made for the existing ships to utilize boat davits for affixing a single whip hoist, this was only an interim solution and the desired hoisting unit still must be developed. The means of lifting persons with the hoist must be compatible with the physical condition of the individual. For injured personnel who must be immobilized for hoisting, the buoyant plastic litter was recommended. Although placing the individual in the litter is more difficult than using the basket or sling, the chance of aggravating an injury is much less. For personnel who are suffering from shock or exhaustion but are not injured, the rescue basket was recommended. Currently two baskets are available and neither is completely satisfactory. One is the improved Erickson helicopter rescue basket. This basket is easily handled and provides a safe means of hoisting, but it is quite difficult to get a survivor into it. The other is the Diehl basket which is easy to board and is capable of hoisting four people simultane-

ously, but is quite cumbersome to handle and in its present configuration is difficult to maintain.

For the conscious and capable person, a sling is the simplest means of hoisting. After investigating and testing a number of types, the recommendation was made to use the "horse collar" sling similar to that used in helicopters. In addition to being hoisted, able bodied survivors and ship's crew can in many circumstances climb to safety. The rope scramble net is far from satisfactory since it provides unsure footing and handholds. The nylon-aluminum rescue ladder is considered far superior and consists of nylon webbing risers, extruded aluminum rungs, and aluminum discs on the rungs for standoff from the ship's side. When coupled with the deck edge grab rails, the rescue ladder provides sure footing and handholds for climbing the side of the ship. The width-to-length ratio is such that rotation of the ladder is not a problem. Another problem investigated was that of boarding the ship's boats from the water, both by survivors and the ship's swimmers. It was recommended that the boats be fitted with boarding ladders.

One additional item evaluated in the course of this project, which is currently undergoing further testing was the buoyant mat. Experience has demonstrated the value of a boarding platform in the water in way

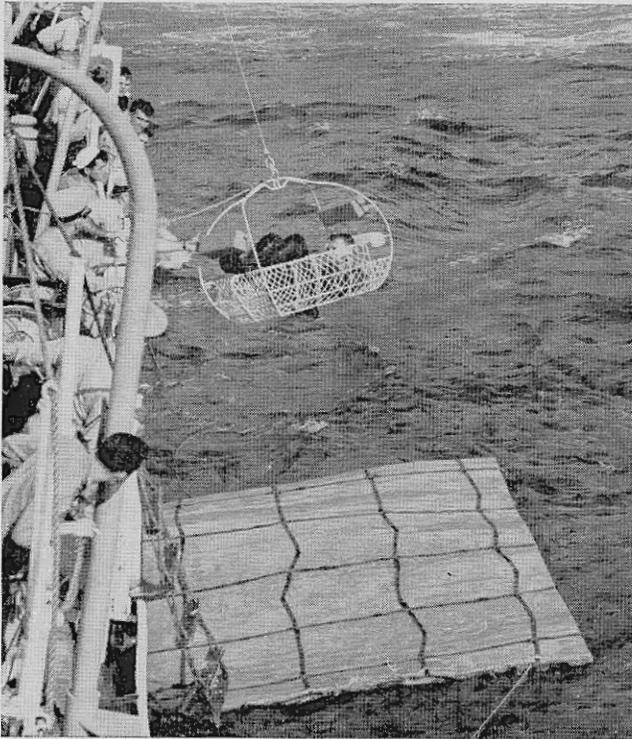
of the rescue station. The platform provides a working area for ship's crew assisting and as a staging point for survivors boarding, and eliminates the hazard of moving survivors directly from the boat to the ship. The boarding platform is currently provided in the form of a 25-man inflatable raft. It has relatively good towing characteristics so the ship can be maneuvered; the tubes of the raft provide high sided security for holding survivors and act as a fender when the boat is alongside. On the debit side, the maintenance and attrition rate are high (semiannual inspection, biennial tests, and estimated 5-year life); launching and retrieval are difficult, re-stowage must be meticulous, cost is relatively high, boarding is difficult and working room is limited.

The buoyant mat is of lower cost, requires little maintenance, will not lose flotation capability upon damage, is easier to board, provides a better working area and acts as a moderately good fender. Its disadvantages are larger stowed bulk, approximately twice that of the 25-man raft; no sides for holding survivors; and very poor towing characteristics. Improved versions of the mat are being tested. These improvements were to facilitate launching, retrieval and stowage, and to improve the towing characteristics. If these tests prove satisfactory, the buoyant mat will be rec-

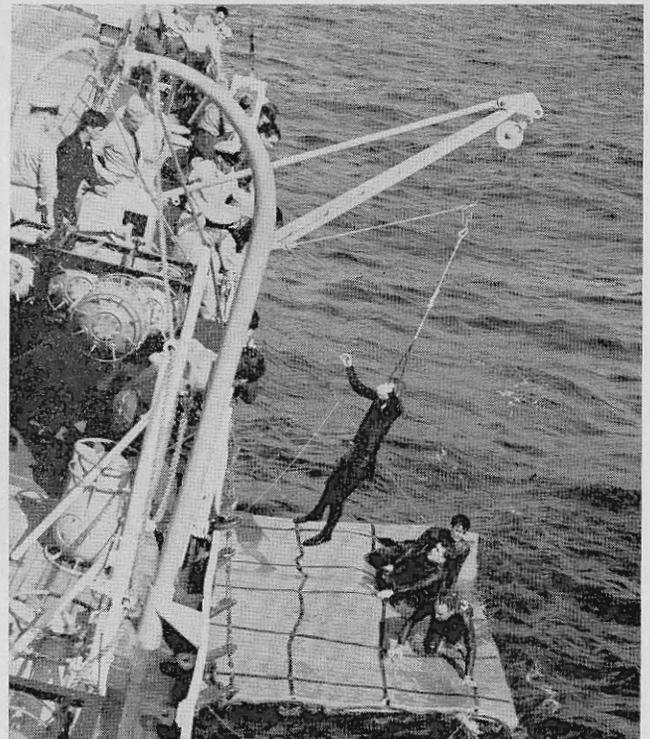
Ship's boat with boarding ladder rigged making landing on rescue mat alongside ship.



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Improved Erickson Helicopter Rescue Basket.



Improved rescue harness; Note other "survivors" on rescue mat.

ommended as additional equipment for use in rescuing survivors.

ELECTRONIC DATUM BEACON BUOYS

Operational experience in conducting an aerial search demonstrated the need for a datum marker for search plan orientation, for marking survivors' positions if the aircraft had to leave the scene before being relieved, and as a means of obtaining an estimate of drift. Based upon evaluating and monitoring tests of existing droppable beacons, a specification was prepared for procurement. The basic requirements for the beacon were:

- a. Be hand launched from the aircraft by the air crewman.
- b. Perform either in fresh or salt water.
- c. Must survive repeated drops from an aircraft flying at an altitude of 200 feet and a true airspeed of 130 knots and/or impact with the water surface at terminal velocity.
- d. Not plunge more than 30 feet below the surface when dropped in the above conditions.
- e. Operate in sea state 5 (International Scale) with a wind velocity of 30 knots, except that carrier dropout is permissible 10 percent of the time.
- f. Complete unit not to weigh more than 25 pounds.
- g. Be easily stowed and launched

from the aircraft without the need of special devices.

h. The beacon to have no descent mechanism, i.e., parachute, etc.

i. The basic frequency range to be 225.0 to 285.0 mc/s, with frequency selection to be possible by using a replaceable subassembly.

j. Power supply to be self-contained and replaceable.

k. Power supply to be at least 500 milliwatts.

l. Operate for at least 36 hours.

A contract was awarded for procurement of 30 units for operational evaluation plus a preproduction model. Service Approval Tests of the preproduction model were conducted in October 1964. These tests demonstrated the prototype met or exceeded the requirements of the specification. Homing trials were conducted with the following results:

Altitude (feet)	Received signal at (miles)	Homed on signal at (miles)
1,000-----	23	20
5,000-----	55	41
10,000-----	75	60

The airborne equipment used in these trials: the UHF Transceiver AN/ARC-27, and Direction Finder Group AN/ARA-25 with RF Preamplifier AM-3969/AR. A total of 30 units are now under operational evaluation at 9 air stations to determine operational procedures for using the beacon and

whether the beacon as designed meets the operational needs. The prototype beacon is shown in figures 8 and 9.

Expendable droplight for helicopter night pickup. This is development of a lightweight, expendable (low cost) droppable light to be used in night water pickups to provide datum or to mark survivors. The light must be such that it can be expended and dropped in areas which contain flammable liquids. The light is not intended to act as an approach light but only as a point reference.

TOWING HAWSER SNAPBACK.

This project is to determine a comparative quantitative measure of snapback (elastic recovery rate) of ropes of various materials and construction.

