

UNITED STATES COAST GUARD

ADDRESS REPLY TO
COMMANDANT
U. S. COAST GUARD
HEADQUARTERS
WASHINGTON 25, D. C.



MVI
16 July 1956
(SALEM MARITIME - a-8 Bd)

Commandant's Action
on

Marine Board of Investigation; explosion and fire involving
SS SALEM MARITIME and tank barges at Lake Charles, Louisiana,
17 January 1956, with loss of life.

1. Pursuant to the provisions of Title 46 C.F.R. Part 136, the record of the Marine Board of Investigation convened to investigate subject casualty, together with its Findings of Fact, Conclusions, and Recommendations, has been reviewed.
2. The SALEM MARITIME, a T-2 tanker of 10,584 g.t., built in 1945, owned and operated by the Cities Service Oil Company, on 17 January 1956 was loading cargo at Rose Bluff near Lake Charles, Louisiana. The vessel was divided into 9 cargo tanks of 3 sections each (stb. - center - port), except No. 1 tank which was subdivided into 2 sections. Tanks Nos. 1, 2, 3 and 4 were loaded with No. 2 heating oil, tank No. 9 was loaded with gasoline, and tanks Nos. 5 and 6 were loaded with kerosene. Tanks Nos. 7 and 8 were also to be loaded with kerosene. Gasoline was found leaking through a defective bulkhead from No. 9 into No. 8 starboard wing tank and it was seemingly decided not to load No. 8 port and starboard wing tanks. From the evidence it is not clear whether this decision extended to No. 8 center tank. 10,000 barrels of kerosene remained to be loaded and while this cargo was being loaded in the completing stages of No. 7 across or in the beginning stages of No. 8 center tank, an explosion occurred in No. 8 tanks across. The deck over No. 8 center and starboard wing was torn away from the bulkhead between No. 7 and No. 8 tanks and bent back to the after deckhouse, and the deck area over No. 8 port wing tank was blown ashore about 500 ft. from the vessel. As a result of the explosion and ensuing fire, 18 crew members and 3 shore employees perished, including the master and the personnel engaged in loading aboard the tanker. The SALEM MARITIME and three tank barges in close proximity and shore installations were severely damaged.

(over)

REMARKS

3. The conclusions of the Board in effect state that gasoline from No. 9 tanks, through a defective bulkhead, was leaking into the No. 8 tanks, in which No. 8 tanks kerosene was to be loaded, that failure to test the bulkhead separating No. 8 and No. 9 tanks prior to loading was poor judgment and that such tanks should have been tested at sea prior to arrival in port, and that the explosion was caused by a spark caused by splashing and turbulence of kerosene where it was discharged into the bottom of No. 8 center tank, coming in contact with water in said tank.

4. The evidence in the record as to whether No. 8 center tank was being loaded and as to whether there was poor judgment is not clear and unequivocal. The master and all personnel involved in loading on board the tanker perished, and therefore the judgments made and the exact condition of loading immediately prior to and at the time the explosion occurred cannot be ascertained. The best evidence in this connection appears to be the testimony of [REDACTED] AB, who overheard and testified as to the conversation between the master and a shore representative. The testimony of [REDACTED] indicates that there was a timely discovery of the leaks in the bulkhead separating No. 8 and No. 9 tanks and that it was decided by the master not to load any kerosene in No. 8 tanks, in which event there could be no criticism for failure to sooner discover such leaks. The testimony of [REDACTED] is the most pertinent to the actual condition of loading on board the vessel and is not in any way refuted by testimony or evidence of any other witnesses. The Conclusions of the Board are accepted as opinions, which were called for in the order appointing the Board to investigate subject casualty, and such opinions should not necessarily be taken to exclude other reasonable hypotheses with respect to the cause of the subject casualty.

5. Subject to the foregoing Remarks, the Findings of Fact, Conclusions and Recommendations of the Marine Board of Investigation convened to investigate subject casualty are approved.

[REDACTED]
A. C. RICHMOND
Vice Admiral, U. S. Coast Guard
Commandant

7 May 1956
A17-6/4 SALEM MARITIME

From: Captain James B. Rucker, USCG
To: Commandant (MVI)
Via: Commander, 8th Coast Guard District (d)

Subj: Marine Board of Investigation; explosion and fire involving
SS SALEM MARITIME and tank barges at Lake Charles, Louisiana,
on 17 January 1956 with loss of life.

