

UNITED STATES COAST GUARD

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



MVI
(BARBARA LEE & tow C-101,
C-102 & T-2200 a-2 Bd)
28 SEP 1959

Commandant's Action

on

Marine Board of Investigation; explosion and fire involving tank barges C-101, C-102 and T-2200 in tow of tug BARBARA LEE, on 20 November 1958 in vicinity of Mile 893, Ohio River, with loss of life

1. 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. On the morning of 20 November 1958 the diesel towboat BARBARA LEE, O. N. 262300, departed Mt. Vernon, Indiana, downbound in the Ohio River en route to Memphis, Tennessee, push-towing three tank barges loaded with Texaco automotive gasoline. Barge C-101 was the lead barge, the T-2200 was the face barge and the C-102 was made up alongside to starboard of the C-101.
3. At about 1630, 20 November the mate left the pilothouse of the tug and began what appeared to be a routine inspection of the tow. Fifteen minutes later, when the tow was in the vicinity of Carrsville, Kentucky (Mile 893.6) the mate was observed in a kneeling or squatting position on the port forward end of the C-101 midway between the port light standard and the hatch to the port forward rake compartment which was 7 feet inboard. Suddenly an explosion occurred in port forward rake compartment and gasoline leaking from the No. 1 port cargo tank spread fire over the surface of the water and to the other vessels in the tow. The towing wires were cut and the BARBARA LEE backed clear without catching fire. As the fire spread the three barges drifted down the river and later became separated. The C-102 approached the lock chamber at Lock 51 and had to be guided through the navigable pass with the help of the U. S. Army Corps of Engineers Maneuver Boat. The fire fighting department of the Texas Company at Lawrenceville, Illinois, responded to fight the fire and when the C-102 was ultimately pushed ashore below the lock the fire was nearly out. In the meantime the T-2200 had grounded above the lock and the C-101 had drifted down on the dam. Fires on these two barges were extinguished by the Texas Company fire fighting department the following day.
4. After the fire was extinguished on the barge C-102 the body of the mate was found on the deck 40 feet from the bow and 20 feet from the port side. The screw base of an electric bulb was found under the body.

5. The permanent electric wiring aboard the C-101 at the time of the casualty consisted of two conductor marine cable in conduit from a receptacle on the stern up the centerline to a receptacle on deck just forward of the forward bulkhead of No. 1 tank. From that receptacle two cables ran under the deck in the forward rake compartments, then to the receptacles located on the port and starboard running light standards. This permanent wiring was found to be in compliance with Coast Guard regulations but the face plates of the originally installed approved receptacles had been removed and rubber-covered receptacles to accommodate two pronged plugs had been spliced in, in violation of 46 CFR 111.60-30.

6. With the tow made up as it was on the day of the casualty the usual system of rigging the running lights called for the port running light on the C-101 to be in place and connected to the receptacle provided, an amber light rigged on the starboard side of the C-101 connected by an extension cord to the forward centerline receptacle on the C-101 and the starboard running light of the tow positioned on the starboard side of the C-102 and connected by an extension cord to the receptacle at the starboard running light standard on the C-101. This system was apparently in effect at the time of the casualty. Power to the lights was supplied by the tug through a jumper from a receptacle on the bow of the tug to one on the stern of the barge T-2200 and from a receptacle on the bow of the T-2200 to the one on the stern of the C-101. The circuit was protected by a 30 ampere fuse on the tug.

7. After the casualty the starboard running light of the tow with 50 feet of extension cord attached was found on the C-102. This cord contained two splices and three sizes of wire. About 30 inches was No. 12 AWG, about 12 feet was No. 14 AWG, and the remainder was No. 16 AWG. The plug was missing. Splices in extension cords are prohibited by regulations and the minimum size wire permitted is No. 14 AWG. The amber light was found on the centerline 12 feet aft of the bow of the C-101. There was no wire attached, the metal frame was badly burned and the glass was broken. Burned and battered parts of another lantern were found about 15 feet aft of the amber light and was presumed to be the port running light. Due to the extent of the damage none of the lanterns could be identified as to exact type or manufacturer.

