

DEPARTMENT OF TRANSPORTATION

MARINE BOARD
of
INVESTIGATION

SS GULFSTAG
Fire with loss of life
Gulf of Mexico, 24 October 1966

U.S. COAST GUARD MARINE BOARD of
INVESTIGATION REPORT and
COMMANDANT'S ACTION

ACTION BY
NATIONAL TRANSPORTATION SAFETY BOARD

Released: 29 MAY 1968

EXPLOSION AND FIRE ABOARD SS GULFSTAG WITH
LOSS OF LIFE AND CAPSIZING OF VESSEL
October 24, 1966

ACTION BY NATIONAL TRANSPORTATION SAFETY BOARD

This accident was investigated by the United States Coast Guard under the authority of R. S. 4450 (46 USC 239) and the regulations prescribed by 46 CFR 136. The Marine Board of Investigation proceedings commenced on 27 October 1966 at Port Arthur, Texas. The Coast Guard report of the investigation of the accident and the Commandant's action thereon are included in and made a part of this report. By publication of this report the National Transportation Safety Board does not adopt those portions of the Coast Guard report which are concerned with activities within the exclusive jurisdiction of the Department of Transportation and the Coast Guard. The National Transportation Safety Board has considered those facts in the Coast Guard report of this accident investigation pertinent to the Board's statutory responsibility to make a determination of cause.

ANALYSIS AND CONCLUSIONS

In analyzing the facts of this case the National Transportation Safety Board finds that there are two possible sequences of events:

- A. Initial explosion occurred in after pumproom;
 - 1. Accumulation of gasoline existed in pumproom bilge.
 - 2. Power ventilation to pumproom was secured.
 - 3. Explosion in pumproom ruptured engineroom bulkhead
and also the bulkhead of #11 center cargo tank

resulting in gasoline flowing into engineroom where many sources of ignition existed to trigger secondary explosions and intense fire.

B. Initial explosion occurred in engineroom;

1. Gasoline accumulated in after pumproom from leakage at pumps, valves, piping or fractured or deteriorated area of #11 cargo tank bulkhead.
2. Pumproom bilge alarm failed to operate or was not heard.
3. Liquid level rose to height of four feet and leaked into engineroom through fractured or deteriorated area of engineroom bulkhead, or
4. Liquid level rose to height of seven feet and leaked into engineroom through pump drive shaft vapor seals at engineroom bulkhead penetrations.
5. Undetected low lying vapors accumulated in engineroom and were ignited from electrical source.

Concerning the first alternative the record does not indicate any known source of ignition, and in accordance with present regulations, no sources of ignition are permitted in pumprooms. The most probable source appears to be a spark caused by a falling tool or other metallic object due to normal vibration of the vessel.

With regard to the second alternative there are many electrical sources of ignition in the engineroom in close proximity to the

engineroom-pumproom bulkhead. However, it appears unlikely that a leak in the pumproom of such proportion to create the head of gasoline required, would have gone unnoticed by the Chief Mate and the two pumpmen who inspected and secured the space following cargo operations. In addition, it appears highly improbable that all the other necessary elements were present.

The Board concludes that the probable cause of the accident was the explosion of gasoline vapors in the after pumproom. The source of ignition is unknown.

RECOMMENDATIONS

The National Transportation Safety Board concurs with the recommendations of the Marine Board of Investigation concerning the pumping of pumproom bilges, 1-A; operation of power ventilation, 1-A; combustible lifeboat falls, 1-B; additional escape units and berthing compartments, 1-C; emergency power systems, 1-E; and CO₂ extinguishing systems, 1-F.

With respect to Recommendation 1-A, the Board concludes that the practice of permitting liquid cargo to remain in pumproom bilges and securing the power ventilation systems in the pumprooms is extremely hazardous. Proper ventilation and pumping of pumproom bilges may be considered to be basic requirements of good seamanship and proper safety practices; nevertheless, the failure in this case to follow such practices resulted in a catastrophic accident. For this reason the Board recommends that rules and regulations be promulgated requiring that the

bilges be pumped as thoroughly as possible, immediately following a cargo transfer, to shoreside tanks or into one of the vessel's tanks suitable to receive such liquid. Further rules should also be promulgated to provide that pumproom power ventilation blowers on all tank vessels remain in operation whenever there is any amount of liquid cargo present in the bilges.

The facts of this accident clearly show that there should be an alternative means of escape from all berthing compartments on tank vessels. This should include manually operated airports of not less than 16 inches diameter and kickout panels.

The Board further recommends that consideration should be given in future design of tank vessels to provide for relief for the forces of explosion in spaces where explosive vapors may accumulate.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ Joseph J. O'Connell, Jr., Chairman

/s/ Oscar M. Laurel, Member

/s/ John H. Reed, Member

/s/ Louis M. Thayer, Member

/s/ Francis H. McAdams, Member



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

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WASHINGTON, D.C.
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5943/GULFSTAG
A-8 Bd
DEC 1966

Commandant's Action

on

The Marine Board of Investigation convened to inquire into the circumstances surrounding the explosions and fire on the SS GULFSTAG in the Gulf of Mexico on 24 October 1966 with the loss of eight lives and the subsequent capsizing and loss of the vessel

1. The record of the Marine Board of Investigation convened to investigate subject casualty has been reviewed and the record, including the findings of fact, conclusions, and recommendations, is approved subject to the following comments and the final determination of the cause of the casualty by the National Transportation Safety Board.
2. On the morning of 24 October 1966 while on a voyage from Port Arthur, Texas, to Port Tampa, Florida, the SS GULFSTAG, Official Number 251066, a tankship carrying a cargo of gasoline, diesel oil, and solvent, suffered a series of explosions and caught fire. The vessel subsequently capsized on 25 October 1966. The casualty resulted in the loss of eight lives from fire in the after part of the vessel.
3. After completion of cargo loading operations at Port Arthur, Texas there remained a small amount of liquid gasoline and water in the after pump room which was not removed before sailing on 23 October 1966. The pump room doors and power ventilation blowers were secured. The four cargo pumps located in the pump room were driven by steam turbines installed in the engine room. The pump shafts passing through the gastight bulkhead between those spaces were fitted with stuffing boxes and packing. The initial explosion occurred in the vicinity of the engine room or after pump room. The source of ignition could not be determined.

4. The initial explosion caused an electrical power failure which prevented the use of the vessel's electrically-driven fire pumps. The fire prevented anyone from reaching and activating the remote release for the fixed carbon dioxide extinguishing systems for the engine room and the after pump room. The fire continued to burn in the after part of the ship until the stern settled and the vessel capsized.

5. The SS GULFSTAG was a T-2 tankship of 12,775 gross tons, 552 feet in length, built in 1944. The vessel had been modified in way of her tanks and midship area in 1958 to provide an increase in cargo carrying capacity.

REMARKS

1. Concurring in the conclusions of the Board, it appears that the SS GULFSTAG burned and capsized in the Gulf of Mexico following several explosions of gasoline vapors in the engine room and after pump room caused by an undetermined source of ignition and that the lives of eight crewmembers were lost in the fire. The record, however, is considered to contain insufficient evidence upon which to base a definite determination that the initial explosion occurred within the confines of the after pump room. Failure of a lens in one of the pump room lights is an unlikely source of ignition in this case. There is evidence in the record that there was fire in the engine room immediately after the initial explosion, that the sheet metal casing of the main generator was found blown off immediately after the initial explosion, and that the top of the pump room was not blown off until the second explosion occurred. Although the evidence does not support a positive determination as to the specific point of ignition there were many possible sources of ignition in the engine room in the event that gasoline or explosive vapors should have found their way into that space.

