



TREASURY DEPARTMENT
UNITED STATES COAST GUARD

Address reply to:
COMMANDANT
U.S. COAST GUARD
WASHINGTON, D.C. 20226

.MVI-3
5943/SAN JACINTO
G-5 Bd

Commandant's Action

on

Marine Board of Investigation; explosion of the SS SAN JACINTO
in the Atlantic Ocean off the Eastern Shore of Virginia on
25 March 1964

1. The record of the Marine Board of Investigation convened to investigate subject casualty together with the Findings of Fact, Conclusions and Recommendations has been reviewed.
2. At approximately 2315 (EST), 25 March 1964, while the SS SAN JACINTO was en route from Portland, Maine to Jacksonville, Florida and in approximate position 37 degrees, 43 minutes North, 74 degrees, 30.5 minutes West, an explosion occurred in the No. 8 cargo tanks causing the vessel to subsequently break in two. Of the 37 persons on board, 36 survived. One crewmember died of natural causes in a ship's lifeboat a short time after the explosion.
3. The SS SAN JACINTO (ex-FORT MERCER) was a modified T-2 type tankship, certificated to carry Grade A inflammable or combustible liquids. As the FORT MERCER, the ship had broken in two in 1952 and was modified by the addition of a completely new bow section from frame 59 forward. The modification lengthened the vessel to 545 feet and added an additional set of tanks.
4. Cargo tanks, 3 across, 5 across, 8 across and 9 port and starboard wings were normally used as ballast tanks and were fitted with magnesium anodes to control internal corrosion.
5. The vessel discharged a mixed cargo of gasoline, kerosene and fuel oil at Portland, Maine, and on 24 March, departed for Jacksonville, Florida, via the Cape Cod Canal. Prior to departure and throughout the day of 25 March, the crew was engaged in cleaning and gas-freeing tanks preparatory to entering a shipyard in Jacksonville for drydocking and Coast Guard inspection. The No. 8 center cargo tank was used as a "slop" tank during the cleaning process. At about 1930 on 25 March, the day's work was completed and the condition of the various cargo tanks at this time was: all cargo tanks gas-free except No. 3 port and starboard, No. 5 center and No. 8 across; ballasted - No. 3 center, No. 5 port and starboard, No. 9



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port and starboard; ballasted but being gravitated out - No. 3 port and starboard, No. 5 center and No. 8 port and starboard. The No. 8 center tank was the last tank to be water washed but was not gas free.

6. While the tanks were being cleaned, two wasted magnesium anodes were found in the bottom of the tanks. One was found in the No. 5 starboard wing tank but the exact location in which the other was found could not be determined. Evidence was received that wasted anodes had been found in tanks on previous trips. At about 1955 on 25 March 1964, the Chief Officer made a tour about the deck prior to retiring for the evening. He found the expansion trunk covers on the No. 8 port and starboard tanks closed and dogged down; the ullage caps were opened with the flame screens in place. The No. 8 center expansion trunk cover was opened. Steam and water had been secured on deck.

7. At about 2315 on 25 March 1964 a violent explosion occurred in the No. 8 cargo tanks; however, other than for a momentary flash there was no fire. As the result of the explosion the deck and sides in way of the No. 8 tanks were destroyed with structural damage extending into the No. 9 tanks aft and the No. 7 tanks forward. Parts of the weather decks over the No. 8 tanks were folded back and lay inverted over the No. 7 tanks. The bottom plating of the ship remained intact until about 0345, 26 March when the two sections of the vessel separated.

8. The explosion disrupted communications between the bridge and engine room and the engineer on watch, receiving no response to the engine order telegraph, stopped the engines. After surveying the damage to the extent practicable, the Master ordered a lifeboat lowered and a distress message transmitted. The radio officer was unable to transmit the distress message because the radio antenna system had been destroyed by the explosion. A ship was observed in the vicinity and communications were established by a flashing light. The lifeboat was lowered to the water manned by the Second Officer and Steward. While attempting to release the boat from the falls, the Steward suffered a heart attack and subsequently died. With the exception of the Master and Chief Officer, the remaining crewmembers on the forward portion of the ship descended into the boat to assist the Second Officer in manning the boat and to care for the unconscious Steward. The Master ordered the boat to proceed to the approaching SS MOBIL PEGASUS to obtain medical care for the steward and to place the radio officer on board the MOBIL PEGASUS to assist with radio communications. Simultaneous with lowering the lifeboat, the Master and Chief Officer commenced ballasting cargo tanks in the forward section to increase that portion of the vessel's stability. After placing the Steward and radio officer on board the MOBIL PEGASUS the lifeboat returned to the forward portion of the SAN JACINTO. By this time the Master and Chief Officer had completed ballasting the forward portion of the vessel. They boarded the boat and proceeded to the after portion of the ship. Upon arrival on the after section, the Master and Chief Officer immediately ballasted the No. 10 tanks.