8. A portable intercommunication system consisting of a low-powered speaker/transmitter in a wooden box for use when passing through the locks was located on the bow of the C-101 and was connected to the tug by a two-wire portable cable. At the time of the explosion the power was on. The details of the system and the name of the manufacturer were not obtained nor was the precise location of the speaker on the bow of the C-101 ever determined. However, it was the master's impression that

the speaker was located on the port bow. After the casualty the remains of the speaker were found on the starboard side of the C-101.

9. The Board also took notice of seven empty steel drums on the deck of the C-102 which were unsecured and without dunnage contrary to the provisions of 46 CFR 35.35-60 and a pump engine also on the C-102 had a starting battery in an uncovered box and another battery which was connected to the starting motor sitting across the top of the battery box. This installation was contrary to 46 CFR 111.15-10(e).

REMARKS

1. Concurring with the Board, it is considered that the exact cause of this casualty cannot be determined from the evidence adduced. Unquestionably an explosive mixture was present in the port forward rake and cargo or vapor leakage from No. 1 port tank is the most likely source. The Board suggested that this leakage may have been the result of a substandard weld between the forward bulkhead of No. 1 tank and the shell on the port side. The fact that a weld is wide does not indicate that it is defective and in addition the record contains no indication that slag inclusions were evident in the fracture itself. Although it was not determined when this welding was accomplished it must be presumed that the seam was found to be tight at the time of construction. But whether or not this weld was necessitated by a wide root opening in construction or subsequent renewal or whether the seam was merely re-welded to stop a possible leak such a weld would certainly be suspect in the event of collision damage or other unusual stress. In this connection there appears to be no justification in the implication by the Board that the collision damage in way of No. 1 port cargo tank sustained by the C-101 on 30 May 1958 could not have been a factor. A deck plate dented over five feet of the barge's length and to a depth of 10 inches as in the instant case would more than likely be accompanied by involvement of longitudinal and transverse strength members and would introduce stresses on welded seams and hull fastenings. From Exhibits N, R and X(a), photographs which show the dented area, it is obvious that the joint connecting the forward bulkhead of No. 1 tank with the port side of the hull was in the area affected by the collision on 30 May 1958. For the same reasons it would also appear that the damage sustained in that collision constituted a reportable marine casualty within the purview of Title 46 CFR 35.15-1, Rules and Regulations for Tank Vessels.

2. The fact that the hatch cover to the port rake was found only five feet from its original position and the deck itself was completely blown off suggests that the hatch may have been open. If this be true there is the further possibility that ignition began on deck. Barring the unlikely possibility that the mate was smoking the source of ignition probably originated in the electrical circuit to the running lights. In support

of this conclusion is the testimony of the master that the customary procedure followed when rigging running lights consisted of first hooking up all lights, then connecting the system to the power source and then checking to see if the lights were on. Since the circuit was found to be energized after the casualty it seems probable that the mate was in the process of checking the lights and from his position immediately before the explosion could actually have been working on the port running light circuit when the casualty occurred.

3. The existence of unauthorized splices, below minimum gauge wire and unapproved receptacles suggests numerous ways in which ignition could have occurred. In this regard the fact that the fuse did not burn out is not considered significant since a partial short or a small spark at a wire splice or at a receptacle or in a slightly damaged wire could easily have provided ignition without overloading the circuit or as pointed out by the Board, the length of the circuit itself may have been a factor. Although there is no probative evidence that any of these conditions caused or contributed to the cause of the casualty it would indeed be difficult to imagine how this explosion could have occurred had all applicable regulations and normal safe operating and maintenance standards been adhered to.

4. Subject to the foregoing remarks, the record of the Marine Board of Investigation is approved.



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

From: Captain C. H. STOBBER (1356) USCG, Chairman
To: Commandant (MVI)

Subj: Marine Board of Investigation; explosion and fire involving tank barges C-101, C-102 and T-2200 in tow M/V BARBARA LEE on 20 November 1958 in vicinity of mile 893, Ohio River, wherein one George F. Lowery lost his life.