SHARK REPELLER. Development of an air droppable shark repeller, which will be capable of providing protection from sharks within a 25 or greater yard radius of the repeller. The repeller to be simple, expendable, reliable, provide protection for an extended period of time and capable of withstanding a free-fall air drop.

This has been a brief review of the background, present and future of the Coast Guard's development effort to improve through the application of new technology the U.S. Coast Guard's Search and Rescue facilities.

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STATISTICAL SUMMARY OF DEATHS ON BOARD COMMERCIAL VESSELS*
(Not Involving a Vessel Casualty)

	Natural cause	Nature of death																						
		Homicide	Suicide	Disappearance	Slips and falls—ladders	Slips and falls—gangways	Slips and falls—on deck	Slips and falls—other	Falls from vessel—into water	Falls into holds or tanks	Struck by objects; falling, dropped or moving	Exposure and asphyxiation	Struck against, crushed, bumped into objects	Operating machinery and tools	Burns and scalds (other than electrical)	Electrical shock and burns	Caught in lines, chains or wire ropes	Pinching and crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Alterations and misconduct	Unknown or insufficient information	
Total	403	193	3	27	2	3	1	5	101	16	18	12	2	7	2	4							7	
15 Intoxication.....	1								10	1														
201 Physical deficiency or handicap.....	192								7	1				1										
5 Unsafe movement or posture.....			1						3															
38 Psychological-immaturity, insanity.....		3	26	1					7														1	
29 Unsafe practice.....					2				8	1	2	5		5	1		1						1	
Violation of law or regulation.....																								
54 Human errors.....									40	6	2		1				2						3	
7 Decks—Slippery or cluttered.....									4	2	2												1	
13 Weather conditions.....						1			11															
1 Poor maintenance or housekeeping.....												1												
4 Inadequate lighting.....									2	2														
3 Inadequate rails or guards.....									1	1					1									
19 Failure of equipment.....								1	2		12	2		1									1	
6 Inadequate supervision.....									1		1	2						1					1	
Inadequate life preservers.....																								
Inadequate tools or equipment.....																								
2 Inadequate protective equipment.....									1	1														
1 Improper use of tools or equipment.....																								
5 Miscellaneous causes.....				1					4															
Types of vessels involved																								
Inspected vessels:																								
47 Passenger and ferry—large.....	37		8						1															
23 Passenger and ferry—small.....	19		3						1															
121 Freight ships and barges.....	79	1	8	1	1	1		4	10	7	6												2	
25 Tankships and barges.....	16	1	2						4		1	1												
6 Public.....	5	1																						
12 Miscellaneous.....	8								1		1			1										
Uninspected vessels:																								
59 Fishing.....	9		3					1	38	1	1	3		1									2	
33 Tugs.....	8		1						17	4	2			1										
28 Foreign.....	4		2						8	6	2	1		4									1	
49 Miscellaneous.....	8			1	2				21	2	3	5	2	2				1					2	
Time of day																								
244 Daytime.....	120	1	16	2	1			5	54	12	12	9		1	1		3						5	
148 Nighttime.....	69	2	10		2	1			44	4	4	3		6	1		1						1	
11 Twilight.....	4		1						3		2												1	
Particulars of deceased																								
Papers of deceased:																								
42 Licensed by Coast Guard.....	31		4						4	1	2													
130 Documented by Coast Guard.....	91	3	8		1	1		3	13	1	2	4											1	
218 No license or document.....	70		13	2				2	79	11	13	7	2	7	1		3						6	
13 Other—unknown—foreign.....	1		2						5	3	1	1												
Status or capacity on vessel:																								
64 Passenger.....	48		11	1				1	3															
37 Longshoreman—harbor worker.....	3		1	1					8	7	8	2		2			2						2	
290 Crewmember.....	140	3	15		1	1		3	85	8	10	9	2	5	2		2						4	
12 Other.....	2				1				5	1		1											1	
Activity engaged in:																								
148 Off duty.....	94	1	13		1	1			29	2		5		1									1	
84 Deck department duties.....	20		2		1			3	33	5	7	4		5			2						1	
26 Engine department duties.....	18	1							3	1			2	1										
10 Stewards department duties.....	6	1	1						2															
22 Handling cargo.....	1								6	6	7												1	
20 Fishing.....	3								16		1													
1 Drills.....	1																							
62 Passenger.....	46		11	1				1	3															
30 Other and unknown.....	4			1	1				9	2	3	3		1			1						4	
Location of vessel:																								
143 At dock.....	53	2	3	1	3			1	37	12	10	7		7			3						4	
44 At anchor.....	16					1			12	1	2	5	2				1						3	
216 Underway.....	124	1	24	1				4	52	3	6				1		1							
Unknown.....																								
Part of body involved																								
2 Head and upper limbs.....											2													
Back and lower limbs.....																								
1 Multiple injuries (internal and external).....																							1	
178 Death—heart.....	175				1				1	1														
121 Death—drowning.....			22	2	1	1			92	1													2	
101 Death—disease, other.....	18	3	5		1			5	8	14	16	12	2	7	2		4						4	

*Statistics concerning recreation and pleasure boating accidents are published in CG-357.

STATISTICAL SUMMARY OF DEATHS/INJURIES DUE TO A VESSEL CASUALTY

	Nature of casualty													Total			
	Collisions; crossing meeting and overtaking	Collisions, while anchored, docking or undocking	Collision, fog	Collisions with piers and bridges	Collisions, all others	Explosion and/or fires—cargo	Explosion and/or fires—vessel's fuel	Explosion and/or fire—boilers, pressure, vessel	Explosion and/or fire—structure, equipment, all others	Grounding with damage	Grounding without damage	Foundering, capsizings, and floodings	Heavy weather damage		Cargo damage	Material failure—structure and equipment	Material failure—machinery and engineering equipment
1 July 1964 to 30 June 1965 Fiscal year 1965																	
Number of casualties	12	3	2	7	4	4	9	3	17	4	28	1	8	4	2	108	
Number of inspected vessels involved	25	4			1	7	3	2	15		5		5	2		69	
Number of uninspected vessels involved	17	3	2	7	3	2	9	6	21	35	55	1	4	4	3	172	
Number of persons deceased/injured	17/25	3/4	1/1	2/5	2/2	1/8	0/12	0/8	11/25	34/1	45/15	1/0	4/5	1/5	3/0	125/116	
Primary cause																	
Personnel fault:																	
Pilots—State																	
Pilots—Federal	2	1														3	
Licensed officer—documented seaman	4						1	1			1		1			8	
Unlicensed—undocumented persons	3		2		2	2	2	2	5	1	1		1	1	1	18	
All others	3	1			2	2	1	2	2	1	1		1		1	14	
Error in judgment—calculated risk				1												1	
Restricted maneuvering room				1												1	
Storms—adverse weather					1					2		8	1			12	
Unusual currents				1												1	
Sheer, suction, bank cushion																	
Depth of water less than expected																	
Failure of equipment		1		1		2			4					4	2	16	
Unseaworthy—lack of maintenance								4	2					2	1	20	
Floating debris—submerged object												11				1	
Inadequate tug assistance				1	1							1				4	
Fault on part of other vessel or person				2								2				3	
Unknown—insufficient information							1		4		1					6	
Type of vessel involved																	
Inspected vessels:																	
Passenger and ferry—large					1											1	
Passenger and ferry—small						1								4	1	38	
Freight	25								2							10	
Cargo barge						1			10							9	
Tankships		4							3					1		10	
Tank barges						5	3	2									
Public															1	1	
Miscellaneous															1		
Uninspected vessels:																	
Fishing	2		1	1			3	3	6	2	33	1				54	
Tugs	8	1		4	1	2	5	3	1		9				4	38	
Foreign			1						6		1					41	
Miscellaneous	7	2		2	2		1		8	1	12			3	1	39	
Particulars of person deceased/injured																	
Papers of deceased injured:																	
Licensed by Coast Guard	3/3			0/1	1/0	0/2	0/2	0/2	1/0	1/1	2/2			1/0	1/2	10/15	
Documented by Coast Guard	8/16	1/4							2/0		6/0			0/1	0/2	17/23	
No license or document	6/6	2/0	1/1	2/4	1/2	1/6	0/10	0/6	6/21	1/0	37/13	1/0	3/4	0/1	3/0	64/74	
Other—unknown—foreign									2/4	32/0						34/4	
Status or capacity on vessel:																	
Passenger							0/1				1/0					1/1	
Longshoreman—harbor worker					1/0		0/3	0/3	0/2		2/0			1/3		4/11	
Crewmember	15/24	3/4	1/1	1/4	1/2	1/4	0/8	0/3	8/9	34/1	41/14	1/0	3/1	1/5	2/0	112/80	
Other	2/1			1/1		0/4		0/2	3/14		1/1		0/1		1/0	8/24	
Activity engaged in:																	
Off duty	5/8	0/2							4/4	1/0	5/0					15/14	
Deck department duties	4/8	0/1	1/0	0/4	1/0	1/1	0/4		4/1	12/1	10/10		2/1	0/1		35/32	
Engine department duties	4/6	1/0			0/1	0/1	0/5	0/3	0/2	16/0	1/0	1/0	1/0	1/4		25/22	
Stewards department duties	2/2	0/1							4/0							6/3	
Handling cargo						0/1			0/2				0/3			0/6	
Fishing				1/0						1/0	20/3					24/3	
Drills																	
Passenger																	
Other and unknown	2/1	2/0	0/1	1/1	1/1	0/5	0/3	0/5	3/16		9/2		1/1		1/0	20/36	
Location of vessel:																	
At dock						1/8	0/6	0/5	7/22		0/1			2/5	1/0	11/47	
At anchor			0/1				0/2		0/1						1/0	1/4	
Underway	17/25	3/4	1/0	2/5	2/2		0/4	0/3	4/2	34/1	45/14	1/0	2/0	0/5	2/0	113/65	
Unknown																	
Part of body involved																	
Head and upper limbs	1/2	0/1	0/1	0/3			0/2	0/3	0/4	0/1	0/5		1/0	0/1		2/23	
Back and lower limbs	0/5	0/3		0/1	0/1			0/1					0/2			0/13	
Multiple injuries (internal and external)	0/18			0/1	1/1	0/8	0/10	0/4	1/21		0/10		1/3	0/4		3/80	
Death—heart										1/0						1/0	
Death—drowning	12/0	2/0		1/0	1/0				1/0	32/0	23/0					72/0	
Death—disease, other	4/0	1/0	1/0	1/0		1/0			0/0	1/0	22/0	1/0	2/0	1/0	3/0	47/0	