9. The crew remained on board the after portion of the vessel and after the ship broke in two, both sections were towed to the Newport News Shipyard.

10. During the inspection of the wreck, a 2 $\frac{1}{2}$ " black rubber hose was found extending through the inverted expansion trunk of the No. 8 center tank. The presence of the hose in this position cannot be fully explained. The Chief Pumpman testified that no hoses were left in the No. 8 center tank when cleaning operations ended on the evening of the 25th of March. However, since the Master testified that all tank cleaning machines were accounted for, the Board's conclusion that this was the hose through which "slops" from other tanks were discharged into No. 8 center tank and which had been inadvertently left in the expansion trunk is concurred in.

REMARKS

1. The Board's conclusion that the explosion originated in the No. 8 center tank and progressed almost simultaneously to the No. 8 wing tanks is concurred in.

2. Further concurring with the Board it is considered that the explosion was most probably caused by a magnesium anode falling in the No. 8 center tank and striking an internal structural member on the bottom plating, thus creating a spark which ignited explosive vapors emanating from the gasoline which had previously been stripped from other tanks.

3. Acting on the Board's recommendation the Rules and Regulations for Tank Vessels (CG-123) have been amended to prohibit the installation or use of sacrificial anodes of a type capable of producing a spark as the result of falling in tanks used for the carriage of inflammable or combustible liquids.

4. The Board's recommendation that all tank vessels fitted with lifeboats amidships and aft be required to carry a suitable portable emergency radio to be stowed in the after deckhouse is in accordance with Regulation 13, Chapter 3 of SOLAS, 1960. The Rules and Regulations for Tank Vessels (CG-123) are being amended to comply with the Convention which will become effective on 26 May 1965.

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



E. J. ROLAND
Admiral, U. S. Coast Guard
Commander



TREASURY DEPARTMENT
UNITED STATES COAST GUARD

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5943/582

2 JUN 1964

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

Subj: S.S. SAN JACINTO, O.N. 248894; explosion aboard on 25 March 1964
and subsequent breaking in two

FINDINGS OF FACT

1. At or about 2315 hours (EST) 25 March 1964 the S.S. SAN JACINTO, O.N. 248894 enroute from Portland, Maine to Jacksonville, Florida, in ballast, suffered an explosion in No.-8 cargo tank and subsequently broke in two in approximate position 37⁰-43'N., 74⁰-30.5'W., about forty miles off the Eastern Shore of Virginia. Of the thirty-seven persons aboard thirty-six survived. One crew member died of natural causes in the ship's lifeboat a short time after the explosion.
2. The S.S. SAN JACINTO, O.N. 248894 (ex-FORT MERCER) was a modified T2 type tankship, of welded steel construction, built at Chester, Pennsylvania in 1945. She was 545 feet long, 11,257 gross tons, 8,408 net tons, with steam turbo-electric propulsion of 6,000 horsepower. Home port was Wilmington, Delaware. Owners and operators were the Trinidad Corporation, 30 Rockefeller Plaza, New York 20, N.Y. Master at the time of the casualty was Harold J. TITUS BK 282813-C1, License #272507, address, Beckworth Road, Pine City, New York; master of steam and motor vessels any gross tons upon oceans. The vessel was certificated for carriage of inflammable or combustible liquids of Grade "A" and lower and for carriage of Grade "E" in the deep tanks. Cargo capacity was 165,140 barrels.
3. The vessel, as the FORT MERCER, had broken in two in 1952 and had been modified at Galveston, Texas in 1953 by addition of a completely new bow section from frame 59 forward to the stem. This new section included cargo tanks No. 1 to 6 inclusive and a new midship house. This repair and modification added an additional tank which resulted in the vessel being lengthened approximately forty feet. At this time, on the existing stern section of the vessel, "B" strake, port and starboard was renewed using one inch plating; "C" strake on deck, port and starboard, was renewed using 1-1/8 inch plating. All corrugated bulkheads, both transverse and longitudinal in the after end of the vessel, were renewed with flat plating, stiffeners, and vertical webs. "H" beams, located at 10' and 25' off the centerline, port and starboard in the after end of the vessel were cut out and removed. Additional internals were renewed as necessary. Crack arrestors and strapping consisting of eight (8) straps; bottom inboard 4' forward of frame 48 to 8' aft of frame 68; bottom outboard, 4' forward of frame 48 to 4'-2" forward of frame 68; deck inboard, 1' forward of frame 48 to 4' aft of frame 68; deck outboard 4' forward of frame 48 to 8' aft of frame 68 were installed. Further extensive renewal of internals as well as plate renewals in way of the cargo tanks in the after section of the vessel was accomplished during the subsequent years prior to the casualty.