Ref: (a) Comdt (MVI) ltr (C-101, C-102 and T-2200 in tow of BARBARA LEE a-2 Bd)

- FINDINGS OF FACT -

1. That, at about 1645 CST, 20 November 1958, the C-101, undocumented, 1050 gross ton, non-propelled tank barge, in the tow of the BARBARA LEE, O.N. 262 300, a 271 gross ton, motor propelled, uninspected vessel proceeding downbound on the Ohio River at Carrsville, Kentucky (mile 893.6), suffered an explosion in the forward port rake compartment with the loss of life of one George F. Lowery, a crewman serving as mate, and with property damage in excess of \$300,000.00.
2. That, the deceased was George F. Lowery, age 26, white, male of Lake Village, Arkansas. His next of kin is Pete Lowery, father, of the same address.
3. That, at about 0510 CST, 20 November 1958, the BARBARA LEE, owned by the Gulf Transportation Company, 3926 McGowan, Houston 4, Texas, in charge of pilot Charlie Jackson Elliot (Z-912 428, Tankerman, Grade B, Cargo), 905 Pierce, Lufkin, Texas, picked up undocumented gasoline laden tank barges C-101 and C-102 at the Texas Company Terminal, Mt. Vernon, Indiana (mile 829.0 Ohio River, RB). Undocumented gasoline laden tank barge T-2200, part of the BARBARA LEE three unit tow had previously been moved from the terminal. All the barges are owned by the Texas Towing Company, Houston, Texas.
4. That, at the time of the casualty, Jesse Neal Spence (Z-913 162) was serving on board the M/V BARBARA LEE as master.
5. That, the tank barge C-101 is an unmanned, undocumented, non-propelled vessel of 1112 gross tons, built in 1955, inspected and certificated by the Coast Guard for the carriage of inflammable or combustible liquids of Grade B at Port Arthur, Texas on 23 April 1958 and is 225 feet long by 48 feet wide by 11 feet deep.
6. That, the tank barge C-102 is an unmanned, undocumented, non-propelled vessel of 1106 gross tons, built in 1955, inspected and certificated by the Coast Guard for the carriage of inflammable or combustible liquids of Grade B at Port Arthur, Texas on 18 April 1958 and is 225 feet long by 48 feet wide by 11 feet, 6 inches deep.

7. That, the tank barge T-2200 is an unmanned, undocumented, non-propelled vessel, of 1380 gross tons, built in 1955, inspected and certificated by the Coast Guard for the carriage of inflammable or combustible liquids of Grade B at Port Arthur, Texas on 18 April 1958, and is 264 feet long by 48 feet wide by 11 feet 6 inches deep.
8. That, the tank barge C-101 was properly loaded with Texaco Fire Chief gasoline and inspected by terminal personnel in accordance with standard practices.
9. That, the tank barge C-102 was properly loaded with a split cargo of Texaco Fire Chief and Sky Chief gasoline and inspected by the terminal personnel in accordance with standard practices.
10. That, the tank barge T-2200 was properly loaded with a split cargo of Texaco Fire Chief and Sky Chief gasoline and inspected by terminal personnel in accordance with standard practices.
11. That, the M/V BARBARA LEE carried an inter-communication system with a portable transmitter/speaker, which at the time of the casualty was located at the bow and to the starboard of T/B C-101. The transmitter/speaker was housed in a wooden box and connected to the pilothouse of the towboat by an extension cord led over the deck of T/B C-101 and the T/B T-2200, terminating in a connection box under the overhang of the pilothouse overhead on the BARBARA LEE.
12. That, at 0620 CST, the BARBARA LEE, master Jesse Neal Spence (Z-913 162), 347½ Zoc, Houston, Texas, on watch, departed Mt. Vernon, Indiana, downbound for Memphis, Tennessee via Carruthersville, Missouri with her unit tow consisting of tank barges C-101, lead barge, C-102 set over to starboard of C-101, and T-2200, face barge.
13. That, the voyage progressed until 1645 CST, 20 November 1958 at which time the explosion occurred and set fire to the entire tow. Gasoline leaked from the Port #1 cargo compartment of C-101, spreading fire over the surface of the water. The tow then broke up and the burning barges drifted downstream.
14. That, just prior to the explosion, the tow was proceeding down river at about 8 m.p.h.
15. That, after the tow broke up T/B C-101 drifted to the dam at Lock 51 and landed upon the wickets on the Kentucky side of the navigable pass. The Texaco fire fighting crew extinguished the fire on T/B C-101 at about 1730, 21 November, 1958, by the use of foam fire extinguishers. T/B C-101 freed herself from the wickets just prior to 1730 and was pushed to the Illinois shore and secured about one mile below the dam by the M/V BARBARA LEE.