STATISTICAL SUMMARY OF CASUALTIES TO COMMERCIAL VESSELS*

1 July 1964 to 30 June 1965 Fiscal year 1965	Nature of casualty														Total			
	Collisions; crossing meeting and overtaking	Collisions, while anchored, docking or undocking	Collision, fog	Collisions with piers and bridges	Collisions, all other	Explosion and/or fires—cargo	Explosion and/or fires—vessel's fuel	Explosion and/or fire—boilers, pressure vessel	Explosion and/or fire—structure, equipment, all others	Grounding with damage	Grounding without damage	Foundering, capsizings, and floodings	Heavy weather damage	Cargo damage		Material failure—structure and equipment	Material failure—machinery and engineering equipment	Casualty not otherwise classified
Number of casualties	147	166	22	307	278	18	25	11	116	242	286	223	41	10	91	158	38	2,179
Number of vessels involved	427	379	51	438	387	24	26	11	122	314	309	257	41	12	91	160	46	3,095
Number of inspected vessels involved	133	140	20	210	173	12	3	4	30	123	208	22	34	7	81	117	18	1,335
Number of uninspected vessels involved	294	239	31	228	214	12	23	7	92	191	101	235	7	5	10	43	28	1,760
Primary cause																		
Personnel fault:																		
Pilots—State	13	3	3	6	3					1	8						2	39
Pilots—Federal	10	2	1	2	1					5	5							26
Licensed Officer—Documented seaman	58	9	9	13	12		1	3	1	23	22	2			5	11	2	171
Unlicensed—undocumented persons	61	20	11	20	42		3		6	32	13	12			2	1	8	231
All others	18	15	4	17	9	9	1	2	17	13	15	7	1		3	3	7	141
Error in judgement—calculated risk																		
Restricted maneuvering room	14	23	1	60	16					26	34	3				1	5	155
Storms—adverse weather	7	15		40	34					14	43				1		1	173
Unusual currents	2	8		33	11					25	13	51	35	7	11	2	4	244
Sheer, suction, bank cushion	13	5		10	1					4	7	3						68
Depth of water less than expected	1	1		4	5					3	6							38
Failure of equipment	6	20		22	11	5	1	2	15	44	88				53	114	2	142
Unseaworthy—lack of maintenance	1	4		3	3	1	16	4	50	24	18	17	5	1	1	23	3	316
Floating debris—submerged object				3	120					8	3	96		1	11	23	3	227
Inadequate tug assistance	5	25		35	25					6	16				1	1	2	146
Fault on part of other vessel or person	213	201	20	123	87	6			6	28	7				1	2	8	145
Unknown—insufficient information		3		2		3	4		26	57	25	24		3	1	2	8	776
Additional contributing factors to cause of casualty																		
Hull and associated parts:																		
Plates and framing—steel	23	12	1	20	36	1			2	10		43	17		14		3	182
Planks and framing—wood	2	2		1	17					3	5	60	1		2	1	2	96
Tanks							3	2		4		4	2		3	1	2	21
Holds and hatches							6			3		1	2		1			13
Superstructure—bulkheads, decks																		
Ladders, gangways, rails and guards		6		2	2					12	2	11	9		3	1	1	49
Masts, booms, and cargo gear		1			3													5
Rudder and stern tube				2	1							2			16		2	23
Watertight closures					5					2		1			2			10
Quarters and living spaces										1		28	1		1			31
Navigation and safety:																		
Lookout	27	8	6	1	9						1							53
Docks—piers—congested area	20	111	1	100	34					20	44		1			1	4	426
Channels—restricted areas	158	29	6	18	62					70	121	2		1			1	468
Buoys—aims to navigation		1		2	19					14	26							62
Excessive speed	19	5	12	3	6					2	5	3					5	60
Poor visibility	26	4	20	7	11					34	28					1		131
Steering gear	10	8		6	13					13	9	4			1	7		71
Radar	6		6		1					3								16
Fathometer—Depth of water					11					1	1	1			1		1	16
Engine order telegraph		6		6												3		15
Navigation equipment—other			1		1					20	9							31
Navigation lights	12	8			6						1							27
Navigation signals	129	2	15	2	9					2	1							161
Weather (generally)	7	28		61	26					33	35	50	3	2	4		1	250
Currents and tides	12	46		91	34					34	45	4			3			269
Lifesaving equipment		1								1			5		11		3	21
Firefighting equipment										4					1			5
Miscellaneous:																		
Yard repairs				1								3				3	2	21
Improper loading or storage	2	2			1	20	1	1	8	8	1	30	6	13	9	3	3	96
Tug assisting	133	69	8	136	66				1	65	24	35		1	1	2	2	543
Anchor equipment	1	30	1	6	8		1		1	24	10	4	3		28	11	6	134
Towing equipment	6	7		8	10					15	2	14					3	65
Mooring equipment	2	16		22	18				3	10	6	12	3	1			7	100
Fishing equipment	5				2					4	1	8	1				2	23
Deck equipment—all other									1				1		1			3

See footnote at end of table.

STATISTICAL SUMMARY OF CASUALTIES TO COMMERCIAL VESSELS*—(Continued)