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4. Martin DOTILLA, Z-114439, succumbed shortly after the explosion occurred. Mr. DOTILLA was 56 years of age and was serving as Chief Steward aboard the S.S. SAN JACINTO. His home address was Route #2, Box 354, Gulfport, Mississippi. A copy of the Record of Death indicates cause of death to be Acute Coronary Thrombosis and further indicates there were no injuries. There were no serious injuries to other personnel of the vessel as a result of the explosion.

5. The weather at the time of the casualty was as follows; wind, SW 12 to 13 knots; sky clear overhead; hazy horizon; visibility, 7 to 8 miles. The air temperature was 49° F and the water temperature 42 F. The sea was moderate with a SW swell.

6. Cargo tanks of the SAN JACINTO which were normally used for ballasting when cargo was not being carried were 3 across, 5 across, 8 across and 9 port and starboard wing tanks. These tanks were fitted with magnesium anodes to control internal corrosion. The anodes are cast around steel straps which are secured to brackets or framework within the cargo tanks with "elastic stop-nuts." In the center tanks there are about sixty anodes which are distributed at different heights and locations within the tanks. There were no written directives or instructions from the company to the operating personnel of the vessel regarding hazards associated with the use of sacrificial anodes in cargo tanks but the Master and Mate had verbal instructions to look for and remove any loose or broken anodes during repair periods. It had been the practice also to remove any anodes which appeared to be wasted to an extent that they might come loose and fall during the ensuing year. There were approximately fifty anodes renewed in various cargo tanks in May 1963 while the vessel was in the shipyard. These included some anodes in No. 8 center, presumably near the top. Approximately six months prior to the casualty additional anodes had been renewed near the bottom of No. 8 center tank by the ship's crew. Normally only the lower anodes were renewed by the ship's crew because of the difficulty in reaching those at a higher elevation. Cargo tanks not normally used for ballast are chemically treated with "Nitrox", a corrosion inhibitor. This chemical is introduced into the tanks to be treated through the "Pyrate" tank washing machine, commonly referred to by crew members as a "Butterworth" machine. In addition to the processes used to control internal corrosion the SAN JACINTO was also fitted with the "Capac" cathodic protection system for combatting external corrosion.

7. The SAN JACINTO was last biennially inspected and certificated by the Coast Guard at Baltimore, Maryland on 28 March 1962. During the period the vessel was in the shipyard at this time the American Bureau of Shipping also conducted an Annual Survey, Annual Boiler Survey, Commencement of the Second Special Survey No. 1 on Hull, and Second Special Survey No. 1 on Machinery as well as the drydocking examination. All cargo tanks were opened and cleaned and the internal members examined. The overall condition was found to be satisfactory. In #8 port and starboard wing tanks the forward and after upper and lower diagonal trusses were renewed. Two belts

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of gaugings in way of No. 4 and No. 8 cargo tanks were made; however, no excessive wastage of metal was found.