FINDINGS OF FACT

1. At or about 2220 hours, CST, 17 January 1956, the SS SALEM MARITIME exploded and burst into flames while loading a cargo of oil at the Cities Service Refining Terminal at Rose Bluff, Louisiana, located near Lake Charles, Louisiana, causing three unmanned tank barges to burn, damage to refinery property and resulting in the death of 18 crew members and 3 shore personnel.

2. (a) The vessel concerned is the SALEM MARITIME, O.N. 247561, Rig. El.S., Type T-2 tank vessel, 10,584 gross tons, 6,431 net tons, built Portland, Oregon 1945, home port, New York, New York, owned and operated by Cities Service Oil Company, 70 Pine Street, New York, New York. Master, John Rugman. Last annual inspection of vessel at Beaumont, Texas, on 10 August 1955. Vessel approved for the carriage of inflammable or combustible liquids of grade "B" and lower.

(b) The barges concerned are:

(1) LCT Co. No. 29, undocumented, type unmanned tank barge, built Port Arthur, Texas in 1935, 490 gross tons, home port, Lake Charles, Louisiana, owned and operated by Lake Charles Towing Company of Lake Charles, Louisiana. Approved for carriage of inflammable or combustible liquid cargoes of Grade "D" and lower. Last annual inspection 14 October 1955 at Port Arthur, Texas.

(2) LCT Co. No. 30, undocumented, type unmanned tank barge, built Orange, Texas, 1936, 571 gross tons, home port, Lake Charles, Louisiana, owned and operated by Lake Charles Towing Company. Approved for the carriage of inflammable or combustible liquids of Grade "D" and lower. Last annual inspection 14 October 1955 at Port Arthur, Texas.

(3) LCT Co. No. 34, O.N. 175835, type unmanned tank barge, built Pascagoula, Mississippi 1943, home port, Lake Charles, Louisiana, owned and operated by Lake Charles Towing Company, Lake Charles, Louisiana. Approved for the carriage of inflammable or combustible cargoes of Grade "B" and lower. Last annual inspection 22 April 1955 at Port Arthur, Texas.

(c) The persons concerned known dead or missing and presumed dead are:

- (1) John Rugman, Master, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Milton, Mass. MMD [REDACTED]
- (2) Evert A. Alanne, Chief Mate, SS SALEM MARITIME, Next of kin - [REDACTED], New Orleans, La. MMD [REDACTED]
- (3) Daniel L. MacDonald, Second Mate, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Denton, Maryland, MMD [REDACTED]
- (4) Willis B. Jardine, Radio Operator, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Framingham, Mass. MMD [REDACTED]
- (5) Robert B. Halvosa, Boatswain, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Rutherford, N.J. MMD [REDACTED]
- (6) Joseph S. Kornek, A.B., SS SALEM MARITIME, Next of kin - Wife - [REDACTED], New Orleans, La. MMD [REDACTED]
- (7) Milton J. Karlovec, A.B., SS SALEM MARITIME, Next of kin - Brother - [REDACTED], Midland, Michigan, MMD [REDACTED]
- (8) Dallas Rushing, A.B., SS SALEM MARITIME, Next of kin - Son - [REDACTED], Pontchatoula, La. MMD [REDACTED]
- (9) Wilmer Clark, A.B., SS SALEM MARITIME, Next of kin - Sister - [REDACTED], Mobile, Ala. MMD [REDACTED]
- (10) Joe Morgan, A.B., SS SALEM MARITIME, Next of kin - Brother - [REDACTED], North Carolina. MMD [REDACTED]
- (11) Michele Candelieri, Dk. Maint., SS SALEM MARITIME - Next of kin - Wife - [REDACTED], Fort Worth, Texas. MMD [REDACTED]
- (12) Fred Fall, O.S., SS SALEM MARITIME, Next of kin - Daughter - [REDACTED], Gornec, N.H. MMD [REDACTED]
- (13) Jan Sidor, Oiler, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Columbus, Ohio. MMD [REDACTED]
- (14) Purvis M. Blackwell, F.W.T., SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Gulfport, Miss. MMD [REDACTED]
- (15) Ernest P. Bellner, Cook, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Framington, Me. MMD [REDACTED]
- (16) James E. Small, Messman, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Cambridge, Mass. MMD [REDACTED]
- (17) Lawrence J. Aquilina, Messman, SS SALEM MARITIME, [REDACTED], Port Arthur, Texas, MMD [REDACTED]
- (18) Leo Kennedy, Utility, Steward Dept., SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Lynn, Mass. MMD [REDACTED]
- (19) H. R. Reynolds, Cities Service Oil Company Inspector
- (20) J. Marcentel, Rodgers Guard Service, Cities Service oil employee
- (21) William H. McCurley, Cities Service Refining Corporation