16. That, after the tow broke up T/B C-102 drifted downstream along the Illinois shore. The U. S. Engineers' maneuver boat succeeded in pushing T/B C-102 to a point where it was able to drift through the navigable pass of Lock 51 and drift on downstream to about mile 906 where it was pushed ashore on the Kentucky side and left there by the BARBARA LEE. When T/B C-102 was ashore the fire had been almost extinguished by the Texaco fire fighting crew. The T/B C-102 later freed herself and again drifted downstream to about mile 910, where she was again pushed ashore, this time on the Illinois side, by the M/V MAMA LERE. The CGC SUMAC, then arriving on the scene, secured T/B C-102 to the shore with a wire cable.

17. That, after the tow broke up, T/B T-2200 drifted downstream and grounded on a sand bar near the Kentucky shore about one mile above Lock 51. The fire aboard T/B T-2200 was extinguished with Ansul dry chemical equipment by the Texaco fire fighting crew shortly after 1130, 21 November 1958. After the fire was extinguished T/B T-2200 freed herself from the sand bar and was pushed by the U. S. Engineers' maneuver boat to the Kentucky shore just below dam 51 where she was tied off.

18. That, at the time of the casualty the weather was clear, with good visibility and with wind from the southwest at about 10 miles per hour.

19. That, about 15 minutes prior to the explosion George F. Lowery left the pilothouse. A few minutes later he was seen walking on the tow. He was not ordered to perform any duties by the pilot on watch who presumed he was making a routine check of the tow.

20. That, the deceased was last observed alive, just prior to the explosion, on the foredeck of barge C-101 in a kneeling or squatting position about midway between the port running light stand and the hatch to the forward port rake compartment. There is a distance of 7 feet between the center of the rake hatch and the running light stand. This placed George Lowery about 25 feet back from the bow of the vessel, in from the port side about $7\frac{1}{2}$ feet, and about 15 feet from the rake vent.

21. That, the T/B C-101 had electric wiring permanently installed, partially in conduit, from the stern of the barge down the deck on the centerline, except at the expansion trunks, where it was routed around the trunks to the collision bulkhead where a receptacle was installed and where the wire penetrated the deck into the rake compartment then was routed outboard to port and starboard, again penetrated the deck and was terminated in receptacles at the base of the running light stands on either side of the vessel.

22. That, the vessel files of the Coast Guard indicate that the blueprint of a proposed electrical system for T/B T-2200 was approved by the Commander, 8th Coast Guard District on 26 March 1956 but there is no indication that the Coast Guard was cognizant of the actual date of installation.

23. That, the vessel files of the Coast Guard do not indicate that the electrical installation of T/B C-101 and T/B C-102 was approved.

24. That, the vessel files do not indicate when the electrical installations on any of the barges were made or by whom the installation was made.
25. That, the Coast Guard inspection reports indicate that the electric wiring on all barges complied with the regulations.
26. That, the T/B C-102 and T/B T-2200 had permanently installed electric wiring installed identically as T/B C-101 except that on these barges there were no deck penetrations and the wiring terminated on the centerline of the barge in receptacles at both ends of the barges.
27. That, the installed wiring was two conductor reinforced rubber sheathed armored cable, wire size appeared to be #12 A.W.G. originally terminating in Russell-Stoll marine type watertight, one and two gang receptacles, all receptacles and light stands were located more than fifteen feet from cargo hatch openings.
28. That, at some time after April, 1958, the front plate and internal parts were removed from all electrical receptacles and an oval, pushpull type, rubber covered, waterproof connector, (manufacturer not indicated on connector), was spliced into the circuit at each receptacle. This connector was referred to by towboat crew as an "Oceanic" non sparking plug. Connections made in this manner are not permitted by 46 CFR 111.60-30.
29. That, after the casualty the running lights were in such a condition that nameplate data could not be ascertained.
30. That, the source of power for the running light circuits was furnished through a receptacle in a lighting circuit on the M/V BARBARA LEE and was protected by a 30 amp fuse located in a fuse panel on that vessel.
31. That, at the time of the casualty the running lights were energized by an extension cord leading from the bow of the M/V BARBARA LEE to the receptacle at the stern of T/B T-2200. Another extension cord was connected from a receptacle at the bow of the T/B T-2200 to a receptacle at the stern of the T/B C-101. At the port bow of the T/B C-101 the port running light was connected by its cord to the receptacle at the base of the running light stand. At the starboard bow of the C-101 the amber light was connected to the centerline receptacle on the same barge. At the starboard bow of the C-102 the starboard running light was connected to the receptacle at the base of the starboard running light stand of the C-101 by an extension cord of about 50 feet in length.
32. That, the remaining portion of the extension cord used for the starboard running light was about 50 feet long and contained two splices. The wire was of three sizes between splices. All wire was rubber covered, two conductor, stranded cable. About 30 inches was #12 A.W.G. about 12 feet was of #14 A.W.G. and the remainder was #16 A.W.G. Splices such as this are not permitted by 46 CFR 111.60-5(e).