2. The conclusion of the Marine Board of Investigation that the "practice of leaving varying amounts of liquid in the bilges of the pump room after a cargo was loaded, until it was convenient to pump it overboard sometime after the vessel was at sea," had apparently been condoned by the owners of the vessel is not supported by the record. Furthermore, it is unlikely that the one-inch layer of gasoline in the bilges could have been completely removed by stripping back ashore or into a cargo tank.

ACTION CONCERNING THE RECOMMENDATIONS

1. No further action is presently indicated in regard to Recommendation 1-A which, in substance, proposes that the manner of bilge cleaning and gas freeing in pumprooms should be spelled out in detail by regulation. Since vapors and some amounts of cargo will be present at various times in the pumprooms of most existing tankships normal operating procedures and regulations have been directed toward the elimination of sources of vapor ignition from pumprooms. Proper ventilation and pumping of pumproom bilges are considered to be basic requirements of good seamanship and proper safety practice. In case of negligence or misconduct by licensed or certificated seamen existing statutes and regulations establish policies and procedures for remedial administrative action. The Tank Vessel Regulations in effect at the time of the casualty required efficient means of ventilating spaces on tankships, and in the case of pumprooms allowed either effective steam or air activated gas ejectors or blowers, or ventilators fitted with heads for natural ventilation. Regulations for Tank Vessels constructed on or after 19 November 1952 require that provisions shall be made for removing drainage from the pumproom bilges and adjacent cofferdams.

2. The general objectives of Recommendations 1-B, 1-E, and 1-F, are met in present regulations applicable to new tankships that are comparable to the SS GULFSTAG in size and service in the following manner:
 - 1-B - Combustible lifeboat falls may no longer be installed since lifeboat winches with wire falls are required on such vessels, construction of which was started on or after 19 November 1952. There is, moreover, no evidence in the record that the lifeboat falls installed on the SS GULFSTAG contributed to loss of life.

 - 1-E - Tank vessels with fire main installations contracted for on or after 19 November 1952 must have fire pumps located in separate spaces, and the arrangement of pumps, sea connections, and sources of power must be such as to insure that a fire in any one space will not put all of the fire pumps out of operation. If one of the fire pumps is dependent upon the emergency generator for its source of power to comply with the above requirements, the generator must be located above the bulkhead deck, or above the freeboard deck, whichever is the higher, and outside the machinery casing. Although the operation may be either manual or automatic, the manual system is defined by the regulations as "one in which a single manual operation, such as the manual operation of a switch from an 'off' to 'on' position is required to cause the emergency lighting and power system to supply power to the emergency loads." The record is not convincing that the absence of any automatic system was a contributory factor in this casualty.

1-F - Regulations for carbon dioxide extinguishing system installations contracted for on or after 1 January 1962 require that all controls and valves for the operation of the system shall be outside the space protected, and shall not be located in any space that might be cut off or made inaccessible in the event of fire in any of the spaces protected. Where provisions are made for the simultaneous release of a given amount of carbon dioxide by operation of a remote control, provisions must also be made for manual control at the cylinders. The cylinders must be located outside the spaces protected and must not be located in any space that might be cut off or made inaccessible in the event of a fire in any of the spaces protected.

3. Various proposals to require a dual general alarm system similar to those in Recommendation 1-D have been under consideration for some time. The change proposed in Agenda Item PH 10-67 considered at the Merchant Marine Council Public Hearing on 20 March 1967 which will be promulgated as a regulation was adopted as the best and most practical means of enhancing the reliability of general alarm systems. The other proposals were considered to be either impractical or to compromise a simple dependable system by complexity. As damage to a single cable between the power supply and the feeder distribution panel can jeopardize the entire system the change actually adopted by the Merchant Marine Council will increase dependability by limiting the length of the cable run by requiring the power supply and the feeder distribution panel to be in the same space and also by providing control of the general alarm system at the location of the power supply. This amendment will also clarify the requirement for four contact makers, except where the power supply is located in or adjacent to the wheelhouse, and the requirement pertaining to the contact maker locations. There is insufficient evidence in the record to support a conclusion that a dual general alarm system as recommended by the Marine Board of Investigation would have reduced the loss of life in this case. Explosions or casualties of this type, of such severity or intensity as to break the continuity of an electrical cable, are almost certain to awaken the crew. Furthermore, it is likely that a dual general alarm system would also be rendered inoperative by such catastrophic casualties that might cause grounds, breaks in cables, and physical destruction of the system components.

4. The blocking of the normal escape routes in this casualty was apparently caused by the unusually sudden intensity of the conflagration. It is not likely that the arrangements of all tank vessels would permit airports to provide a means of escape

in accordance with Recommendation 1-C. To serve as an efficient and practicable avenue of escape they must be readily openable by hand, of sufficient size and accessibility, and must lead to an outside deck area or some other safe location. Further, in some marine casualties flooding through airports and weathertight doors leading to weather decks have been determined to be contributing factors. Since the advent of air conditioning trends in design have been away from portlights which can be opened and toward fixed portlights. Tank vessel regulations presently require that where plans and arrangements will possibly permit, all passageways leading to living quarters, or places where anyone may be regularly employed, shall be provided with not less than two avenues of escape. In addition, the structural fire protection requirement for new vessels, especially the requirements for machinery space boundary bulkheads and stairway closures, are considered adequate to prevent the rapid engulfment of passageways by a machinery space fire.

5. A study as proposed in Recommendation 2, concerning the use of combustible substances in flexible joints of sea connections, has been in progress for some time. Agenda items of the Merchant Marine Council Public Hearing on 4 December 1967 included proposals for revision of the Marine Engineering Regulations (Subchapter F) relative to reinforcing and cover material of expansion joints. Although certain material for flexible expansion joints may be capable of withstanding the intense heat generated by the fire on the SS GULFSTAG the type of flexible expansion joint used on sea connections must be a practical joint that is not likely to fail due to any of the factors normally encountered in marine service.

6. I am in agreement with the Board that the rescue vessels acquitted themselves ably and well and that the good seamanship, professional alertness, and efficiency displayed by the SS ATLANTIC PRESTIGE and the SS WESTERN SUN in rescuing a large number of survivors were especially noteworthy and should be recognized. The superior performance of duty in effecting the prompt rescue of all survivors of the casualty has been officially recognized by Letters of Commendation on behalf of the masters and crews of the SS ATLANTIC PRESTIGE and the SS WESTERN SUN.



W. J. SMITH
Admiral, U. S. Coast Guard
Commandant

m
5943/4 GULFSTAG (Marine
Bd of Investigation)
31 March 1967
Serial

From: Marine Board of Investigation
To: Commandant (MVI)

Subj: SS GULFSTAG, O.N. 251066; explosion, fire, and capsizing in
Gulf of Mexico, Latitude 28°28.4' N, Longitude 91°43.7' W,
on 24 October 1966 with loss of eight lives

FINDINGS OF FACT

1. At approximately 0305 CST on 24 October 1966, the tanker SS GULFSTAG, enroute from Port Arthur, Texas to Port Tampa, Florida, with a cargo of gasoline, diesel oil, and Stoddard solvent, suffered a series of explosions, caught fire and subsequently capsized, resulting in the loss of eight lives.