Total	Nature of casualty															Total		
	Collisions, crossing meeting and overtaking	Collisions, while anchored, docking or undocking	Collision, fog	Collisions with piers and bridges	Collisions, all other	Explosion and/or fires—cargo	Explosion and/or fires—Vessel's fuel	Explosion and/or fire—boilers, pressure vessel	Explosion and/or fire—structure, equipment, all others	Grounding with damage	Grounding without damage	Foundering, capsizings, and floodings	Heavy weather damage	Cargo damage	Material failure—structure and equipment		Material failure—machinery and engineering equipment	Casualty not otherwise classified
	1 July 1964 to 30 June 1965 Fiscal year 1965																	
2,179	Engineering:																	
3,095	1	10		20	65		16	2	14	23	10	8	1		5	72	3	250
1,335	1			2	1		12	10	6	4	5	13			4	82	1	143
1,760					3	1				2		18						24
					1		7			19					1			36
	1			6	1		6		34	1	4	1	2		4	25		85
	1			3	1	1	1	1	23		3	1			3	3		41
39																		
26																		
	Type of vessel																	
171	Inspected vessels:																	
231	2	5		10	6				1	7	20	1	1			10	1	64
141	3	6	2	5	10		1			11	15	3			4	2	2	63
	28	63	8	113	70			3	13	35	95	8	25	4	58	73		613
155	14	6	1	13	12				2	13	5	5	1	3	2	2		79
173	21	20	4	21	33	1			3	18	67	1	5		13	21	3	231
244	61	29	5	39	26	2	2	1	4	35	9	3	1		2	2		221
68	2	2		1	3					3	1				4	6	1	23
38	2	9		8	13					1	3	1	1		1	1	1	41
142	Uninspected vessels:																	
316	34	23	2	6	37		11	4	47	57	11	82	6			37	3	360
	147	82	12	115	106	2	7	3	17	72	26	65	1	2		5	11	673
227	31	69	11	24	17	6	1		11	24	49	6			3	1	3	256
	53	39	2	73	36	2			1	24	10	47		3	3	3	3	296
146	29	26	4	10	18	2	4		16	14	5	35			4		8	175
145																		
	Gross tonnage																	
776	197	144	16	121	163	4	23	6	82	133	58	190	8	4	4	47	17	1,217
57	96	59	11	104	69	3	1	2	14	72	22	47	1	1	4	7	13	526
	98	122	15	164	113	15	2	2	19	81	140	18	22	5	57	69	10	952
	36	54	9	49	42	2		1	7	28	89	2	10	2	26	37	6	400
	Length																	
182	170	128	15	99	149	3	21	5	76	118	44	161	6	2	4	36	12	1,049
96	175	106	15	172	109	5	4	3	22	124	54	88	4	4	8	20	19	932
21	40	72	9	85	74	13	1	3	15	30	102	6	20	3	48	54	9	584
13	42	73	12	82	55	3			9	42	109	2	11	3	31	50	6	530
	Age																	
49	176	138	17	154	106	6	5	3	24	95	82	53	4	1	13	30	14	921
5	143	103	14	117	116	12	7	2	36	89	68	90	5	6	18	27	14	867
23	82	96	16	105	116	6	8	4	37	90	105	60	28	5	51	86	13	908
10	26	42	4	62	49		6	2	25	40	54	54	4		9	17	5	399
31	Location of casualty																	
13	27	26	4	44	46	7	5	3	30	55	98	33	3		14	13	7	415
53	49	41	6	80	68	4	9	4	28	37	55	52		2	7	15	3	460
426	9	26		33	39				23	47	35	37	5	1	17	18	8	300
62	2	2	1	1	17	1	1		7	7	4	18	12	3	6	27	1	110
60	8	4	1	4	16			1	11	11	5	25	1		5	30	3	126
131	5	2	2	3	13	2	2		3	11	4	14	12	4	9	16	5	107
71	5	18	3	63	23			1	5	32	49	12	1		11	13	2	238
16	35	27	2	45	22	1	2	1	6	26	10	25			2	2	6	212
16	1	1		2	4					3	3	6			2	5	1	31
15	6	19	3	32	30	3	2	1	3	13	23	1	5		18	19	2	180
27	Time of day																	
161	57	87	11	175	166	11	18	10	62	105	136	139	22	6	64	104	24	1,197
250	79	70	11	113	106	5	6	1	48	126	136	82	17	4	24	45	9	882
269	11	9		19	6	2	1		6	11	14	2	2		3	9	5	100
21	Estimated losses																	
5	7,949	3,349	681	2,399	2,917	160	623	90	7,094	8,136		8,280	386	25	697	2,671	253	45,710
21	319	181		323	54	401	2		352	1,081		1,453	44	285	293		1	4,789
96	2	531		2,306	435		1		245	5		167	34	15		11	118	3,870
543	Vessels totally lost																	
134	Inspected																	
65	3						1		4	3		7					1	19
100	14	11	1	7	17		16	2	44	28		98			3			242
23																		
3																		

*Statistics concerning recreation and pleasure boating accidents are published in CG-357.

STATISTICAL SUMMARY OF PERSONNEL INJURIES ON BOARD ALL COMMERCIAL VESSELS*
(Not Involving a Vessel Casualty)

	1 July 1964 to 30 June 1965 Fiscal year 1965 Cause of injury	Nature of injury																			
		Slips and falls— ladders	Slips and falls— gangways	Slips and falls— on deck	Slips and falls— other	Falls from vessel— into water	Falls into holds or tanks	Struck by objects; falling, dropped or moving	Exposure and asphyxiation	Struck against, crushed, bumped into objects	Operating ma- chinery and tools	Burns and scalds (other than electrical)	Electrical shock and burns	Caught in lines, chains or wire ropes	Pinching and crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises, and punctures	Allergations and miscellaneous	Unknown or insufficient information	
Total	1,850	173	40	150	272	13	28	318	4	131	27	102	3	45	112	1	228	93	74	36	
81	Intoxication	13	10	5	18	1	1	2	4	5	7	1	1	1	1	125	2	2	1	5	
22	Physical deficiency or handicap	2	1	3	7	3	6	2	2	1	7	1	1	1	1	1	1	1	1	1	
177	Unsafe movement or posture	1	1	5	2	3	6	2	2	1	7	1	1	1	1	1	1	1	1	1	
5	Psychological-immaturity, insanity																				
188	Unsafe practice	39	2	8	23	2	1	20	4	8	9	17	2	13	11	17	11	3	1	1	
	Violation of law or regulation																				
744	Human errors	77	15	22	106	4	15	137		73	6	38		27	61		45	57	50	11	
183	Decks—slippery or cluttered	12	5	85	48	1		2		2		1					23	3		1	
128	Weather conditions	8	4	15	22	2		21		18		8			18	1	6	4		1	
39	Poor maintenance or housekeeping	12		3	8			2		2		6			1		2	3		2	
16	Inadequate lighting	2		2	3			2		2		1					2				
5	Inadequate rails or guards	1	1		5					1		7									
90	Failure of equipment	3	1	1	5			52		3		1			5		2	3		1	
74	Inadequate supervision	1	1		4			47		3		4			9		2			2	
	Inadequate life preservers																				
	Inadequate tools or equipment																				
22	Inadequate protective equipment	1						10			1	6					1	2		1	
33	Improper use of tools or equipment				1			9		3	6	4			4		2	2		1	
43	Miscellaneous causes	1		1	4			14		4	1	8			2					8	
	Types of vessels involved																				
	Inspected vessels:																				
274	Passenger and ferry—large	27	2	42	39	2		34		16	4	20			17		35	17	13	6	
16	Passenger and ferry—small			3	6		2	1		2				2							
1247	Freight ships and barges	111	33	88	190	6	23	218	1	92	16	59	2	21	76	1	169	65	52	24	
156	Tankships and barges	25	3	11	20		1	22	1	11	2	16		6	6		15	5	8	4	
25	Public	6		2	4			3		2		3		1			4	2	1		
24	Miscellaneous	1		1	1			8		3		1	1	1							
	Uninspected vessels:																				
38	Fishing	1	1	1	2	2		10		2	2			5	8		1	2		1	
48	Tugs	1		3	7	2		19		3	1	2		6	3		1				
7	Foreign	1		1	1	2		1		1		1		1			1				
15	Miscellaneous	1		2	2	1		2	2	1				3			2			1	
	Time of day																				
1251	Daytime	103	13	94	176	7	22	238	4	86	21	70	3	32	84	1	163	72	35	27	
514	Nighttime	62	23	47	86	6	4	67		37	5	25		9	27		57	15	37	7	
85	Twilight	8	4	9	10		2	13		8	1	7		4	1		8	6	2	2	
	Particulars of person injured																				
	Papers of person injured:																				
162	Licensed by Coast Guard	21	3	7	28	1	6	19	1	12	4	21	1	3	13		15	5	1	1	
1551	Documented by Coast Guard	151	36	133	228	7	18	260	1	111	17	75	2	28	90	1	205	84	73	31	
129	No license or document	1	1	10	14	5	1	88	2	8	6	5		13	9		8	4		4	
8	Other—unknown—foreign				2		3	1				1		1							
	Status or capacity on vessel:																				
20	Passenger			7	7			1		3				1			1				
14	Longshoreman—harbor worker				1			8		1		2								2	
1811	Crewmember	173	39	143	265	13	26	308	3	128	26	100	3	44	112	1	227	92	74	34	
5	Other		1					2		1											
	Activity engaged in:																				
330	Off duty	58	35	21	74	3		10		30		6			11		18	14	48	2	
786	Deck department duties	54	4	66	105	9	20	209	2	51	8	13		36	48	1	107	37	5	11	
397	Engine department duties	37		20	57		4	57	2	30	16	54	3	2	28		62	13	6	6	
256	Stewards department duties	24	1	34	24		1	20		13	2	26			21		33	27	15	15	
10	Handling cargo						1	7		1				1							
18	Fishing			1		1		6		1				4	3					1	
15	Drills			1	4			2		1	1										
20	Passenger			7	7			1		3				1			1				
18	Other and unknown				1		1	7		1		3					3	1		1	
	Location of vessel:																				
706	At dock	70	33	56	106	8	13	145	2	50	8	41	3	17	43		96	47	42	16	
134	At anchor	8	6	5	17	1	4	33	1	9	3	12		3	6		14	5	4	3	
920	Underway	95	1	89	149	4	11	140	1	72	16	49		25	63	1	118	41	28	17	
	Unknown																				

See footnote at end of table.