(d) Persons injured:

- [REDACTED], First Assistant Engineer, SS SALEM MARITIME -
Next of kin - Mother - [REDACTED], Conn. MMD [REDACTED]
[REDACTED], Wiper, SS SALEM MARITIME, Next of kin - Wife -
[REDACTED], Boston, Mass. MMD [REDACTED]

force 8 to 12 knots, temperature 52° F., Barometer 29.99, relative humidity 45%.

4. The SS SALEM MARITIME departed from Boston, Massachusetts on or about 10 January 1956 bound for Lake Charles, Louisiana with a crew of forty-one (41) including the Master. The vessel was ballasted with water in No. 3, 5 and 7 tanks leaving Boston. While enroute a section of pipe line in No. 4 center tank was repaired. Prior to arrival orders were received changing the intended loading plan and port of destination. The night before arrival tanks No. 5, 6, 7 and 8 across were butterworthed (washed) to permit the loading of kerosene. The cargo loading plan was to load approximately 50,000 barrels of No. 2 Heating Oil in No. 1, 2, 3 and 4 tanks, approximately 60,000 barrels of kerosene in No. 5, 6, 7 and 8 tanks, and approximately 17,000 barrels of regular gasoline in No. 9 tanks. The bulkheads separating No. 8 and 9 tanks were not tested for leaks prior to arrival. The vessel arrived alongside the Cities Service Refining Company dock "B" located at Rose Bluff, near Lake Charles, Louisiana, and moored starboard side to, finishing with engines at 1457 hours C.S.T. 17 January 1956. The Cities Service Refinery and docks are located on the west bank of the Calcasieu River and the vessel when secured was heading approximately 193° true. Immediately upon docking a "Tender Notice" was delivered to the dock representative by the Master which declared the vessel to be ready in all respects to load cargo. The "Tender Notice", upon receipt, was kept in a small wooden office building on the dock. One H. R. Reynolds, an Inspector employed by the Cities Service Oil Company, boarded the vessel shortly after arrival and inspected the cargo tanks, finding them in good order. A ship's guard, named M. J. Marcantel, employed from the Rodgers Guard Service by the Cities Service Oil Company, boarded after arrival to stand guard at the gangway. His duties included the checking and recording of all persons boarding or leaving the vessel. A bonding cable was secured to the vessel from the dock by means of a "U" clamp attached to a stanchion on the vessel's side prior to connecting cargo hoses to the ship. The cargo hoses which consisted of three (3) 8" bonding type hoses were attached to the three main cargo lines at the ship's starboard loading manifold just aft of the midship house. The Chief Mate, Mr. Alanne, usually set the cargo line valves for loading personally or supervised same. The vessel's cargo lines were the same as a conventional T-2 type tanker consisting of a starboard line, center line, and port line. The common stripper line which had originally been installed was replaced with three (3) independent stripping lines. To load the three grades of cargo at the same time the No. 2 Heating Oil would be loaded through the starboard line running through the pumproom to tanks No. 1, 2, 3 and 4; the gasoline through the port line going through the pump room to No. 9 tanks and the kerosene through the center line using the drop line on deck at No. 5 center tank and the crossover from 7 center to the port line in 7 center tank to load 5, 6, 7 and 8 tanks. The watertight doors opening from the crew's quarters aft on the main deck and poop deck were closed and dogged tight, and also the doors leading from the quarters amidship. Fire hoses were led out from hydrants on the main decks fore and aft, screens were placed in ullage openings in tank tops and plugs inserted in scuppers prior to the loading operations beginning. Non-sparking tools were used about the deck. Mr. Alanne, the Chief Mate, was considered to be very cautious and always remained aboard to supervise the loading operations himself.

instead of having a common header which had originally been installed. The venting system had been changed prior to the vessel's last annual inspection and the grade of cargo permitted to be carried was reduced from grade "A" to grade "B" and lower due to same. Approximately twelve (12) to sixteen (16) trips had been made subsequent to the change in the venting system.