2. Vessel data is as follows:

NAME: SS GULFSTAG
OFFICIAL NUMBER: 251066
SERVICE: Tanker (T-2 Jumboized)
BUILT: Chester, Pa. 1944; rebuilt at Baltimore, Md, 1958
GROSS TONS: 12,775
NET TONS: 8,185
LENGTH: 552.5' (Registered)
BREADTH: 75.3'
DEPTH: 39.3'
PROPULSION: Turbo-Electric
HORSE POWER: 6,000
HOME PORT: Wilmington, Delaware
OWNERS: DELSHIPS, INC., 100 W. 10th St., Wilmington, Delaware
OPERATORS: Gulf Oil Corporation, 1290 Avenue of the Americas, N. Y., N.Y.
MASTER: Larry LaRue, 4401 Lakeshore Drive, Port Arthur, Texas
(License - Master Oceans #312710)

CERTIFICATE:
LAST INSPECTION
FOR CERTIFICATION:
BIENNIAL:
DATE: 6 June 1966
PORT: Port Arthur, Texas
LAST INSPECTION: (as above)

The GULFSTAG was equipped with the following primary lifesaving devices:

- a. #1 Lifeboat -- Steel, 24', oar-propelled, 37-person - midship house, stbd
- b. #2 Lifeboat -- Steel, 24', oar-propelled, 37-person - midship house, port
- c. #3 Lifeboat -- Steel, 24', hand-propelled, 31-person - after house, stbd
- d. #4 Lifeboat -- Steel, 24', oar-propelled, 27-person - after house, port
- e. #1 Liferaft -- Rubber, inflatable, 10-person-midship house, port, boat deck
- f. #2 Liferaft -- Rubber, inflatable, 15-person - after house, stbd, boat deck

The lifeboats were mounted on hand-operated quadrantal davits using manila falls for launching and retrieving the boats. The #1, #2 and #4 lifeboats and all of the davits were manufactured by the Welin Boat & Davit Company. The #3 lifeboat was manufactured by the Marine Safety Equipment Corporation. Both of the liferafts were manufactured by the U. S. Rubber Company.

3. The following named persons are missing as a result of this casualty, and presumed lost.

IRVIN R. CHATAGNER, Chief, Engineer, Bk-157095-C1
2319 Wignall Avenue, Port Arthur, Texas
RICHARD BOLCOME, 3rd Asst. Engineer, Z-1201194
31 Perkins St., Gloucester, Massachusetts
PAUL STRAUGHAN, Oiler, Z-824316-D2
545 Stillwell Blvd., Port Arthur, Texas
GUNNAR E. TAFT, Boatswain, Z-104285
2018 Ray Avenue, Groves, Texas
JOSEPH P. ZIAJOR, Able Seaman/Deck Maintenance, Z-347208
2911 Pearl Avenue, Groves, Texas
CHARLIE PERNELL, Steward, Z-112319
2230 E. 17th Street, Port Arthur, Texas
JOSEPH THOMAS, Pantryman, Z-167391
625 W. 18th Street, Port Arthur, Texas

JESSE E. JEFFRIES, Chief Pumpman, Z-251636, 4236 Rachel Ave., Port Arthur, Texas, died at the U. S. Public Health Service Hospital, New Orleans, Louisiana, on 12 November 1966, as a result of burn injuries suffered on board the SS GULFSTAG on 24 October 1966, and complications.

The following named persons were injured as a result of this casualty and were hospitalized at the U. S. Public Health Service Hospital, New Orleans, Louisiana.

MILTON GUTHRIE, Oiler, Z-402867
5205 8th Street, Port Arthur, Texas
PAUL F. BERRY, Fireman/Watertender, Z-761345-D1
1131 Fairfield Avenue, Indianapolis, Indiana

4. The weather at the time of the casualty was clear, with a calm sea, bright moonlight and good visibility. The radar was in good operation and indicated no other vessels or objects in the near vicinity except a nearby offshore platform which could also be clearly seen. The wind was from the north-northeast at approximately 4 - 6 knots.

5. At 1955 on 21 October 1966 the SS GULFSTAG arrived and docked at the Gulf Oil Docks, Berth #3, Gulf Basin, Port Arthur, Texas with a full load of gasoline. At approximately 2345 on 21 October the vessel began discharging her cargo to shore. At 0040, on 23 October 1966, all cargo on board was discharged and loading of new cargo commenced at 0100. At approximately 1430 on 23 October 1966, loading of cargo was completed and the vessel was secured for sea. The vessel was loaded as indicated by Exhibit "A" and the final ullages of all cargo tanks were listed in accordance with Exhibit "H", the minimum being 3'9". The final draft of the vessel at the time of her departure from Port Arthur, Texas, at approximately 1530 on 23 October 1966, was 29'05" forward and 30'09" aft. There were no spillages or leaks noticed by anyone during the discharging, loading and securing procedures prior to sailing.

6. Upon completion of loading operations the Chief Mate, Frank McPherson, entered and checked the condition of the after pumproom. He found a small amount of unidentified liquid in the bilge, but stated that in his opinion there were no unusual conditions or leaks. He then called the Chief Pumpman (J. E. Jeffries) who secured the pumprooms. The 2nd Pumpman, Homer Fontenot, also entered the pumprooms and checked the valves, bilges, and pumps and secured the hatches upon leaving the pumproom. The deck maintenance man, J. P. Ziajor, sounded all void spaces, cofferdams and pumproom bilges, and gave the readings to the Chief Mate as the vessel left the dock. In the Chief Mate's opinion, the vessel was in a safe and normal condition to sail. The Chief Pumpman reported to the Chief Mate that the pumprooms were all secured properly. The vessel proceeded to sea. As far as the Board could ascertain, the pumprooms were not entered again after the sailing of the vessel.

7. At approximately 0305 on 24 October 1966, while underway approximately sixty miles south-southwest of Morgan City, Louisiana, the vessel was shaken by a severe explosion which appeared to occur in the vicinity of the after pumproom. Within a period of seconds, it was again shaken by a second, more severe explosion, in the same general area. At the first explosion, all electrical power was lost. At the time of the first explosion, the persons on watch and their locations were as follows:

a. JAMES GUNNELL, 2nd Mate	- Wheelhouse
b. PAUL FORD, Quartermaster	- Wheelhouse
c. DUREL HARRIS, Able Seaman	- Bow
d. ROLAND BRADHAM, Ordinary Seaman	- Crew's Messroom
e. EUGENE SCHMIDT, 2nd Asst. Engr.	- Fire Room
f. BERT BARRETT, Fireman/Watertender	- Fire Room
g. PAUL STRAUGHAN, Oiler	- Engine Room

As far as the Board could ascertain, all other persons on board were in their bunks at this time.

8. James Gunnell, the 2nd Mate, in the wheelhouse, heard what he expressed as a dull but severe explosion at exactly 0305, and the lights went off simultaneously. Hearing the gyro alarm he proceeded back to the gyro room and upon arriving there at about 0305½ he felt a second very severe explosion. While looking out of the porthole aft from the midships house at the time of the second explosion, he saw that the top of the after pump room appeared to be blown off and that a sheet of flame was coming out of the after pump room and the forward ends of the after house passageways. The Master arrived on the bridge about that time and energized the general alarm circuit. Gunnell secured the gyro and he and the Captain proceeded aft on the raised catwalk to see if they could get any water on the fire. However, with the loss of power, there was no water pressure on the firemain. At that time the Master decided to anchor the vessel, so the Second Mate, Gunnell, and the Quartermaster, Ford, went forward where they dropped the port anchor with the assistance of the Able Seaman, Harris, and the Third Mate, Wurschy. The vessel came to rest at anchor on five (5) shots of chain. Gunnell then proceeded back to the midships section where the No. 1 lifeboat was lowered into the water.