8. The vessel was last drydocked on 3 May 1963 at Norfolk, Virginia. In addition to the drydock examination a midperiod reinspection was conducted by the Coast Guard. The American Bureau of Shipping also conducted a Drydocking Survey, Annual Classification Survey, Examination of tailshaft, annual load line inspection and annual boiler survey. During the drydocking a new oversize stern bushing and a reconditioned tailshaft were installed.

9. The SAN JACINTO arrived Portland, Maine on 23 March 1964 from Houston, Texas with a cargo of petroleum products loaded on the ship as follows: No. 1 port and starboard and No. 2 across, Shell Super gasoline; No. 3 across and No. 4 across, regular gasoline; No. 5 across, kerosene; No. 6 center, No. 7 across, No. 8 across, and No. 9 center, #2 fuel oil; No. 10 across, kerosene; No. 6 port and starboard also contained #2 fuel oil but were not full as they were being used as trim tanks. No. 9 port and starboard were empty except for a relatively small amount of #2 fuel oil in No. 9 port, leakage from No. 8 port. 143,584 net barrels of products were discharged at Portland, Maine and the vessel was given a dry certificate on 24 March 1964. While at the dock No. 3 center cargo tank, No. 5 wings and No. 9 wings were washed, gas freed and mucked. While this cleaning was being accomplished two fallen magnesium anodes were found in the bottom of tanks. One of these fallen anodes was found in No. 5 starboard wing tank. The exact tank location in which the other was found could not definitely be ascertained. Fallen anodes also had been found lying in the tanks on previous trips.

10. At approximately 2:36 PM (EST) on 24 March 1964 the vessel left the Shell Oil Dock at Portland, Maine enroute to Jacksonville, Florida for routine shipyard repairs, drydocking and biennial inspection. Sailing draft forward was 12 feet, aft 21 feet, mean 16'06". At the time of leaving the dock No. 8 wings, No. 5 center and No. 3 wings were ballasted. While the vessel was being turned around all other tanks which had not been cleaned were stripped into No. 8 center which was being used as a "slop" tank. The strippings were "slopped" into No. 8 center through the expansion trunk by means of a 2½ inch rubber hose which was dropped about halfway into the tank. This hose was reportedly removed from the tank prior to machine washing of the tank.

11. After leaving the dock at Portland the SAN JACINTO took departure from the Portland Lightship at 1600 hours, 24 March 1964 and proceeded south, through the Cape Cod Canal, with a Coastwise Pilot. The pilot departed the ship at 0323, 25 March 1964 at Brenton Reef Light and the vessel proceeded due south at approximately 13.5 knots until 0445 at which time Block Island Lighthouse was abeam 7½ miles to starboard. At this time a course of 215°pgc was set toward the Texas Tower Buoy in order to keep in the

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lee of the land because of expected northwest winds. This course and speed were continued until 2300 when a course change was made to 192° pgc, intended to bring the vessel a short distance off Diamond Shoals Light Vessel. The explosion occurred about fifteen minutes after the course change. Draft at the time of the casualty, as computed by the Master, was 11'06" forward, 21'06" aft, 16'06" mean.

12. After the vessel got outside upon departure Portland, No. 3 center, 5 wings and 9 wings, which had been cleaned at the dock, were filled with clean ballast. It was noted that 5 wings and 3 center had traces of oil on the surface so these tanks were cleaned again the following day, 25 March. During the voyage down the coast all remaining cargo tanks except no. 3 wings, 5 center and 8 across were washed and gas freed, the chemically treated tanks being washed with "Nitrox" solution. During the washing process cold water was used. The machine washing was secured at about 1700 hours on 25 March after washing No. 8 center. Tank cleaning however, continued until about 1930 hours, during which time several of the tanks had been machine washed, hand hosed but not mucked, and then gas freed by use of steam driven Coppus blowers. Condition of the various cargo tanks at this time was:

No. 1 port and starboard - gas free. Empty

No. 2 port, center and starboard - gas free. Empty

No. 3 center - gas free. Ballasted

No. 3 port and starboard - not washed or gas free. Ballasted and being gravitated out at this time.

No. 4 port, center and starboard - gas free. Empty

No. 5 center - not washed or gas free. Ballasted and being gravitated out at this time.

No. 5 port and starboard - gas free. Ballasted

No. 6 port, center and starboard - gas free. Empty

No. 7 port, center and starboard - gas free. Empty

No. 8 center - washed but not gas free. Empty

No. 8 port and starboard - not washed or gas free. Ballasted and being gravitated out at this time.