Total Injuries

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STATISTICAL SUMMARY OF PERSONNEL INJURIES ON BOARD ALL COMMERCIAL VESSELS*—Continued
(Not Involving a Vessel Casualty)

Total Injuries	1 July 1964 to 30 June 1965 Fiscal year 1965	Nature of injury																		
		Slips and falls—ladders	Slips and falls—gangways	Slips and falls—on deck	Slips and falls—other	Falls from vessel—into water	Falls into holds or tanks	Struck by objects; falling, dropped or moving	Exposure and asphyxiation	Struck against, crushed, bumped into objects	Operating machinery and tools	Burns and scalds (other than electrical)	Electrical shock and burns	Caught in lines, chains or wire ropes	Pinching and crushing	Heavy weather	Overexertion, sprains, and strains	Cuts, lacerations, bruises and punctures	Altercations and misconduct	Unknown or insufficient information
	Part of body injured:																			
151	Head and neck	14	3	12	32	3	2	35	16		4						1	4	24	1
66	Eye and face	2		1	3			32	4	1	6	2						1	8	6
169	Arm and shoulder	21	4	25	36			18	23	2	13		5	3		8	4	5	2	
401	Hand	12	3	20	30		1	56	18	23	21	1	20	95		10	66	13	13	
253	Leg and hip	20	12	31	48	1	7	62	31		6		8	3		15	4	4	1	
308	Foot	35	7	17	35	1	3	78	14		19		8	7		69	11	1	3	
239	Back	44	3	19	41		3	9	9		3		1	2	1	93	1	5	5	
111	Body—external	10	5	11	23	1	5	11	6		27		1			4	2	4	1	
100	Body—internal	14	3	11	20	5	5	15	9	1				2		7		8		
28	Hernia			2	3		1	1	1							21				
8	Multiple body injuries			1	1			2		1			1					1		
16	All other injuries	1				2					3		1					1	4	
	Additional contributing factors to cause of injury																			
481	Human element	36	9	53	52	4	5	55	2	19	7	20	2	9	21		73	17	92	5
20	Decks—slippery or cluttered	1		11	4			1		1						2				
37	Weather conditions	4	2	9	7	1		4		1		1		4		2	1			
10	Poor maintenance or housekeeping			4	3					1				1			1			
7	Inadequate lighting	1		2	2											1	1			
	Inadequate rails or guards							4									2			
6	Failure of equipment							7									1			
15	Inadequate supervision	1	1		1			7		1	1		1	1			1			
2	Inadequate tools or equipment							3			1	1					2			
10	Inadequate protective equipment	1		1	1			3				2					1			
10	Improper use of tools or equipment		1		2			3			1						1			
3	Causes not otherwise classified							1									1			
119	Hull structure	4		45	31	2		2	11	3					1	14	3		1	
142	Holds, hatches, tanks	3		1	43		21	18	3	5	1	7		2	11	24	3		1	
282	Ladders, gangways, stairs	166	39	4	12	3	5	11	14				8		18	1			1	
164	Masts, booms, cargo gear	6		8	19	1	1	63	10	2			5	11	27	11			1	
108	Watertight closures	1		3	9	1	2	18	13	1			45		5	8	1		1	
155	Living spaces	10		21	60			8	21		7			6	11	4	5		2	
22	Fishing equipment					1		5	2				6	6		3	1		1	
18	Navigational equipment	1		4	2			1	6							4	2			
25	Lifesaving equipment				5			5	3				3	3		1				
5	Firefighting equipment				1			3												
	Communications equipment																			
	Yard repairs																			
59	Improper loading, stowage, and ventilation	1		5	14		2	13	5		3			3		11	2			
6	Ground tackle							1	1				3			1				
26	Tugs and towing equipment			1	2	1		15	1		1		3	1		1				
146	Mooring equipment	2		7	4			77	7				22	4		16	2			5
131	Miscellaneous deck department equipment	2		9	20	2		34	10	4	5		3	6		24	9		3	
12	Main propulsion machinery				1			2	1	3	2		2	2		1				
60	Boiler parts and accessories				1			4	7	2	38		1	4		7	2		3	
225	Auxiliary machinery	12		9	45		5	36	1	15	10	22	1	2	11	42	9		5	
18	Electrical equipment							7	2	2	1	2	1	1		2	2			
143	Galley equipment	1	1	9	14			12	5	3	26			4		24	29		15	

*Statistics concerning recreation and pleasure boating accidents are published in CG-357.

CASUALTIES

(Continued from 247)

had cleared the bridge about 10 minutes prior to the collision. At the time of the collision her engine was on stop while moving ahead dead slow on an easterly course. The *Cedarville*, upbound towards the Straits, was underway at full speed of 12

m.p.h. Within 45 minutes after being struck on the port side forward of amidships, the *Cedarville* suddenly rolled over and sank with the resultant loss of 10 lives. The *Topdalsfjord* received extensive bow damage but suffered no personnel casualties. The gallant rescue operations of the German freighter *M/V Weissenburg*

which resulted in the rescue of all survivors is worthy of comment. This vessel immediately proceeded to assist and in a matter of 15 minutes passed close aboard the stricken freighter. Since the master of the *Cedarville* reaffirmed his intentions of beaching the vessel, the *Weissenburg* continued to follow the vessel by radar. When

she capsized, the German freighter immediately launched lifeboats and rendered assistance which resulted in the rescue of 26 persons. The survivors were lavish in their praise of the quick actions of the German master and crew in effecting the rescue and in the care and comfort they received.

These rescue operations were conducted in accordance with the highest traditions of the sea, and the Coast Guard recommended that action be initiated towards appropriate recognition of the meritorious acts performed. The report of the Marine Board of Investigation is still under review.

SS Smith Voyager. Another serious casualty which occurred during the past year was the loss of the victory type freighter *SS Smith Voyager*. The vessel, loaded with a cargo of wheat, developed a severe starboard list in heavy weather while in a position approximately 600 miles ESE of Bermuda. Of the 38 crewmembers who abandoned the vessel on 20 December 1964, 4 lost their lives when a water-filled lifeboat capsized. The master, one mate and two able seamen who remained on board for another day were subsequently rescued by the USCGC *Rockaway*. On 27 December the vessel sank while under tow of a commercial vessel. Although the Commandant has not completed his review of the Board's Report, some of the contributing factors of the casualty are readily apparent and widely known. The public testimony strongly suggests that the vessel was overloaded which reduced her reserve buoyancy and her ability to survive the adverse weather and sea conditions. The cargo of wheat shifting due to the ship's rolling and resulting in an initial list of approximately 10° to starboard leads one to question whether or not the cargo was adequately and properly stowed. In addition, the failure of a gasket in the main steam line prevented the vessel from maintaining headway and proceeding on a favorable course to minimize the effects of the sea and the list.

In conclusion, this casualty has placed the varied problems concerning both load line regulations and the carriage of grain type cargoes under active consideration.

I conclude by stating that the overall casualty statistics have revealed cause for optimism. There has been a marked reduction in the number of serious casualties; however, needless casualties are still occurring. If during the coming year the present casualty rate can be held, and hopefully reduced, it will be a major achievement for all of us associated with the American Merchant Marine. †



nautical queries

DECK

Q. Name some of the information which may be found on a Certificate of Inspection.

A. Name of vessel, official number, class, gross tons, net tons, length, home port, owners, operators, date of inspection, port where inspected, date of expiration of certificate of inspection, date of building of vessel, material of construction, place of building, if rebuilt, date of rebuilding, number of berths and staterooms. Complement of crew required to man vessel, number of persons in addition or passengers that may be carried. Total number of persons allowed. Route over which the vessel is permitted to operate. Lifesaving apparatus required, firefighting apparatus required. If permitted to carry flammable or combustible liquids, the highest grade permitted and other pertinent data to carriage of such substances, also the barrel capacity. Date of stability letter issuance. Date last drydocked, and date tailshaft was last drawn. Method of propulsion, and fuel used. Last examination of pressure vessels, number of boilers, when built, manufacturer's name, date hydrostatically tested, date boiler mountings were removed and opened, maximum steam pressure permitted, and the minimum efficiency of the weakest longitudinal section, and inspection office where records are kept.

Q. What is amplitude?

A. Amplitude is the angular distance north or south of the prime vertical; the arc of the horizon or the angle at the zenith between the prime vertical and a vertical circle, measured north or south from the prime vertical to the vertical circle. The term is customarily used only with reference to bodies whose centers are on the celestial horizon, and is prefixed E or W, as the body is rising or setting, respectively; and suffixed N or S to agree with the declination. The prefix indicates the origin and the suffix the direction of measurement. Amplitude is designated as true, magnetic, compass, or grid as the reference direction is true, magnetic, compass, or grid east or west, respectively.