9. Eugene Schmidt, the Second Assistant Engineer, was on watch, and was standing in front of the starboard boiler in the fire room at the time of the first explosion. Bert Barrett, the fireman-watertender, was also on watch in the fire room. Paul Straughan, the oiler, was on watch in the engine room, standing by the log desk on the port side, forward, of the upper level. The concussion from the first explosion threw Schmidt against the front of the starboard boiler, and the lights went out throughout the engine room and fire room spaces. He then, immediately, stepped through the watertight doorway into the upper level of the engine room and found it engulfed in flames. Being unable to approach the log desk, where the oiler was last known to be, he retreated into the fire room at which time he felt a second less severe explosion. He then glanced at the clock on the bailey board, which was lit up by the flames now coming out of the fire room ventilators, and noticed the time was 0306. Schmidt obtained an emergency flashlight from the fireman, Barrett, and attempted to enter the lower level of the engine room through the shaft alley, but the lower level was aflame. He retreated to the fire room. He then attempted to climb the ladder into the fidley in an effort to get to the CO₂ release controls for the engine room bilges, but the heat and smoke drove him back down to the fire room. At this time the fireman was attempting to enter the upper level of the engine room, using a portable fire extinguisher. He and Schmidt decided there was no way to reach the oiler who was still somewhere forward in the engine room. They attempted to get out through the door leading from the steering gear room into the port main deck passageway, but found the door would not move. They next tried the escape trunk (ex-ammunition hoist trunk) from the steering gear room to the after poop deck, and managed to get out on the poop deck aft. They never saw the oiler, Paul Straughan, again.

10. Neither Schmidt nor Barrett were aware prior to the explosions, of any unusual or unsafe conditions in the engine room or in the vicinity of the

forward engine room. Neither was in a location or position to notice any particular orientation or location of the damage as a result of the initial explosion, other than that it and the second explosion occurred forward of their location in the fire room.

11. Roland Bradham was on watch at the time of the casualty. Bradham had gone aft to the crew's pantry on the poop deck of the after house about ten minutes before the initial explosion, to make coffee. When he passed the after pumproom he noticed that both pumproom doors were closed and everything appeared to be normal. About ten minutes later, at 0305, he felt an explosion and was thrown across the crew's pantry against the port side. At the same time he saw a bright flash outside the porthole. Bradham got up from the deck and ran up onto the boat deck to see what had happened. He saw there was a fire forward of him and he went back down to the engineers' quarters, aft, to try and wake everybody up. Seeing it was impossible to enter the engineers' quarters due to smoke and flames, Bradham returned to the poop deck, went forward on the port side, down to the main deck and then forward to the midships house. In passing the after pumproom, Bradham saw both of the doors had been blown off and the pumproom was afire. Bradham departed the GULFSTAG safely in one of the forward lifeboats.

12. The Master, Larry LaRue, stated that he was first awakened when he was jarred or caused to jump out of his bunk from an undertermined cause at about 0305. He immediately looked out of the porthole to see if a collision had occurred, and seeing nothing, he then headed for the bridge. On the way to the bridge he felt an explosion. Upon reaching the bridge he went out on the bridge wing and looked aft and the whole after end of the vessel was afire. As he was looking aft another explosion occurred and flames came out of the pump room area and the smokestack. LaRue went back into the wheelhouse and activated the general alarm, locking the control lever in the on position. Upon talking to the Second Mate, he found that no attempt had been made to contact anyone aft by telephone. An effort was then made to telephone the Chief Engineer, the engine room and the after crew's messroom with no success. The Master ordered the port anchor dropped and then obtained the vessel's position which he gave to the Radio Officer, Frederick Seid, who was attempting to contact the Coast Guard by radio. The Radio Officer told the Master that his main antenna had been broken and that he was rigging a jumper on the ship-to-shore radio-telephone antenna. Captain LaRue then cut off the 500 Kc auto-alarm, which was in operation, while Seid transmitted the distress message. A moment later he turned the auto-alarm transmitter back on and then discovered that the transmitter could not be shut off with the switch in either position. The Master then met the Chief Mate down on the deck and they opened a fire hydrant to attempt to get a fire hose in operation. There was no pressure on the fire main system. At this time the Chief Mate attempted to approach the after pump room. He was forced back by another eruption of flame and smoke from the pump room which he and the Master noticed had both watertight doors blown off. The Master then directed the Chief Mate to lower the starboard No. 1 lifeboat. This the Chief Mate did with the assistance of several

men who had come forward up the port side from the after section of the vessel. He then told the Third Mate, Peter Wurschy, and another seaman to lower the Port No. 2 lifeboat into the water in case they needed it. He then kicked the releasing device on the 10-man inflatable life raft so that it would be readily available to toss overboard. Captain LaRue and the Chief Mate then decided that they had no means available to fight a fire of this size. The Chief Mate checked the midship pump room doors and released the fixed CO₂ into it. He then ordered the No. 1 and No. 2 lifeboats to move up forward of the break of the bow where they would be partially shielded from any potential further blasts. The lifeboats were secured with painters to the bow of the GULFSTAG. The Captain, the Chief Mate, and the Second Mate remained aboard the vessel, on the bow, in hopes that another vessel would come along which could furnish adequate fire-fighting equipment. Then the Captain saw the Port No. 4 lifeboat had been lowered into the water aft and was moving away to the port beam of the vessel. Immediately thereafter the Captain noted the tanker ATLANTIC PRESTIGE which had arrived on the scene and was laying to approximately one (1) mile off. He saw the ATLANTIC PRESTIGE pick up his No. 4 lifeboat survivors and noticed that the No. 2 lifeboat was approaching the vessel WESTERN SUN, which had also just arrived on the scene. Then the No. 1 boat worked its way over to the ATLANTIC PRESTIGE. All of the men in the lifeboats were picked up by the ATLANTIC PRESTIGE and the WESTERN SUN. Fearing that the GULFSTAG might drag her anchor and drift into one of the oil rigs in the vicinity, the three remaining men let out two (2) more shots of chain on the anchor. The Master decided nothing further could be done on the GULFSTAG, so he used a flashlight and signaled by flashing light to the ATLANTIC PRESTIGE. That vessel received his signal and dispatched a lifeboat which picked up Captain LaRue, the Chief Mate and the Second Mate and took them aboard the ATLANTIC PRESTIGE. It was now about 0600 and breaking daylight.

13. The after quarters and house were completely isolated from the bridge and forward area of the ship due to the initial explosion severing communications. With the exception of a few persons, no one was able to go forward from the after house. Following the second explosion, the forward bulkhead of the after house was rapidly engulfed in flames and dense smoke. Homer Fontenot, the Second Pumpman, and Jesse Jeffries, the Chief Pumpman, were quartered in the first room on the forward starboard side of the poop deck. They were awakened by an explosion and found themselves standing up facing each other. All the lights were out and the passageway outside the compartment was dark. Both men made their way to the watertight door on the forward end of the passageway adjacent to their compartment. However, upon opening the door, all they saw was fire and smoke. Fontenot turned around, yelled, "Come on, Jeff, let's go through a porthole," and went back into what he thought was his own room, but which was actually the Quartermaster's room immediately aft of his own. He could see someone else moving in the almost total darkness of the room and thought it was Jeffries. He opened a porthole, climbed out on deck and ran aft onto the stern. Upon reaching the stern he realized that the person with him was the Quartermaster and not Jeffries. He then saw

Jeffries standing close by and asked him how he got out. Jeffries told him that he had gone out through the door, thinking that he (Fontenot) had gone through ahead of him, and then told him he was all burned. Jeffries had some butter which he had taken from the messroom, and Fontenot helped him rub it on his burns. Fontenot helped an unidentified person on the boat deck release the inflatable (15) man rubber liferaft on the stern and throw it in the water. It appeared to him to sink out of sight without opening or inflating. However, it was later found floating and completely useable.

14. Clifton Charles, the Chief Cook, and Willie Joseph, the Second Cook, were quartered in the second compartment aft on the port side of the poop deck. Charles was awake, smoking a cigarette at the time of the initial explosion. At about 0305 he felt a blast and the lights went out. He opened the door to the passageway to find out what happened. However, he could not get into the passageway due to smoke, so he woke up Joseph and told him they had to make it out of the porthole. Charles heard the door to the Steward's room immediately aft of his own, open and then close again, and he heard the Steward call out "WILLIE - WILLIE - WILLIE," but Charles and Joseph were unable to give him any assistance. They went out through the portholes onto the port side deck and went aft on the poop deck.