33. That, the extension cord between the M/V BARBARA LEE and the T-2200 was of two conductor, stranded, size 12 A.W.G. wire.

34. That, no evidence of the other extension cords in use at the time of the casualty was found.

35. That, the entire deck over the forward port rake compartment of C-101, an area of about 25 feet by 25 feet, was removed by the explosion. The collision bulkhead was parted from the shell for a distance of about 2 feet from the deck and the shell was open to the water at that point for the same distance.

36. That, T/B C-101 in addition to the damaged deck plating, suffered severe distortion of the entire deck. Six of the pressure vacuum valves on the cargo tank vents were melted, all cargo hatch covers were blown open and the entire barge above the waterline was flame damaged.

37. That, T/B C-102 and T/B T-2200 suffered severe distortion of the entire deck, 50% of the cargo hatches were blown open and the entire area of the barges above the waterline suffered flame damage.

38. That, the M/V BARBARA LEE suffered only damaged paint work throughout. All surfaces were coated with an oily soot.

39. That, after the explosion, the pilot on watch on the M/V BARBARA LEE, Elliot, sounded the general alarm. There was considerable confusion due to the vessel being engulfed in flames and smoke. The master, proceeded from his stateroom to the bow of the towboat to knock the vessel out of tow. The pilot on watch stopped the engines of the vessel and proceeded to the bow to knock the vessel out of tow. During this time the engines would not start. After releasing the tow the master returned to the pilothouse, the engines were started and the vessel engaged in searching for the missing crew members. Mack Doddridge had jumped overboard just after the explosion and was picked up by a boy in a small boat. The vessel then was engaged in securing the barges to the river bank.

40. That, the remains of the body of the deceased were found at a point about 40 feet back from the bow and 20 feet in from the port side on the deck of the C-102.

41. That, the Coast Guard Cutter SUMAC arrived at the scene at 0030, 21 November, 1958, secured the T/B C-102 to the bank, then stood by as directed by the senior C.G. officer present and was released at about 1730 that same date.

42. That, the Texaco Company fire fighting department from Lawrenceville, Illinois extinguished all fires.

43. That, the T/B C-102 was carrying seven (7) empty steel drums on deck, amidships, about 30 feet back from the bow, stretched out in a line fore and aft, unsecured and without dunnage, this is contrary to 46 CFR 35.35-60.

44. That, the T/B C-102 had an electric engine starting battery in a box with the cover removed and another battery sitting crosswise on the top of the battery box. The uppermost battery was connected to the starting motor. This installation was located just to starboard of the centerline of the barge about 13 feet from the stern of the vessel. Pump and engine were located about 27 feet from nearest cargo hatch. This installation is contrary to 46 CFR 111.15-10(e).

45. That, the access hatch to the rake compartment in which the explosion occurred moved only about 5 feet toward the stern of the vessel from its installed location.

46. That, T/B C-101 sustained damage to the deck knuckle in the No. 1 port cargo tank just abaft the collision bulkhead on May 30, 1958. The damage consisted of a dent and buckling of the deck plate about 60 inches long and 8 to 10 inches deep. The dented and buckled area had been faired by a concrete filling.