Q. What is meant by the magnetic course?

A. By the magnetic course is meant the course relative to magnetic north; compass course corrected for deviation.

ENGINE

Q. Explain the effect of a cracked regulator diaphragm or bellows upon the boiler water level when operating under the control of the thermo-hydraulic automatic feed system. How can the feed be controlled under these conditions?

A. A cracked diaphragm would cause the loss of the pressure within the generator and the spring of the regulator would close the valve, thereby shutting off the boiler feed. To operate the boiler under these conditions it will be necessary to bypass the regulator or jack it open and control the water level with the hand check valve.

Q. What are the factors that govern the clearance to be given a bearing?

A. The amount of clearance to be provided depends upon:

1. The size of the bearing.
2. The accuracy of shaft alignment.
3. The speed of revolution.
4. Whether the direction of the load force alternates, or remains constant.
5. Whether gravity or forced lubrication is used.
6. The desired operating temperature.
7. The viscosity of the lubricant.

Q. A valve is 4¼ inches diameter, its bearing face is flat. What is the lift when the area of opening is one-fourteenth of the area of the valve?

$$A. \frac{\text{Diameter} = 4\frac{1}{4}}{4} = \frac{4\frac{1}{4}}{4}$$

$$1\frac{1}{16} \text{ inches full lift}$$

∴ $1\frac{1}{16} \times \frac{1}{4} = 0.075$ inch lift to get one-fourteenth of the area

$$\frac{4\frac{1}{4}}{4} = \frac{17}{4} = \frac{17}{4} \times \frac{1}{4} = \frac{17}{16} = 1\frac{1}{16} \text{ inches}$$

full lift

$$1\frac{1}{16} \times \frac{1}{4} = 1\frac{1}{16} \times \frac{1}{4} = 1\frac{1}{224}$$

224) 1700 (0.075 in. lift to get ¼ area
1568

1320

1120

Q. What is the weight of a steel plate 6' 6" long, 3' 6" wide and ¾" thick. A square foot of plate ⅛" thick weighs 5 lbs.

$$A. 6.5 \times 3.5 = 22.75 \text{ sq. ft.}$$

$$\frac{3}{4}'' = \frac{6}{8}''$$

$$\frac{1}{8}'' \text{ weighs } 5 \text{ lbs. } \frac{6}{8}'' = 6 \times 5 \text{ or } 30 \text{ lbs.}$$

$$22.75 \times 30 = 682.5 \text{ lbs.—weight of plate}$$



MARITIME SIDELIGHTS

SAFEST SHIPS OF 1964 HONORED

Steamship operators with the best safety records in 1964 have been honored by the Marine Section of the National Safety Council.

Special awards also went to individual ships which have operated for 2 or more years without a lost-time personnel accident. Known as the "Jones F. Devlin Awards," they are presented to ships which have kept an accident-free record for 2-year and 4-year periods.

This year, a special award was established on a permanent basis to be given annually to any ship whose unblemished crew-safety record goes beyond 4 years. In 1964, four ships met this stringent qualification.

"*Texaco Wyoming*" (Texaco Inc.) has the phenomenal record of operating 8 years without a lost-time personnel accident. The "*Esso Dallas*" (Humble Oil & Refining Co.) received her special award for 6 accident-free years. Awards for 5-year records went to the "*Eastern Sun*" and "*Mystic Sun*" of the Sun Oil Co. fleet.

Other winners of the Jones F. Devlin Award were ships in the fleets of Alcoa Steamship Co., Lykes Bros. Steamship Co., Sinclair Refining Co., Socony Mobil Oil Co., United Fruit Co., United States Lines Co., and Waterman Steamship Corp.

Winners in the National Safety Council's Annual Safety Contest for 1964 in the cargo and passenger ship division were States Marine Lines, United States Lines Co., and Waterman Steamship Corp.

The tanker division winners were Sinclair Refining Co., Texaco Inc., and Tidewater Oil Co. (See photo inside front cover). †

SEAMEN JUST HAVE MORE EXPOSURE, THAT'S ALL!

An interesting study of ship personnel accidents during a recent 2-year period by the Accident Prevention Bureau of the Pacific Maritime Association supports the claims of seafaring men that they work at a greater disadvantage, being sailors, than their shoreside brethren. But being at sea apparently is not the real factor, strange to say.

The PMA finds that of 3,296 accidents, 2,132 occurred at sea, while 1,164 happened in port. Percentage of in port accidents: 35.3 percent.

If, as PMA's figures would indicate, roughly one-third of all shipboard accidents occur while the ships are secured, fore and aft, where weather nor the violence of the sea are prime influences, of what do these "in port" accidents consist? Can they be compared with shoreside industry accidents such as those typical in the shoe manufacturing or motortruck transportation industries?

Ships serve as floating warehouses and quite often when they are worked no greater area of confusion can be imagined. And, too, conditions change daily, sometimes more than once . . . different docks, different conditions. A loading platform at the trucking terminal doesn't shift—it remains the same day in and day out. But those who work on ships must adjust to constant changes in port. At one location the accommodation ladder is used; at the next dock, the Jacob's ladder is the only means of getting on or off the ship. Sometimes it is dropped between the ship and railroad cars, resting on a stringer which may necessitate the men crawling over the boxcar couplers.

A list of but a few of these reported accidents in that 35.3 percent in port category:

"Stepped in hole on dock returning to vessel (no lights);"

"Struck by slingload of pallet boards when going aft to steering engine flat;"

"Tripped over chain lashings;"

"Fell from a half-constructed catwalk;"

"Slipped on grease under topping lift winch."

Of these few incidents—not one can be found at that truck loading platform or in the shoe factory. Many accidents suffered aboard ship at sea or in port are peculiar to the marine industry alone; nevertheless, they can be prevented. Seamen, PMA says, just have more exposure to various ways of getting hurt. So, take the challenge of good seamanship ashore and afloat. It pays to be on the constant "Standby Alert." †

SAFETY MEANS NO ACCIDENTS

Rear Adm. Wm. D. Irvin, USN, new MSTC Pacific Area commander, stressed his dedication to sound safety principles upon assuming command at Fort Mason, San Francisco. In a message to his command, Admiral Irvin stated: "During my command safety will be given paramount consideration in all operations. Safety is not a collateral duty but an integral essential part of every operation. Proper attention to safety will result in elimination of most injuries that would otherwise occur. Full support of our safety program by everyone in the command is expected to safeguard the lives and well-being of passengers, crews and other employees and to minimize the cost incident to material accidents. Safety means no accidents."

Last year, PAC's rate was 3.04, or 3.04 disabling work injuries per mission hours of exposure. This is less than half the all-Federal rate of about 8.0 for 1964. †

MANEUVERING PROPULSION DEVICES STUDY SUBMITTED TO MARAD

A research study entitled "The Use of Maneuvering Propulsion Devices on Merchant Ships" has been completed and submitted to the Maritime Administration, U.S. Department of Commerce.

The study is concerned with the design and economic selection and application of maneuvering propulsion devices such as bow thrusters to large merchant ships. The contract provided for a detailed study of the technical, practical, and economic considerations in the selection as well as a working example of the selection procedure. In addition, a presentation of means for calculating external forces and moments acting on a ship, and for calculating maneuvering device and ship response to the forces and moments has been included in the final report. †

AMENDMENTS TO REGULATIONS

TITLE 46 CHANGES

IMPLEMENTATION OF SOLAS REGULATIONS PUBLISHED

Amendments to vessel inspection regulations bringing them in line with provisions of the 1960 International Safety of Life at Sea Convention have been published in an 81 page special edition of the Federal Register dated 8 September 1965.

The Merchant Marine Council held public hearings on March 23, 1964, and March 22, 1965, for the purpose of receiving comments, views, and data. Federal Register Part II of September 8, 1965 contains most of the changes required in 46 CFR Chapter I in order that these regulations will be in agreement with the provisions in the 1960 SOLAS Convention. These regulations are based on proposals considered at the public hearing held March 23, 1964, and in various items considered at the public hearing held March 22, 1965.

The President by Proclamation dated March 24, 1965, announced that the International Convention for Safety of Life at Sea, 1960 (SOLAS) was to come into force and effect on May 26, 1965, and this Convention was to be observed and fulfilled with good faith by the United States.

Background

Since the 1960 SOLAS Convention supersedes the 1948 SOLAS Convention on May 26, 1965, the vessel inspection rules and regulations in 46 CFR Chapter I were reviewed and changes made so that these requirements will give force and effect to those portions of the 1960 SOLAS Convention which apply to merchant vessels of the United States. Where necessary the authority notes have been revised to include an appropriate reference to the Executive Order directing the various Federal agencies to carry out the administration responsibilities assumed under this Convention. Many vessel inspection rules and regulations did not have to be amended because of the similarity of requirements for certain subjects in the 1960 SOLAS Convention when compared with the 1948 SOLAS Convention. Such rules and regulations are continued in effect without modification.