15. Howard H. Keith, the First Assistant, was quartered in the first room forward on the port side of the boat deck. He was awakened suddenly and although not aware of what had happened, started putting on his pants. While partially dressed, the door to his room blew open and smoke rolled in through the door. He closed the door twice, but it would not remain closed, and the room was rapidly filling with smoke. Keith opened his forward porthole, went through it onto the boat deck, and proceeded aft down onto the poop deck where he met Schmidt, the Second Assistant, and Barrett, the Fireman/Watertender, who were just coming out of the steering room escape trunk. Schmidt told Keith there was no use going down there, that everything was on fire. Keith looked around at the people already gathered on the after poop deck, and told Schmidt, "Let's get a fire axe and try to get the Chief out, the Chief and Third." Not being able to find a fire axe, they used a piece of pipe and broke the porthole out of the Third Assistant's room on the starboard side of the boat deck. However, the smoke was so heavy in the Third's room, they were unable to enter. They were not able to get to the Chief's room at all, due to the heat and smoke in that area of the boat deck. Keith and the men who had been gathered on the poop deck then lowered the #4 lifeboat on the port side of the after house into the water. Everyone who had made it out of the after house got into the boat and made their way over to the ATLANTIC PRESTIGE which was lying off the port beam of the GULFSTAG.

16. Peter K. Wurschy, the Third Mate, was quartered in the midship house and was awakened a little after 0300 by what he described as a thumping noise. He tried to turn on his bunk light but finding it out of order grabbed a flashlight and went into the passageway to investigate. In the passageway he met McPherson, the Chief Mate, and they proceeded down to the main deck together. Just before reaching the main deck they felt an explosion and saw flames at

the after house. They returned to their rooms, put on additional clothing, and then returned to the main deck in an attempt to get water on deck with which to fight the fire. However, there was no fire main pressure on deck, so they returned to the midship house where Captain LaRue ordered them to drop the port anchor. Some of the crew members who had gathered on the bow had no life jackets so Wurschy and Earl Wise, Able Bodied Seaman, went down into the boatswain locker in the lower hold and obtained the additional life preservers which had been stowed there for emergency use. After the life jackets had been distributed, Wurschy went to the midships boat deck. At the Master's instructions, #1 and #2 lifeboats were lowered into the water, crew members were embarked, and the boats then secured to the bow of the GULFSTAG by their sea painters. Wurschy and Wise manned the #2 lifeboat. They moved it over alongside #1 lifeboat and picked up three more men to help row #2 lifeboat. A few minutes later they rowed toward someone in the water who was yelling, and found one of the wipers, James Hiott, who had jumped overboard from the GULFSTAG and was holding on to a ring buoy. #2 boat then rowed away from the GULFSTAG. The occupants were taken aboard the SS WESTERN SUN. Two of the men, Paul Berry, Fireman/Watertender, and Milton Guthrie, Oiler, had been burned and were given first aid treatment on board the SS WESTERN SUN before being evacuated by a Coast Guard helicopter.

17. All of the crewmembers who survived the explosions and fire remained calm, organized themselves, and were able to successfully launch three of the four lifeboats, and release both of the inflatable life rafts. The inflatable life raft which had been thrown overboard from the stern was later seen adrift, astern of the GULFSTAG prior to the vessel capsizing. The life raft was checked by the crew of a Coast Guard helicopter and found to have no persons in or near it. The life raft which had been released amidships by Captain LaRue was seen, inflated, with a light on top still attached to the vessel after the GULFSTAG had capsized. It was retrieved, unused, by the tug TITAN. The #3 lifeboat, located on the starboard side of the boat deck of the after house could not be lowered due to the heat and smoke in that particular area (the lee side of the GULFSTAG, at that time). Also, the manila falls were beginning to smoke and burn. The men lowering the #4 lifeboat located on the port side boat deck of the after house, also complained about the rope falls getting hot and beginning to smoke.

18. Of the seven missing men, Paul Straughan was the Oiler on watch in the engine room at the time of the casualty; Joseph Thomas, the Pantryman, was last seen after the casualty going back into the burning after house; Straughan, Thomas and the other five men who were missing, that is, Gunnar Taft, Joseph Ziajor, Irvin Chatagnier, Richard Balcome and Charlie Fernell, were never again seen by anyone. The five persons who were not seen by anyone after the explosion were not on watch at this time and would normally have been asleep in their quarters in the vessel's after house. As shown on enclosure 16 of the record, Gunnar Taft and Joseph Ziajor were quartered in the third room aft on the starboard side of the poop deck, adjacent to the

engine room casing. Charlie Pernell was quartered in the third room aft on the port side of the poop deck and Joseph Thomas was quartered in the fourth room aft on the port side of the poop deck. Irvin Chatagnier was quartered in the first room on the starboard side of the boat deck, and Richard Balcome was quartered in the third room aft on the starboard side of the boat deck. This entire after house quarters area was filled with dense smoke and heat immediately following the initial explosion and rapidly filled with flames after the second explosion. It was only a matter of a few minutes before the intense heat inside the after house precluded anyone from re-entering to search for persons either injured or trapped within the house.

19. At approximately 0320 on 24 October 1966 the U. S. Coast Guard Radio Station, New Orleans, Louisiana received a distress signal on 500 Kcs from the SS GULFSTAG advising that she was afire at a position sixty-five miles south of Point au Fer Reef. The information was relayed to the 8th Coast Guard District Rescue Coordination Center, New Orleans, Louisiana, which immediately ordered Search and Rescue aircraft into the air from the Coast Guard Air Stations at Biloxi, Mississippi and New Orleans, Louisiana. The RCC also ordered the 82-foot Coast Guard Cutter POINT LOOKOUT and the 82-foot Coast Guard Cutter POINT VERDE to proceed from Morgan City, Louisiana and Venice, Louisiana, respectively, and assist upon arrival at the scene of the casualty. At 0342 Coast Guard Radio, New Orleans, commenced directing all vessels in the immediate vicinity to proceed and assist the SS GULFSTAG. The Coast Guard Air Station, Biloxi, Mississippi reported a Search and Rescue aircraft HU-16E in the air enroute to the scene at 0349. At 0500 the HU-16E aircraft dispatched from Biloxi, Mississippi, arrived on the scene and commenced searching the area for survivors. At 0510, an HH-52A helicopter was dispatched from the Coast Guard Air Station, New Orleans, Louisiana to assist in the search efforts, and at 0543 a second HH-52A was dispatched from New Orleans to assist on-scene operations. At 0520 the SS WESTERN SUN reported that she had picked up six survivors at the scene and two of them were burned. Then at 0545 the SS ATLANTIC PRESTIGE advised that she had picked up an unknown number of survivors at the scene and one of them had burns over seventy (70) percent of his body and required immediate evacuation. The SS STEEL NAVIGATOR arrived on the scene and launched a lifeboat to search for survivors. However, no other survivors were found in the water. At 0600 a second HU-16E aircraft was dispatched from Biloxi Air Station to assist in search operations. At 0630 the first HH-52A dispatched from New Orleans arrived on the scene and using a rescue basket, picked up the three burned survivors, one from the SS ATLANTIC PRESTIGE and two from the SS WESTERN SUN, and departed enroute to Lakewood Memorial Hospital, Morgan City, Louisiana at 0645. The burned survivors arrived at the hospital at 0730 and the HH-52A departed enroute to Point au Fer to refuel and stand by for further assistance. The Coast Guard aircraft on the scene continued their search patterns. The SS WESTERN SUN departed enroute to Sabine, Texas at 0723 with four (4) survivors aboard.