5. At 1650 the shore station began pumping No. 2 Heating Oil to the ship and also bunkers through a 6" hose connected to the bunker loading line just aft of the cargo loading manifold. The temperature of the bunker oil was 128° F. at the shore tank and was only a few degrees less entering the ship's tanks. The bunker line ran aft on the deck outboard of the three (3) 4" stripping lines. At 1700 the loading of kerosene began, the temperature of which was 90° F., and at 1710 gasoline was loaded at a temperature of 65° F. During the afternoon four (4) crew members were paid off and four replacements were obtained. The names of those crew members leaving the vessel were: [redacted] Deck Maintenance, MMD [redacted]; [redacted], pumpman, MMD [redacted]; [redacted], Oiler, MMD [redacted]; and [redacted], messman, MMD [redacted]. The four replacements obtained were: [redacted] A.B., MMD [redacted]; Theodore Jones, pumpman, MMD [redacted]; [redacted], Oiler, MMD [redacted], and Lawrence Aquilina, messman, MMD [redacted]. During the afternoon and evening a number of crew members, including the Master, went ashore, some returning early. The sailing time had been set shortly after arrival for 0200 on the following morning, 18 January. The cargo loading rate was approximately 10,000 barrels an hour on all three grades of cargo. The average loading rate for kerosene at the Cities Service Refinery was about 7,000 barrels an hour on tankers. The maximum pressure allowed on the cargo lines at the dock was 100 pounds p.s.i. At 1850 the loading of bunkers was completed and at 1855 the loading of gasoline in No. 9 tanks was completed. At about 1930 the Chief Mate discovered gasoline leaking from No. 9 starboard wing tank into the No. 8 starboard wing tank and the No. 8 tank was opened to investigate. The Master was called and he was present when Mr. Reynolds entered the top of the opened tank to inspect the leaking bulkhead. The largest leak was noted to be about as large as a finger and located about four feet from the deck. The leaking gasoline was spurting out in an arc before falling to the bottom of the tank. Other leaks were noted by Mr. Reynolds and he was heard by [redacted], an A.B. on watch, to tell the Master that the No. 8 wing tanks could not be loaded. The Master was heard to say that they would load No. 7 tanks all the way across to compensate. At this time No. 8 center tank had not been opened, however No. 5 tanks had been topped off and finished.

6. At 2000 hours when the watch changed Joe Morgan, A.B., [redacted] A.B., and Fred Fall, O.S. reported for duty. The Chief Mate and Daniel L. MacDonald, Second Mate, who had agreed to stand the Third Mate's watch, remained on duty. Shortly after 2000 [redacted] A.B., [redacted] A.B., and [redacted] O.S. went ashore. O'Connell and [redacted] left the vessel ahead of Cox, who hurried from the quarters aft to overtake them. In walking past the No. 8 starboard wing tank [redacted] dropped his wallet which slid under the stripping lines and bunker line. In retrieving his wallet [redacted] noted one pipe that felt hot to his touch and he commented about it to the Second Mate as he was passing the cargo hoses. The Second Mate told [redacted] that the pipeline was hot due to friction or

heat. At about 2100 hours the pumpman, Harry Granger, left the vessel and was informed by one of the seamen on watch that No. 6 tank was finished and No. 7 tank was being opened. At about 2130 Mr. [REDACTED] who was in charge of the loading operations at "B" dock, boarded the vessel and talked several minutes with Mr. MacDonald, the Second Mate who was standing near the No. 7 tank on the starboard side. Nothing unusual was noted by Mr. [REDACTED] at this time. In leaving the vessel Mr. [REDACTED] noticed that Mr. W. H. McCurley, who was in charge of the loading valves on the dock, had been taking oil samples from the ship's tanks and was on the dock. Mr. [REDACTED] proceeded to his office which was a small brick structure about 150 feet from the ship. He had calculated that the vessel would complete loading about 2330. The cargo remaining to be loaded at 2130 was estimated to be approximately 8,000 barrels of No. 2 Heating Oil and 15,000 barrels of kerosene.