- CONCLUSIONS -

1. That, the deceased, George F. Lowery, just prior to the casualty, was engaged in making a routine inspection of the rigging on the tow and checking the running lights.
2. That, it is impossible to determine the exact cause of the casualty.
3. That, a section of the collision bulkhead in T/B C-101 in the lower port corner of the No. 1 port cargo tank had been replaced or poorly installed at the time of build because it appeared not to fit too well, the weld joint was of an excessive width and contained slag inclusions. Coast Guard records do not reveal when this occurred. The appearance of this weld, which was parted by the explosion, gave the impression that the joint may have been leaking.
4. That, although T/B C-101 had been in a collision on May 30, 1958, at which time the deck knuckle in the No. 1 port cargo tank was dented and buckled, there was no damage that was serious or impaired the seaworthiness of the vessel. This was determined by examination of the area affected.
5. That, the hatch to the port forward rake compartment on tank barge C-101 was open at the time of the casualty. This is concluded by the fact that the deck to which the hatch cover would have been secured was blown away while the hatch cover moved only about 5 feet.
6. That, the permanently installed electrical wiring on all barges, as originally installed, would have met Coast Guard requirements had Coast Guard approval been requested. This was determined by examination of the barges and inspection records.
7. That, failure to request approval of the electrical system did not contribute to the casualty since inspection records indicate that the system was in physical compliance with the regulations when the vessels were last inspected.
8. That, the wire to the portable intercommunication speaker/transmitter located at the head of the tow was a two conductor, stranded, flax covered speaker cable. This is concluded from the appearance of the ashes after the fire.
9. That, the portable intercom system did not contribute to the casualty because of its location about 60 feet from the point of explosion.
10. That, the empty drums carried on deck of the C-102 without dunnage did not contribute to the casualty because they were located about 40 feet from the explosion area.
11. That, the improperly installed battery did not contribute to the casualty because it was located over 200 feet from the space in which the explosion occurred.

12. That, the extension cord containing splices did not contribute to the casualty due to the end of the cord nearest the space where the explosion occurred being 20 feet away.
13. That, the fire was extinguished on board the T/B C-102 by the use of dry chemical and foam fire extinguishing agents since these were the agents employed on the other two barges.
14. That, the fire was extinguished on T/B C-102 shortly after the barge was pushed to the bank by the M/V BARBARA LEE.
15. That, the violations stated herein were not wilful on the part of the personnel involved.
16. That, George F. Lowery met his death from the impact of the explosion.
17. That, no personnel of the Coast Guard or any other government agency contributed to the casualty.
18. That, there is no substantive evidence of misconduct, incompetence, inattention to duty, negligence or wilful violation of any law.
19. That, due to the lack of definite evidence indicating otherwise, it is believed that the explosion was caused either by a mechanical failure in the electrical system within the port rake compartment of T/B C-101 which ignited fumes in the rake or a mechanical failure in the electrical system on deck which ignited fumes emanating from the rake hatch which it is believed was open at the time of the casualty.
20. That, the electrical circuit supplying current to the running lights was energized at the time of the casualty and that the overcurrent device protecting the circuit failed to function for an unknown reason. The failure of the overcurrent device may have been due to the length of the conductors between the fuse and the short circuit.

- RECOMMENDATIONS -

21. That, the Texas Towing Company be cited under R.S. 4499 (46 USC 497) for the following violations of 46 USC 391a:
 - a. Steel drums carried on the deck of T/B C-102 without dunnage (46 CFR 35.35-60)
 - b. Jury rigged starting battery improperly installed on T/B C-102 (46 CFR 111.15-10(e)).
 - c. Jury rigged electrical connectors spliced into receptacle fittings on T/B C-101, T/B C-102 and T/B T-2200 (46 CFR 111.60-20)

d. Portable electric extension wire between T/B C-101 and T/B C-102 contained two splices (46 CFR 111.60-5(e)).

/s/
CARL H. STOBER
Captain, United States Coast Guard
Chairman

/s/
LEWIS A. BAKER
Commander, United States Coast Guard
Member

/s/
JOSEPH W. FINNEGAN
Lieutenant Commander,
United States Coast Guard
Member and Recorder