20. At 1045 the CGC POINT LOOKOUT arrived on the scene, obtained a list of known survivors, and tied the three drifting lifeboats of the GULFSTAG together. At approximately 1420, the Master, Larry LaRue, and Chief Mate McPherson boarded the CGC POINT LOOKOUT intending to remain on the scene until the arrival of a salvage tug. At 1425 the SS ATLANTIC PRESTIGE departed the scene enroute to New Orleans with twenty-three (23) survivors aboard. It had now been established that seven crew members of the SS GULFSTAG were missing and believed to have been trapped in the burning after quarters of the vessel. The POINT LOOKOUT then began a search of the area in conjunction with on scene aircraft, and prepared a surface marker to be used in the event the GULFSTAG should sink. The CGC POINT VERDE arrived on the scene at 1530 to assist in search operations. At 1642, search by aircraft was discontinued and surface vessels remained on the scene. The POINT VERDE departed the scene at 1750 with the three GULFSTAG lifeboats in tow, enroute to the Coast Guard dock at Venice, Louisiana.

21. At approximately 0030 on 25 October 1966 the tug TITAN arrived on the scene to investigate the possibilities of salvage of the GULFSTAG. An attempt was made by the POINT LOOKOUT to place the Captain and Chief Mate of the GULFSTAG aboard the tug TITAN; however, the weather conditions at this time were an 18 mile per hour wind from the NNW, seas five (5) to six (6) feet from NNW, and it was considered too risky, so no further attempt was made. At 0830 the CGC IRIS arrived on the scene. The IRIS lowered a motor lifeboat, and the boat crew, although operating under very adverse sea conditions, safely transferred the Captain and Chief Mate from the POINT LOOKOUT to the salvage tug TITAN with a skillful display of outstanding seamanship. The POINT LOOKOUT departed the scene at 1020 and the CGC IRIS remained on the scene anchored 2,000 yards west of the GULFSTAG. The IRIS lowered her small boats and twice attempted to float a blanket of foam over the fire. However, due to sea conditions and wind, the attempt was not very successful and fire continued burning. The GULFSTAG, which had been slowly settling by the stern deeper in the water, was now down enough to allow water to enter the engineroom skylight. At approximately 1800 on 25 October 1966 the GULFSTAG rolled to starboard and capsized. After capsizing, the fire was out. About one hundred twenty (120) feet of the bow and forefoot section remained afloat, keel in the air. At 0615 on 28 October 1966 the M/V FLOOD TIDE arrived on scene with a salvage party aboard, and an underwater survey commenced, to determine the condition of the hull and feasibility of salvage. The underwater survey by salvage divers disclosed no apparent damage to the vessel's underwater body.

22. At about 1700 on 28 October the salvage vessel CABLE, owned by Merritt, Chapman & Scott Corporation arrived on scene to begin salvage operations on the GULFSTAG. Upon arrival of the CABLE, the TITAN departed the scene. The CGC IRIS departed on the following day. The services of Dick Evans Divers of New Orleans, Louisiana were retained by Merritt, Chapman & Scott Corporation for diving and salvage operations. Dick Evans Divers worked from the M/V FLOODTIDE, owned by Tidewater Marine Service, Inc. of Morgan City, Louisiana.

23. An underwater survey of the GULFSTAG, conducted by the divers, disclosed that the afterhouse superstructure was buried in the soft sea bottom. They were unable to enter the vessel or to work under the exposed after pumproom area for fear of building up an air pocket, which might cause the vessel to shift or roll. However, evidence was found in the area of the after main deck house lifelines which indicated that the explosion had shattered valves and pipe fittings in the area of the after pumproom. There was no indication of any fractured hull fittings or damage in way of seachests and their connections.

24. Due to inclement weather conditions, salvage efforts proceeded very slowly. During salvage operations the divers and the vessel were continually hampered by gasoline and heavy black oil which floated to the surface from the after section of the GULFSTAG. The gasoline fumes became very strong at times and the M/V BECT II was employed to spray an emulsifier on the surface of the leaking cargo. However, the emulsifier had very little effect and as a result, diving operations had to be discontinued from time to time until explosimeter readings indicated a safe atmosphere for continuing work.

25. The GULFSTAG was raised by pumping air into the after pumproom and the #11 centerline cargo tank after first plugging the seachests and installing adapters for the two inch air hoses in the docking plugs for these two compartments. The overboard discharges and seachests were plugged by using stuffer drain patches and, in some cases, by pouring concrete into the seachests. One air fitting was also installed in the shaft alley. Air was pumped into the fittings in the after pumproom and the #11 centerline tank, but not into the shaft alley fitting. The air introduced into the after pumproom and #11 tank found its way into all areas of the stern and gradually the inverted stern was filled with trapped air. After several hours of pumping air, at 1700-1800 on 13 December the GULFSTAG slowly rose to the surface, keel up. Preparations were made to tow it southward to much deeper water for final sinking.

26. The M/V CABLE secured a 1-5/8" wire through one of the GULFSTAG's hawsepipes and began towing. However, it was found necessary for the divers to sever the tanker's anchor chain with explosives before any appreciable headway could be made. At about 1000 on 15 December the CABLE arrived at Latitude 27-41 N, Longitude 91-42.5 W, with a fathometer reading of 200 fathoms depth. The divers began setting timed explosive charges on the hull for the purpose of sinking the GULFSTAG and burning off her cargo. The charges exploded at 1215 as set, but failed to either sink the vessel or burn the cargo. However, the explosion ripped small holes in the hull and the vessel began settling very slowly.

27. By the morning of 17 December the GULFSTAG was completely down by the stern with about 80 feet of the bow protruding up out of the water in a vertical position, and with the remaining length of anchor chain swinging freely. It was estimated that the vessel had been sinking at a rate of about one foot every three to four hours. More explosives were ordered by radio.

The Coast Guard was requested to assist in delivering this material. At about 1400 on 17 December the CGC POINT LOOKOUT arrived on scene with 2000 pounds of dynamite. However, on 18 December, before the dynamite could be used on the exposed surface of the GULFSTAG, she suddenly caught fire and began burning furiously. Later on 18 December, the tanker sank out of sight. The CABLE fixed the final position of sinking, by loran, at Latitude 27-56N, Longitude 91-35 W in 165 fathoms of water. The escaping gasoline continued to burn furiously on the surface for approximately two more days.

28. At no time during the diving or salvage operations were the bodies or remains of any of the missing persons sighted.

29. Coast Guard records of the last inspection for certification, conducted at Port Arthur, Texas, on 6 June 1966, entered in the Marine Board of Investigation record as Exhibits "F" and "G", and the testimony of the inspecting officers did not indicate any conditions at that time which would have contributed to this casualty. The drydock examination and internal tank inspection conducted at Jacksonville, Florida on 29 March 1966 did not reveal any structural defects or conditions which would have contributed to the casualty.

30. The crew did not encounter any undue difficulty in launching any of the lifeboats or life rafts, other than the heat, smoke and flames which prevented launching of #3 lifeboat. Some difficulty was encountered in lowering #2 lifeboat due to the small number of persons available to assist in lowering operations after #1 lifeboat had been launched and manned.

31. The firefighting equipment available to fight the fire was inadequate in that the ship's auxiliary power, necessary to run the fire pump, was lost with the first explosion, and the release controls for the engine room and after pump room fixed systems were inaccessible due to the fire and smoke in the immediate area of the controls, which were located within the after house.

32. There were no electrical circuits or fixtures within the confines of the after pump room. The only electrical system associated with the pump room was the lights, and these were mounted from the engineroom side of the bulkhead with bolts and fitted on the pump room side with explosion-proof lenses. There was no evidence that any of these lights as installed were in any way defective although one lens had been replaced at some time in the past because it was cracked during installation.