7. At about 2200 [REDACTED] Second Assistant Engineer, who had been watching television in the midship lounge with the Master, [REDACTED] and Willis Jardine, Radio Operator, went onto the deck to obtain a bunker report. The Chief Mate entered the lounge several times and [REDACTED] had heard the Chief Mate and the Master speak of expecting to complete loading shortly before midnight. Mr. [REDACTED] returned to the midship lounge at about 2210 and about ten minutes later an explosion occurred. Mr. Jardine, the Radio Operator, ran out the port door of the lounge and was presumed by Mr. [REDACTED] to go out the after door facing the after deck. Mr. [REDACTED] observed flames shooting from aft toward the lounge port glasses at the time of the explosion. The Master and Mr. [REDACTED] followed the Radio Operator out the port passageway but upon opening the door facing the main deck flames entered the door. The door was closed and the Master and Mr. [REDACTED] went up the inside stairway to the boat deck. Mr. [REDACTED] went out on the port side of the boat deck and around the forward part of the house to the starboard side where he lowered himself by a rope to the main deck. From the main deck Mr. [REDACTED] jumped to the forward end of the dock but was unable to reach shore by the dock ramp due to flames. Mr. [REDACTED] jumped overboard into the water on the inboard side of the dock and reached the shore 25 to 30 feet away. In jumping into the water Mr. [REDACTED] noticed a man alongside the dock. In scrambling ashore he noticed a man whom he presumed had been blown by the blast. After getting ashore some distance he looked back and did not see the man again. Mr. [REDACTED] ran away from the dock in a southerly direction and met two men who had left "A" dock and was taken to the refinery dispensary. Mr. [REDACTED] did not observe the Master's actions after reaching the boat deck. Mr. [REDACTED] noted several explosions after the original one.

8. The engine room personnel standing the 2000 to 2400 watch were [REDACTED], Third Assistant Engineer, Jan Sidor, Oiler, and [REDACTED], Fireman-Watertender. At the time of explosion the three men were below on duty. When the explosion occurred at about 2220, [REDACTED], FWT, noted a section of pipe drop from the fireroom overhead to the deck. Mr. [REDACTED] the Third Assistant Engineer, was near the log desk and Jan Sidor, Oiler, was elsewhere in the engine

room. No one in the engine room knew what had happened until [redacted], the First Assistant Engineer, came below a few minutes after the explosion. Mr. [redacted] was awakened from his sleep by the explosion which appeared to him to be immediately outside his stateroom which was located on the port forward side of the boat deck aft. He had run through the crew's messroom to the fantail and noted [redacted], the Machinist, standing there with his life jacket on. The flames were rapidly spreading aft and Mr. [redacted] returned to his room to obtain a life preserver. Upon returning to the fantail he observed four or five men there but did not recognize them. The flames were near the stern so he turned and proceeded down into the steering engine room, thence into the fireroom and engine room where he informed the men on watch of the explosion and fire. Mr. [redacted] advised the men on watch that he considered it safest to stay below the waterline and if necessary they could take refuge in a double bottom. He had heard of survivors aboard the SS ESSO GREENSBORO taking refuge in the double bottom in a fire. Mr. [redacted] then opened the master valve to the steam smothering system for the cargo tanks, and Mr. [redacted] started the fire pump. Mr. [redacted] then proceeded to have the double bottom tanks and cofferdam on the starboard side of the engine room opened as well as the after port double bottom tank in the shaft alley. At about this time the Oiler, Jan Sidor, started to leave the engine room and was advised by the First Assistant Engineer to remain, however, he left and was seen no more. The First Assistant Engineer then secured the boilers and closed the watertight doors to the fireroom. About twenty minutes after the boilers were secured the generators stopped and the electric lights went out. A fire broke out in the upper engine room storeroom starboard side aft where electrical stores, including light bulbs and electro cleaner were stored. The shell of the ship on the starboard side had become so hot that the stores caught fire. An attempt was made to extinguish the blaze with two one-quart carbon tetrachloride extinguishers and a 15-pound CO₂, but without success. The fire in the locker was not considered too serious as there was little to burn there. The three men retired to the lower engine room and found that fresh cool air was coming in the port after ventilator which made it possible to breathe well in that area. The engine room was filled with smoke at this time and the shell plates above the waterline on the starboard side were glowing red from the heat.