In writing the regulations, many of them are written specifically for new vessels or new installations. Many of the subparts of regulations for passenger, cargo and miscellaneous ves-

sels (46 CFR Parts 70 to 78 and 90 to 98) have as their concluding section the applicable requirements for existing vessels. For convenience the ending number in such section identification is usually "90." In most cases, instead of giving or repeating the detailed requirements for existing vessels or installations, the regulations state that the existing arrangements and materials previously accepted or approved will be considered satisfactory so long as they are serviceable and maintained in good condition. The advantage of this method is that it preserves the current status on arrangements and details which have been previously accepted without an excessive amount of wording necessary to take care of the many special cases which have been acted upon in the past.

Certain items of new equipment primarily necessitated by the 1960 SOLAS Convention, such as the 15-minute floating orange smoke distress signal, the emergency fishing tackle kits, and lifeboat protecting covers, may not have been available on May 26, 1965. Further, although certain items necessitated by the 1960 SOLAS Convention may be commercially available, such as the desalter kit or the international shore connection, the procurement or installation of such items may require some time. Accordingly, a reasonable time has been given to bring the vessel into compliance. For the time being the lack of such items of equipment will not be considered as sufficient reason for denial of the 1960 SOLAS Convention certificates or the certificate of inspection; however, it is believed reasonable and practicable to require compliance in this respect as soon as possible.

Cork and Balsa Life Preservers

The specification regulations for cork and balsa wood life preservers in 46 CFR 160.003-1 to 160.003-7, inclusive, and 160.004-1 to 160.004-7, inclusive, are canceled effective July 1, 1965. The life preservers built to the specification requirements in 46 CFR Subparts 160.003 and 160.004 fail to meet the standards for all life preservers with respect to supporting the head of an unconscious person properly and providing the desired turning moment of the wearers under the various conditions which may be encountered.

The vast majority of changes in the rules and regulations concern passenger ships carrying more than 12 passengers, tankships and cargo ships of 500 gross tons or more, and all ships provided with nuclear powerplants. These amendments are to the requirements in 46 CFR Parts 70 to 78 (Subchapter H—Passenger Vessels) (CG-

256, Rules and Regulations for Passenger Vessels); Parts 90 to 98 (Subchapter I—Cargo and Miscellaneous Vessels) (CG-257, Rules and Regulations for Cargo and Miscellaneous Vessels); and Parts 30 to 35 (Subchapter D—Tank Vessels) (CG-123, Rules and Regulations for Tank Vessels). Minor changes were necessary in 46 CFR Parts 50 to 61 (Subchapter F—Marine Engineering) (CG-115, Marine Engineering Regulations and Material Specifications); and Parts 110 to 113 (Subchapter J—Electrical Engineering) (CG-259, Electric Engineering Regulations). Revised procedures, minor changes to have uniformity in wording of requirements, appropriate cross references, and editorial changes were made throughout the chapter, but in particular in 46 CFR Parts 2, 24, 110, 175, and 176. In addition, the various specifications governing the manufacture of required items of equipment or processing of materials for use on merchant vessels, and the granting of approvals in specified instances are set forth in 46 CFR Parts 160 to 164 (Subchapter Q—Specifications).

Application of regulations

In the administration of the rules and regulations with respect to certain subjects, distinctions will be made between "existing vessels" and "new vessels." Therefore, various portions of the regulations (other than in the Tank Vessel Regulations) are generally set forth in terms of vessels or installations "contracted for" prior to, or on or after, a certain date. The term "contracted for" was adopted as being more definite than terms such as "keel laid" or "construction started." However, it should be noted that the provisions of the 1960 SOLAS Convention are stipulated in terms of "keel laid," and accordingly, in the case of vessels engaging upon an international voyage, the specific requirements of the 1960 SOLAS Convention must be considered in terms of the date of the laying of the keel rather than the date of the signing of the contract. As the number of vessels involved in this confusion of terms is fairly small, little difficulty should be encountered. However, it is important to note that for some time after the new regulations in this document are in effect, vessels will be completed and receive their first certificates, but for the purpose of the regulations they will be "existing vessels."

In writing the new or revised regulations it was assumed that each "existing vessel" was in complete compliance with all of the applicable existing requirements. This being the case, no change is contemplated for such vessels other than some items

specifically required by the text of these regulations; however, if any such vessel is not in compliance with all the existing requirements, it should be brought up to the existing standards.

The approvals of cork and balsa wood life preservers and the certificates of approvals for such life preservers issued in accordance with the specification regulations in 46 CFR Subparts 160.003 and 160.004 are withdrawn effective July 1, 1965.

Notwithstanding this withdrawal of approvals such life preservers manufactured and approved prior to July 1, 1965, may be placed in service or continued in use so long as such life preservers are serviceable and in good condition to the satisfaction of the Officer in Charge, Marine Inspection: *Provided*, That such life preservers bearing basic Approval No. 160.003 or 160.004 shall not be considered as approved equipment meeting the requirements of the regulations for those passenger, cargo, and tank vessels constructed or contracted for on or after May 26, 1965, which are engaged on international voyages and subject to all of the requirements of the 1960 Safety of Life at Sea Convention.

Lifeboat Handling Equipment

The proposals to amend 46 CFR 33.10-5(f) (1) (viii), 33.10-10(d), 75.25-10(b), 75.33-5(b), 94.25-10(b), and 94.33-5(b) were intended to give effect to the requirement in Regulation 29(g) in Chapter III of the 1960 SOLAS Convention regarding the use of a fore and aft loading component on lifeboat handling equipment which would result from a 10-degree trim of a vessel. It has been determined that these proposals gave an erroneous interpretation of the Convention requirements because they merely provided for longer falls while it was found that consideration of a "fore and aft 10-degree trim" imposed additional factors governing the strength of the davits which must be taken into consideration when designing and constructing davits. Therefore, the revised requirements to cover this point were transferred to the general requirements in 46 CFR 75.25-5 and 94.25-5 and the specification requirements in 46 CFR 160.032-3 and 160.032-5 governing the design, construction and manufacture of davits, which is in agreement with comments received on this subject.

Safety Construction Certificates

The provisions regarding certificates required by the 1960 SOLAS Convention were revised and certain comments proposing that the American Bureau of Shipping be authorized to

issue the Cargo Ship Safety Construction Certificate to American Bureau classed cargo and tankships were accepted. At the option of the owner or agent of a cargo or tankship on an international voyage, and on direct application to the American Bureau of Shipping, the Bureau may issue to such cargo or tankship a Cargo Ship Safety Construction Certificate. The requirements for Convention certificates issued by the Coast Guard, or the Cargo Ship Safety Construction Certificate issued by the American Bureau of Shipping at the option of the owner or agent, are set forth in this Federal Register and identified as 46 CFR 2.01-25, 31.40-1 through 31.40-45, 71.75-1 through 71.75-20, 91.60-1 through 91.60-45, and 176.35-1 through 176.35-30.

Method of administration. Beginning May 26, 1965, the 1960 SOLAS Convention certificates were issued to passenger, cargo and tankships engaging on international voyages and subject to the Convention. After May 25, 1965, no more 1948 SOLAS Convention certificates were issued. It is not intended that special inspections will be made for the purpose of determining that existing vessels are in compliance with the new requirements of the revised regulations in this document. However, as the various vessels come up for their regular inspection for certification after May 25, 1965, a determination of compliance with the new requirements will be made so that by May 26, 1966, passenger vessels and by May 26, 1967, cargo and tank vessels will have been examined for compliance with the new or revised regulations.

MORE TITLE 46 CHANGES

BUOYANT VEST AND CUSHION SPECIFICATIONS EXTENSIVELY AMENDED

Specifications for buoyant vests and buoyant cushions have been revised. These revisions have been published in the Federal Register of September 10, 1965.

With respect to buoyant vests the major changes in the proposals concern (1) maintaining a 300-pound (for adult) and 230-pound (for child) weight tests for dee rings and snap hooks while reducing the breaking strength tests of the complete body strap assembly to 150 pounds (for adult) and to 115 pounds (for child); (2) permitting dee rings to be of one-piece castings; (3) requiring manufacturers to test a certain number of vests for strength of body strap assembly; (4) requiring thread to be suitably mildew inhibited; and (5) permitting the marking to be applied directly to the cloth cover. The pro-

posals regarding two-ply flexible vinyl film for the pad coverings were rejected.

For buoyant cushions to the major changes concern (A) requiring the thread to be suitably mildew inhibited; (B) permitting the marking to be applied directly to the cloth cover; and (C) specifically prohibiting hooks, snaps, or other means to be included in the construction which might facilitate fastening the cushion to the boat. The Council adopted the proposal which changes the construction of grab straps of buoyant cushions so as to have a continuous loop strap, which should reduce failures caused by straps pulling out at the seams.