33. The only bulkhead penetrations in the after pump room bulkheads, other than solid welded pipe penetrations were four cargo pump drive shafts and a bilge liquid level alarm actuating rod. The electrical section of this alarm was installed entirely on the engineroom side of the engineroom-after pumproom common bulkhead. The section of the alarm in the pumproom was entirely mechanical. The drive shafts and actuating rod were fitted with packing glands and were found to be in proper condition at the time of the last cargo loading prior to the casualty. No evidence could be adduced that there were any weights, tools, or loose objects in the after pumproom of a nature which,

by falling or sliding, could be expected to generate a spark and thereby trigger a gasoline vapor explosion.

34. No one who was in the after house can remember hearing the general alarm ringing after the initial explosion, although the Master actuated the controls within seconds.

35. The GULFSTAG was drydocked in Jacksonville, Florida on 29 March 1966 for a routine drydocking. The vessel was examined externally and internally and gagings were made of the hull plating. The only plates found to be under the minimum allowable, were the M-10 and M-11 plates, which were renewed during this drydock period. The M strake is above the sheer strake line and the 10 and 11 plates are located in the after quarters area and are not contiguous to either the machinery spaces or the after pumproom spaces.

36. As a result of an interview on 1 February 1967 with Mr. Ed Jacobs, Port Engineer, and a visit aboard the SS GULFSEAL, sistership to the GULFSTAG, the following conditions were found to have existed in the sea injection and overboard discharge piping aboard the GULFSTAG at the time of the casualty. The sea injection and overboard discharge lines were fitted with rubber, flexible expansion joints as listed below:

- (a) One 26" joint between the high and low main circulating inlet lines.
- (b) One 24" joint between the main circulating pump and the main condenser.
- (c) One 24" joint between the main condenser and the overboard discharge valve.
- (d) One 14" joint between the auxiliary circulator and the auxiliary condenser.
- (e) One 4" joint on the air conditioner circulating water sea valve.

In addition to the above joints, there were four additional 12" rubber expansion joints located in the cargo pump condenser system which would not have been subjected to head pressure from the sea.

37. The rubber expansion joints fitted in the sea injection and overboard discharge lines of the GULFSTAG were manufactured by the Goodall Rubber Company and were all of style #E-103. The use of rubber expansion joints is permitted for vessels under 46 CFR 55.07-1, and the Goodall Rubber Company is an approved manufacturer of fittings, listed in CG-190, Equipment List.

38. The four 12" rubber expansion joints were of style #4150 manufactured by the United States Rubber Company, an approved manufacturer of fittings, listed in CG-190, Equipment List.

39. As far as the Board could ascertain, no one saw, heard, or in any way detected anything prior to or at the time of the initial explosion which would be of help in determining the exact cause of the casualty. However, the testimony of crewmembers who were on watch at the time of the casualty and survivors located in the after quarters definitely establishes the location of the explosion as being in the after pumproom.

40. Testimony of the Chief Mate and the 2nd Pumpman indicated that there were several inches of liquid in the bilges of the after pumproom when the vessel departed Port Arthur, Texas. The liquid was identified as part water and part gasoline. The exact amount of gasoline on top of the water was not determined but was estimated by the 2nd Pumpman to be about one inch in depth.

41. The Board could ascertain no person amongst the survivors who could state that the contents of the bilges of the after pumproom were pumped overboard after the vessel departed the loading dock at Port Arthur, Texas on 23 October 1966, although both the Chief Mate and the 2nd Pumpman testified that such a pumping of bilges in both pumprooms was the ordinary and regular routine of the ship after it got to sea, after loading. The after pumproom bilge liquid level alarm had not sounded prior to the casualty.

42. Witnesses who were on watch at the time of the casualty and had passed the area of the after pumproom just prior to the casualty saw no indication of any unsafe conditions nor anything out of the ordinary. No persons other than the watch personnel were seen up and about during the watch on which the casualty occurred.

43. The ventilation fans had been secured when the vessel had completed loading her final cargo and as far as could be ascertained were never again started prior to the casualty. Roland Bradham, Ordinary Seaman, passed the pumproom just minutes before the first explosion and testified that the pumproom doors at that time were secured and all appeared to be normal.

44. The vessel was equipped with a diesel engine-driven emergency generator which could only be started and placed in operation manually. The emergency generator was not provided with an automatic start and changeover relay and therefore was not readily available to furnish power to run the electrically powered fire pumps. When the GULFSTAG was built in 1944 and when it was jumboized in 1958, there was no official Coast Guard requirement that an emergency power source be provided.

45. The portholes in the berthing area of the after quarters, which were sixteen inches in diameter, provided a second means of escape for many persons who would otherwise have been trapped in their rooms and perished. There is no existing Coast Guard regulation which requires airports in berthing spaces of tank vessels to be of any minimum size or readily openable.

CONCLUSIONS

1. It is concluded that the SS GULFSTAG burned and partially sank in the Gulf of Mexico on 24 and 25 October 1966 as a result of several explosions which originated in the after pump room, and of subsequent fire and leakage of sea water, with the loss of the lives of eight crewmembers. Seven lives were lost during the fire on 24 October 1966 and one crewmember died on 12 November 1966 as a result of injuries received during the fire. The GULFSTAG was eventually salvaged to the point where it floated and could be towed and was finally sunk at sea in 165 fathoms depth on 18 December 1966.
2. An explosion occurred in the after pump room at 0305S, 24 October, which ruptured the surrounding bulkheads allowing gasoline to flow into the after pump room and the engine room bilges from #11 cargo tank, thereby causing further explosions and fire, with the subsequent eventual sinking and loss of the vessel.
3. Fuel for the initial explosion was gasoline vapor emanating from liquid gasoline in the bilges of the after pump room. The source of ignition for the explosion cannot be determined. There were no witnesses who actually saw the explosion closely or who saw the interior of the pump room between the time it was secured for sea at about 1600S on 23 October and the time of the initial explosion. There was no surviving witness who was located within 50 feet of the focal point of the initial explosion when it occurred. No surviving witnesses examined the material condition of the scene of the initial explosion before the vessel capsized, nor was anyone else ever able to examine this area of the GULFSTAG before it was finally sunk in 165 fathoms.
4. However, the Board concluded that one of the possible sources of ignition for the explosion was one of the pump room electric lights. The pump room lighting system was the only possible source of accidental electrical ignition present in or attached to the pump room. Failure of a lens and contact of gasoline vapor with a hot bulb could have triggered an explosion. There was no evidence of the dropping of a heavy object which could have caused a spark and possibly triggered an explosion.
5. The nature and location of the casualty on board the vessel prevented anyone from reaching or activating the remote releases for the fixed CO₂ extinguishing systems for the engine room and the after pump room. The initial explosion caused a complete power failure which prevented the use of the vessel's electrically-powered fire main system or any topside water fire fighting equipment.
6. The seven lives lost on board the GULFSTAG were lost in the following manner: (a) Paul Straughan, Oiler on watch in the engine room, was trapped and died in the engine room as a result of the first explosion and the rapid

spread of flames throughout the engine room; (b) Irvin R. Chatagnier, Richard Bolcome, Gunnar E. Taft, Joseph P. Ziajor, Charlie Pernell, and Joseph Thomas were trapped within their quarters or adjoining passageways by the heat and smoke from the fire and died as a result of smoke inhalation or burns.

7. Jesse E. Jeffries died in the U. S. Public Health Service Hospital, New Orleans, La. on 12 November 1966 as a result of injuries received 24 October 1966 during the fire on board the GULFSTAG.

8. The practice on board the GULFSTAG, as supported by testimony of crewmembers, of leaving varying amounts of liquid in the bilges of the pump-rooms after a cargo was loaded, until it was convenient to pump it overboard sometime after the vessel was at sea, while not an unlawful practice or a practice prohibited by regulation, is concluded to be a highly questionable practice which should not be permitted on board any tank vessel. The Board believes that any liquid other than plain water remaining in the bilges of a pump room of a tank vessel after loading or discharging should be immediately stripped back ashore or into a cargo tank suitable to receive it. If such a practice had been followed on the GULFSTAG on 23 October 1966, it is likely that this casualty would not have occurred. However, since the practice had been followed on the GULFSTAG for a considerable length of time and had apparently been condoned by the owners of the vessel, the Board could find no actionable culpable negligence in the fact that this practice was followed on the final loading of the GULFSTAG.