9. An attempt was made to blow a whistle which was used in the engine room at the change of the watch by connecting a steam line to it, but without success. The three men in the engine room were apprehensive that the fixed CO₂ system might go off and wanted to attract attention to the outside so their presence would be known. After about four hours in the engine room it was found that the ladders from the engine room had cooled sufficiently to climb. The main deck level was reached on the port side and only slight smoke was observed. They proceeded aft to the wiper's toilet where a port was opened and an attempt made to signal with flashlights to the shore. There was consideration given to climbing out the port hole and dropping into the water, however, as [redacted] the

Fireman-Watertender could not go through the port hole due to his size, the idea was abandoned. It was found that by going forward on the port side and up to the athwartship passageway that the heat was not too intense and they were able to reach the fantail by the upper port passageway. The fantail was found to be covered with ashes as everything had been burned. A tugboat nearby was summoned by flashlight signals and the three men dropped to the deck of same from the port after quarter. The vessel was at this time still ablaze forward.

10. The crew members who were aboard at time of explosion other than Mr. [REDACTED], Mr. [REDACTED], Mr. [REDACTED] and Mr. [REDACTED] that escaped alive from the vessel were Michele Candelieri, A.B., [REDACTED] Machinist, [REDACTED] Fireman-Watertender, and [REDACTED] Wiper. [REDACTED] Machinist, was picked up by the tug JOHN L. SCROGGINS, which had been berthed some distance astern of the SS SALEM MARITIME. [REDACTED] was recovered from the water with his life jacket on a few feet ahead of the flames on the water which were overtaking him. [REDACTED] FWT, wearing a life jacket had passed [REDACTED] in the water and reached the marshland on the opposite side of the river. He fell exhausted on reaching the marsh but ran farther from the river when the flames reached the edge of the marsh. He was subsequently picked up by the tugboat JOHN L. SCROGGINS. [REDACTED] Wiper, had leaped from the stern of the vessel and swam diagonally to the shore. He collapsed upon reaching the shore and was picked up by Refinery personnel and taken to the dispensary. Another crew member had been observed by the crew of the JOHN L. SCROGGINS swimming astern of [REDACTED] but had been overtaken by the flames spreading on the water, and was observed to slip out of his life jacket and disappear. Michele Candelieri, A.B., was rescued near the scene of the fire and taken to St. Patricks Hospital in Lake Charles due to serious burns where he died on 25 January 1956. William H. McCurley "Pumper" in charge of "B" dock was also taken to the hospital with serious burns where he died on 26 January 1956.

11. The fire from burning oil on the water drifted with the ebb current to the "A" dock about 500 feet down stream. At the time of the explosion there were two refinery workers employed on "A" dock attending to the discharge of three unmanned tank barges loaded with crude oil. The said barges were the LCT Co. No. 29, LCT Co. No. 30, and LCT Co. No. 34. A towboat named the WHITE GOLD was astern of the barges and downstream taking bunkers at "A" dock. Another towboat, name unknown, was secured to the north end of "A" dock upstream of the barges waiting to take on bunkers. The two refinery workers on "A" dock immediately stopped the pumps and ran from the dock and the two tugs cast off and left. The fire spread very rapidly downstream igniting the north end of "A" dock and then catching the three barges on fire.