With respect to the unicellular plastic foam material, the changes in the proposals concern (a) the adding of reference specifications needed in determining fire retardance, which are Federal Specification C-C-91 for an illumination candle and American Society for Testing Materials' specification ASTM D1692 T for flammability of plastics, foam and sheeting; changing one type of material from "Buna N type polymer" to "synthetic rubber modified polyvinyl chloride"; and (c) revising requirements for buoyancy in fresh water, compression deflection, fire retardance, tensile strength, and water absorption. Other editorial changes were also accepted.

Because of the many changes adopted, the complete text of the specifications is set forth in the Federal Register of September 10, 1965 as 46 CFR Subparts 160.047, 160.048, 160.049, 160.052, and 160.060, for buoyant vests and cushions, which are limited to use on motorboats of classes A, 1, or 2 not carrying passengers for hire, and as 46 CFR Subpart 164.015 for the unicellular plastic foam. In response to many inquiries received, the manufacturers of currently approved buoyant vests and cushions were informally notified by letter of the changes and furnished preliminary drafts of the specifications as set forth in this Federal Register.

STORES AND SUPPLIES

Articles of ships' stores and supplies certificated from September 1 to September 30, 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

Pennsalt Chemicals Corp., Three Penn Center, Philadelphia, Pa., 19102, Certificate No. 583, dated September 20, 1965, PENNSALT 3004 MEDIUM

DUTY CLEANER, Certificate No. 632, dated September 8, 1965, PENNSALT 3026.

Arco Chemical Corp., 218 Patton Dr., Cheshire, Conn., Certificate No. 606, dated September 20, 1965, ARCO B.C. 2.

DuBois Chemicals, Broadway at Seventh, Cincinnati, Ohio, 45202, Certificate No. 630, dated September 3, 1965, DUBOIS SOLVENT CLEANER.

The Klean-Strip Co., Inc., 2340 S. Lauderdale, Memphis, Tenn., 38106, Certificate No. 631, dated September 3, 1965, MARINE FINISH REMOVER.

CANCELED

Pennsalt Chemicals Corp., Three Penn Center, Philadelphia, Pa., 19102, Certificate No. 583, dated October 25, 1963, PENNSALT 3004 MEDIUM DUTY CLEANER.

Arco Chemical Corp., 400 Post Rd., Fairfield, Conn., Certificate No. 606, dated November 12, 1964, ARCO B.C.-1.

CIRCULAR

SOLAS IMPLEMENTATION FURTHER EXPLAINED IN NVIC 11-65

Navigation and Vessel Inspection Circular 4-65 was promulgated in May 1965 for the purpose of stating the policies and procedures for effecting changes necessary to implement the vessel inspection regulations that are applicable to existing U.S. vessels subject to SOLAS '60. Since NVIC 4-65 was issued, it has become necessary to amend various sections of the inspection regulations. In addition, it was found desirable to further amplify and add to other parts of Circular 4-65. To accomplish this, NVIC 11-65 has been issued superseding NVIC 4-65.

The vast majority of changes to the requirements will be found in the "Rules and Regulations for Passenger Vessels," CG-256 in 46 CFR Parts 70 to 78 (subchapter H); "Rules and Regulations for Cargo and Miscellaneous Vessels," CG-257 in 46 CFR Parts 90 to 98 (subchapter I); and "Rules and Regulations for Tank Vessels," CG-123 in 46 CFR Parts 30 to 35 (subchapter D). Cross references or revised procedures will be also found in 46 CFR Parts 2, 24, 110, 175, and 176.

Those new provisions of NVIC 11-65 not found in NVIC 4-65 which was carried in the *Proceedings* of July 1965 appear below.

PASSENGER VESSEL REGULATIONS

75.15-10(b)(7) Means shall be provided for bringing the lifeboats

against the ship's side and holding them there so that persons may be safely embarked. (This requires an adequate tricing pendant and frapping line installation. Tricing pendants are only required on gravity type davits.)

75.15-10(c)(2) Means shall be provided to prevent the discharge of water into liferafts launched at fixed positions and from approved launching devices.

75.20-10(a)(oo) Protecting Cover. (This cover is not currently available and will not be required at the present time. It is expected that this cover will be commercially available from boat manufacturers approximately 60 days after the date of issue of this circular.)

75.40-10(b) An additional 5 percent approved life preservers shall be provided. These additional life preservers shall be stowed in conspicuous places on deck.

77.35-5(d) Each breathing apparatus shall have attached to its belt or harness, by means of a snaphook, a fireproof lifeline of sufficient length and strength. The lifeline shall be of steel or bronze wire rope. Steel wire rope shall be galvanized or tinned to resist corrosion. Each end shall be fitted with a hook with keeper having throat opening which can be readily slipped over a 5/8-inch bolt. The total length of the lifeline shall be dependent upon the size and arrangement of the vessel, and more than one line may be hooked together to achieve the necessary length. No individual length of lifeline may be less than 50 feet in length. The assembled lifeline shall have a minimum breaking strength of 1,500 pounds.

CARGO VESSEL REGULATIONS

91.60-5(a) All cargo vessels are required to have a Cargo Ship Safety Construction Certificate. This certificate shall be issued by the Coast Guard or the American Bureau of Shipping to certain vessels on behalf of the United States of America as provided in Regulation 12, Chapter I, of the International Convention for Safety of Life at Sea, 1960.

91.60-40(b) A Cargo Ship Safety Construction Certificate shall be issued for a period of not more than 60 months.

91.60-45(a) The American Bureau of Shipping, with its home office at 45 Broad Street, New York, N.Y., 10004, is hereby designated as an organization duly authorized to issue the "Cargo Ship Safety Construction Certificate" to certain cargo ships on be-

half of the United States of America as provided in Regulation 12, Chapter I, of the International Convention for Safety of Life at Sea, 1960, and Executive Order 11239.

91.60-45(b) At the option of the owner or agent of a vessel on an international voyage and on direct application to the American Bureau of Shipping, the Bureau may issue to such vessel a Cargo Ship Safety Construction Certificate, having a validity of not more than 60 months after ascertaining that the vessel:

(1) Has met the applicable requirements of the Convention; and,

(2) Is currently classed by the Bureau and classification requirements have been dealt with to the satisfaction of the Bureau.

91.60-45(c) When the Bureau determines that a vessel to which it has issued a Cargo Ship Safety Construction Certificate no longer complies with the Bureau's applicable requirements for classification, the Bureau shall immediately furnish to the Coast Guard all relevant information, which will be used by the Coast Guard to determine whether or not to withdraw, revoke or suspend the Cargo Ship Safety Construction Certificate.

94.15-10(b)(6) Means shall be provided for bringing the lifeboats against the ship's side and holding them there so that persons may be safely embarked. (This requires an adequate tricing pendant and frapping line installation. Tricing pendants are only required on gravity type davits.)

94.20-10(mm) Same as 75.20-10(a)(oo).

96.35-5(d) Same as 77.35-5(d).

TANK VESSEL REGULATIONS

31.40-5(a) Same as 91.65-5(a).

31.40-40(b) Same as 91.60-40(b).

31.40-45(a) Same as 91.60-45(a).

31.40-45(b) Same as 91.60-45(b).

31.40-45(c) Same as 91.60-45(c).

33.15-5(mm) Same as 94.20-10(mm).

33.20-1(f) Same as 94.15-10(b)(6).

34.10-15(d) Vessels of 1,000 gross tons and over shall be provided with at least one international shore connection. Facilities shall be available enabling such a connection to be used on either side of the vessel. The international shore connection shall be in accordance with specification Subpart 162.034 of Subchapter Q (Specifications).

35.30-20 Same as 96.35-5(d).

Navigation and Vessel Inspection Circular 11-65 may be obtained at the local marine inspection office or by writing Commandant (CHS), U.S. Coast Guard Headquarters, Washington, D.C., 20226.



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, 9-8-65.
123	Rules and Regulations for Tank Vessels (4-1-64). F.R. 5-16-64, 6-5-64, 3-9-65, 9-8-65.
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, 9-8-65.
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, 9-8-65.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-64). F.R. 2-13-65, 3-9-65, 8-21-65, 9-8-65.
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, 9-8-65.
259	Electrical Engineering Regulations (7-1-64). F.R. 2-13-65, 9-8-65.
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, 9-8-65.
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, 9-8-65.
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, 9-8-65.
329	Fire Fighting Manual for Tank Vessels (4-1-58).

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CG-115, CG-123, CG-176, CG-256, CG-257, CG-258, CG-259, CG-268, CG-269, CG-270 and CG-323
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