9. If the power ventilation blowers of the after pump room had not been secured on the afternoon of 23 October 1966, but had been left running, it is likely that the concentration of gasoline vapors in the atmosphere of this pump room would never have reached a high enough percentage to be within the explosive range. With liquid gasoline present in the bilges, the Board could see no good reason for securing these blowers and believes that they should have been left running while any gasoline remained in the bilges.

10. With the exception of the rope boat falls, the primary lifesaving devices were adequate for the needs of the crew and were in proper condition. The rope boat falls for boats #3 and #4 were subject to rapid disablement from heat and flames due to their combustible nature.

11. The stowage of additional life preservers in a forward locker and in the pilot house, as required by 46 CFR 33.35-1, provided vital life preservers for crewmembers who would otherwise have had none available to use.

12. All members of the ship's company of the GULFSTAG conducted themselves in a highly commendable manner. Every possible effort was made to rescue persons known or believed to be trapped within the burning after house of the ship.

13. The communications during the casualty and the coordination of search and rescue efforts thereafter were excellent and contributed to the rapid rescue and first aid treatment rendered the survivors. The efficiency in signalling by Morse code with a flashlight, as displayed by the Master and Chief Mate of the GULFSTAG, reflects well on their professional ability, and supports the need to require examinations in signalling methods for candidates for deck licenses.

14. All Coast Guard rescue units involved, and the ships SS ATLANTIC PRESTIGE, SS WESTERN SUN, and SS STEEL NAVIGATOR acquitted themselves ably and well. They responded to the GULFSTAG's distress signals immediately, and rendered all possible assistance. The good seamanship, professional alertness and efficiency displayed by the SS ATLANTIC PRESTIGE and SS WESTERN SUN in rescuing large numbers of the survivors were especially noteworthy and should be recognized by higher authority.

15. The battery-powered General Alarm system worked efficiently in the forward end of the vessel but not at all in the after end due to damage to wiring caused by the initial explosion. If a battery-powered source of current had not been provided for this system, loss of ship's power at the initial explosion would have made the entire system inoperative and may have endangered lives of persons who were forward at the time. If two separate and separated wiring systems had been provided for the General Alarm system between the forward house and the stern area it is possible that one such system would have survived the explosion damage and the alarms would have sounded aft. In this case, additional lives may have been saved.

16. The inability of any personnel to reach the remote release controls for the fixed CO₂ systems for the after pump room and the engine room, due to smoke and flames, leads to the conclusion that, if widely separated duplicate remote release controls had been provided, one such set of controls might have remained accessible and the vessel might have been saved, and additional lives saved.

17. If the emergency generator fitted on the GULFSTAG had been installed with an automatic start and changeover relay, it might well have provided the electrical power necessary to operate fire pumps, when normal ship's power failed. Use of fire hoses, fog nozzles, and portable foam systems might have enabled the crew to significantly alter the outcome of this vessel fire.

18. Had the 16-inch portholes installed in the berthing areas of the GULFSTAG been of lesser diameter, many crewmembers who escaped by crawling through the ports would probably have perished, and the death toll would have been much greater.

19. Although the cause of flooding of the stern of the GULFSTAG following the explosions could not be definitely determined, one likely cause was the consuming of certain portions of the combustible rubber flexible joints in sea connections in the engineroom area by fire, with consequent progressive flooding and eventual capsizing. If no joints of combustible nature had been present in these sea connections, it is entirely possible that the stern would not have flooded and that the vessel would not have capsized. In this case, firefighting efforts by an arriving vessel or by the original crewmembers themselves, if they could have returned aboard, might have been able to contribute toward saving the vessel. No evidence could be adduced that there was any shock damage to sea connections, valves, or the hull itself caused by the explosions, which would have caused the flooding.

20. The GULFSTAG is now resting in 165 fathoms of water in position Latitude 27°56' North, Longitude 91°35' West, and does not constitute a menace to navigation.

21. Prior to the casualty and to the extent ascertainable, the GULFSTAG was in all respects seaworthy and in full compliance with the Rules and Regulations for Tank Vessels.

22. Other than the practice of not immediately pumping out the bilges and thereby leaving some gasoline in the bilges of the after pumproom for an indefinite period, which practice is believed by the Board to be ill advised but not to be actionable negligence, the Board found no evidence of misconduct, culpable inattention to duty, neglect or wilful violation of law or regulation on the part of any licensed or certificated persons, or any failure of inspected material or equipment which contributed to the casualty. The Board found no evidence that any inspector, officer of the Coast Guard, or other officer or employee of the United States, or any other person caused, or contributed to the cause of this casualty.

23. There was no evidence that the casualty was caused by any object or influence outside the vessel, or that any sabotage, wilful intent to destroy, or any form of foul play were involved.

RECOMMENDATIONS:

1. Based upon the facts adduced from the investigation of this casualty, and the conclusions of the Board, it is recommended that the Coast Guard consider the following changes to the RULES AND REGULATIONS FOR TANK VESSELS, Chapter 1, Subchapter D, Title 46, Code of Federal Regulations, Parts 30 through 35:

- A. Incorporate in the Rules for Cargo Handling, subpart 35.35, a rule that, if any liquid other than plain water remains in the bilges of any tank vessel pumproom after loading or discharging are completed, as much as possible of such liquid shall immediately be pumped to a shoreside tank or into one of the vessel's cargo tanks suitable to receive it. Incorporate in these same Rules for Cargo Handling a rule that pumproom power ventilation blowers on all tank vessels shall remain in operation at all times while there is any amount of liquid cargo present in the bilges.
- B. Restrict and reduce the use of combustible lifeboat falls.
- C. Incorporate the principle that all berthing compartments on tank vessels shall have one other avenue of escape than exit into a passageway, and if such other avenue of escape is an airport, such airport shall be maintained openable by hand and shall have a clear inside diameter of the useable opening of not less than 16 inches. It is recommended that this principle be applied fully to all new construction and to the extent possible to existing vessels.
- D. Require that the General Alarm System on all tank vessels be wired with two different circuits, each circuit to be installed as remote from the other as possible; with two different sources of battery power, each source to be as remote from the other as possible; and with at least two switches for activation of the entire system, with at least one such switch to be installed forward and one aft.
- E. Require that on all tank vessels on which emergency generators are installed, there shall be an automatic starting and changeover relay fitted in such manner that the emergency generator will automatically start and will automatically pick up certain predetermined emergency loads whenever ship's power fails.
- F. Require that all fixed CO₂ extinguishing systems on tank vessels be fitted with at least two independent sets of remote manual release controls, each set of controls to be as widely separated as possible from the duplicate set of controls for the same system.

2. It is also recommended that the Coast Guard institute a study of the advisability of continuing to permit the use of combustible substances in flexible joints or any other parts of sea connection devices on merchant vessels at such locations where destruction of such joint or part by fire could cause flooding of the hull.

3. It is recommended that the Masters and crews of the SS ATLANTIC PRESTIGE and the SS WESTERN SUN be issued an official recognition for their superior performance of duty in effecting the prompt rescue of all survivors of the GULFSTAG casualty.

4. It is recommended that no further action be taken and that the case be closed.

R. F. Barber

R. F. BARBER
Captain, U.S. Coast Guard, Chairman

J. W. Finnegan

J. W. FINNEGAN
Captain, U. S. Coast Guard, Member

R. N. Howard

R. N. HOWARD,
Lieutenant, U. S. Coast Guard, Member and
Recorder

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