12. The firefighting equipment at the refinery was put into play immediately and all pipe lines and pumps going to the docks secured within a few minutes. The flames from the burning tanks aboard the SS SALEM MARITIME were being blown toward shore tanks endangering them. Waterlines were laid to make spray curtains in the tank area and fire on the shore was combatted where possible. Foam equipment was brought into play and all firefighting equip-

ment at the Refinery utilized to the best advantage. Two explosions were noted almost together when the initial explosion occurred. A portion of the deck forming the top of No. 8 port wing tank of the SS SALEM MARITIME was blown onto the shore approximately 500 feet away. Trees in the area along the shore were burned, pipelines on the shore were burned and the docks "A" and "B" completely gutted. The small brick office building about 150 feet from the ship used by Mr. Todd who was in charge of loading operations was completely stripped of all furnishings and only the brick walls remained. Mr. Todd observed fire on the deck near No. 8 tanks after the first explosion and fire where the deck plating from No. 8 port wing tank landed after the second explosion which followed immediately. The time of the blast was noted to be 2220 hours by the pumping stations where the pumps were immediately shut down. At the time of the explosion the automatic gauge ashore indicated there were 9,000 barrels of kerosene remaining to be loaded. In examining the tanks after explosion the No. 7 center and wing tanks appeared to have been loaded. All crew members who were loading the vessel at the time of explosion were killed.

13. The following crew members of the SS SALEM MARITIME were ashore at the time of the casualty and are accounted for:

- (1) [REDACTED], Third Mate, SS SALEM MARITIME, Next of kin - Mother, [REDACTED], Cheboygan, Mich. MMD [REDACTED]
- (2) [REDACTED], A.B., SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Salem, Mass. MMD [REDACTED]
- (3) [REDACTED], A.B., SS SALEM MARITIME, Next of kin - Mother - [REDACTED], Norfolk, Va. MMD [REDACTED]
- (4) [REDACTED], A.B., SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Jersey City, N.J. MMD [REDACTED]
- (5) [REDACTED], O.S., SS SALEM MARITIME, Next of kin - Mother - [REDACTED], Minneapolis, Minn. MMD [REDACTED]
- (6) [REDACTED], Chief Engineer, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Huntington Station, L.I. MMD [REDACTED]
- (7) [REDACTED], Oiler, SS SALEM MARITIME, Next of kin - Mother - [REDACTED], Cartersville, Ga. MMD [REDACTED]
- (8) [REDACTED], Wiper, SS SALEM MARITIME, Next of kin - Mother - [REDACTED], Brooklyn, N.Y. MMD [REDACTED]
- (9) [REDACTED], Wiper, SS SALEM MARITIME, Next of kin - Mother - [REDACTED], Lake Charles, La. MMD [REDACTED]
- (10) [REDACTED], Steward, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Maplewood, La. MMD [REDACTED]
- (11) [REDACTED], Messman, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Stark, Louisiana, MMD [REDACTED]
- (12) [REDACTED], Messboy, SS SALEM MARITIME, Next of kin - Godmother - [REDACTED], Lake Charles, La. MMD [REDACTED]
- (13) [REDACTED], Messboy, SS SALEM MARITIME, Next of kin - Mother - [REDACTED], Oberlin, La. MMD [REDACTED]
- (14) [REDACTED], O.S., SS SALEM MARITIME, Next of kin - Sister - [REDACTED], Little Rock, Ark. MMD [REDACTED]

The following four crew members were paid off on arrival and left the vessel prior to the explosion.

- (1) [REDACTED] Pumpman, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Sulphur, La. MMD [REDACTED]
- (2) [REDACTED] Oiler, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Alabama, MMD [REDACTED]
- (3) [REDACTED], Deck Maintenance, SS SALEM MARITIME, Next of kin - Wife - [REDACTED], Pensacola, Florida, MMD [REDACTED]
- (4) [REDACTED] Messboy, SS SALEM MARITIME, Next of kin - Brother - [REDACTED], Worcester, Mass. MMD [REDACTED]

The following two crew members joined the vessel at Lake Charles but went back ashore:

- (1) [REDACTED] Pumpman, SS SALEM MARITIME, MMD [REDACTED]
- (2) [REDACTED] Oiler, SS SALEM MARITIME, MMD [REDACTED]

14. The approximate damage to the vessels and shore property concerned is as follows:

- (a) SS SALEM MARITIME - superstructure, masts, deck fittings, decks, tanks, and hull (with exception of after port, Crews' quarters and engine room spaces) completely destroyed or damaged by fire and explosion.
Estimated cost of damage unknown.
Estimated cost of damage to cargo unknown.
- (b) Tank Barge LCT CO. NO. 29 - damaged - estimated damage \$34,000.00.
Estimated damage to cargo \$22,000.00.
- (c) Tank Barge LCT CO. NO. 30 - damaged - estimated damage \$34,000.00.
Estimated damage to cargo \$22,000.00.
- (d) Tank Barge LCT CO. NO. 34 - damaged - estimated damage \$34,000.00.
Estimated damage to cargo \$22,000.00.
- (e) Cities Service Refining Corporation property - damage to docks "A" and "B", pipe lines, shore buildings and miscellaneous, \$1,000,000.00 to \$2,000,000.00.

15. Previous explosions and fires involving the loading of kerosene into tank barges at the Cities Service Refinery Terminal have occurred. The tank barges concerned were the S.T. Co. #115 on 2 September 1951, the S.T. Co. #5 on 30 January 1952 and the G.T.C. #6 on 26 June 1955. Precautions are now used to wet the bottoms of the dry tanks with water and use dry ice in loading tank barges with kerosene.

16. Numbers of seaman's Merchant Mariner's Documents were obtained from U. S. Coast Guard Headquarters subsequent to the receipt of the crew list, Exhibit No. 2.

CONCLUSIONS

1. It is concluded that the primary cause of the explosion and fire was due to the presence of gasoline vapors in the No. 8 tanks caused by bulkhead leaks from the No. 9 tanks.
2. It is further concluded that the loading of gasoline into the No. 9 tanks without the bulkheads separating the No. 8 tanks being tested for leaks prior to loading was poor judgment on the part of the master who was responsible and Mr. Reynolds, the inspector, if he was aware of it.
3. It is considered that the safe operation of the vessel required the bulkheads separating the No. 8 and 9 tanks to be tested at sea prior to arrival instead of the leaks being discovered while loading.
4. The leaks discovered between the No. 9 and 8 starboard wing tanks and those which are believed to have existed between 8 and 9 center and port wing tanks constituted a failure of material which is not unusual on tankers due to the heavy stresses they are subjected to.
5. It is reasoned that vapors in a tank which is being loaded with gasoline rapidly reaches a hydrocarbon content which is too rich to be ignited by a common spark but a tank which is gas free that has a small amount of gasoline leaking into it will rapidly accumulate explosive vapors that remain present for an extended period of time.
6. The presence of gasoline vapors in all three of the No. 8 cargo tanks is believed substantiated by the entire deck in that area being rolled back by the explosions with a portion from the port side blown ashore.
7. The fact that the automatic gauge ashore indicated that 9,000 barrels of kerosene remained to be loaded at the time of explosion, coupled with the fact that the No. 8 center tank held about that amount, indicates the loading valve in that tank was opened at about that time.
8. It is concluded that the spark which initiated the explosion was caused by splashing and turbulence as the kerosene first discharged into the bottom of the No. 8 center tank and contacted water which usually remains after butterworthing.
9. The high loading rate of 10,000 barrels of kerosene an hour is considered to have been a contributing factor in producing the spark necessary to ignite the explosive fumes present in the tank.
10. It is conjectured that if the kerosene had been loaded first and the gasoline last the explosion and fire would not have occurred.
11. It is concluded that the hot pipe felt by [REDACTED] as he left the vessel was the bunker loading line which was much warmer than the outside air temperature.

RECOMMENDATIONS

1. It is recommended that regulations be considered for requiring the testing of bulkheads dividing tanks which are to separate explosive liquids from non-explosive liquids before loading.
2. It is further recommended the Commandant obtain the cooperation of the Petroleum Industry to arrive at a safe loading rate aboard tank vessels where explosive liquids are involved. That further safety precautions also be considered, such as testing tanks for explosive fumes prior to loading kerosene and the sequence in which the tanks are loaded in order to eliminate hazards.
3. Based on possible safety requirements arrived at by the above which would be applicable to all tank vessels, no further action be taken and the case closed.

[REDACTED]
JAMES B. RUCKER, Captain, USCG
Member

[REDACTED]
DONALD G. ELLIOT, Commander, USCG
Member and Recorder