No. 9 center - gas free. Empty

No. 9 port and starboard - gas free. Ballasted

No. 10 port, center and starboard - gas free and empty.

The Chief Pumpman testified that no hoses were left in No. 8 center tank upon securing from tank cleaning operations about 1930 hours on 25 March.

13. At about 1955 hours, after being relieved of the watch on the bridge, the Chief Mate, Robert D. BENNETT, made a tour of the deck. At this time he checked No. 5 center tank, which was gravitating, and found it down a few feet. Eight port and starboard, which were also gravitating out were checked and were found to be down two or three feet. The expansion trunk covers on these two tanks were dogged down; the ullage caps were open with the ullage screens in place. Eight center expansion trunk cover was open. The Chief Mate did not note any hoses leading into the No. 8 center tank but indicated that he could not positively state that there was none. All Coppus blowers were secured but three remained in place on Nos. 7 center, No. 9 center, and No. 1 starboard tanks. Steam and water had been cut off from deck.

14. At or about 2315 hours on 25 March 1964 a violent explosion occurred in No. 8 cargo tanks. Other than a momentary tongue of flame there was no fire. At the time the explosion occurred the master was in his cabin preparing to take a shower. The Chief Mate who normally sailed on the vessel as 2nd mate was asleep in his room. The 2nd mate, Gunnar NORGNEN, was in his room preparing to go on watch at midnight. The 3rd mate, James MURPHY, was on watch in the wheelhouse. The Radio Officer, Wilbur N. BOCK was lying in bed reading. Able Bodied Seaman, Alvin C. WHITE, was standing his watch as lookout on the bow, and Benjamin BARUELA, the Quartermaster on watch was at the wheel in the pilothouse. Martin DOTILLA, Steward, was also in the midships house. All other personnel were aft. Testimony varied as to how many explosions were heard. Some witnesses heard one explosion, others heard two noises sounding like explosions and still others heard what they thought may have been three explosions.

15. To Captain TITUS the explosion sounded sharp and loud followed by a second sound almost as loud. There was a third sound immediately after but of a lot less intensity. The master immediately started for the bridge upon hearing the explosion. He told the third mate to get the DR position at eleven o'clock so that an SOS could be sent and told the Radio Officer to warm up the transmitters. He then returned to his room for some clothes and subsequently went to the boat deck where he could see aft. He noted the stern was still afloat and there appeared to be no danger of the ship splitting up immediately. Although the hull above the water line in way of No. 8 cargo tanks was completely severed, he ascertained that there were no casualties to personnel aft. It was noted the vessel was beginning to hog so the Master and Mate started ballasting #6 wing tanks. The No. 2 boat which had been cleared away for launching in the meantime was swung out on the port side. The starboard boat was not used due to the danger involved because of a large piece of tank bulkhead which was blown upward off a cargo tank and had become lodged on the aft quarter of the bridgehouse and which would have endangered personnel working beneath it. The starboard boat itself was undamaged and was clear so that it could have been

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lowered. During this period of time the Radio Officer had been attempting to transmit but was unsuccessful due to loss of power. He obtained the lifeboat radio but it was unnecessary to use it as the S.S. MOBIL PEGASUS came in sight and communications was established by means of signaling.

16. As the Radio Officer was passing information to the MOBIL PEGASUS the port lifeboat was lowered away in accordance with the Master's instructions. The second mate, Gunnar NORGREN and the steward, Martin DOTILLA, were in the boat while it was being lowered. After the boat was waterborne the second mate attempted to trip the releasing gear but was unable to do so. He asked Mr. DOTILLA to assist him and Mr. DOTILLA stepped into the center of the boat where he slumped over the release. The second mate asked for assistance and Quartermaster, BARUELA, Able Seaman WHITE, Third Mate MURPHY, and Radio Officer BOCK descended into the boat. The steward was removed from the releasing gear handle but it still could not be released, although in the meantime the forward falls had released. It was necessary to cut the after falls in order to release the boat. After the boat was clear of the forward section the master directed the second mate to take the boat around the stern section of the SAN JACINTO to the MOBIL PEGASUS with the steward. He further directed that the Radio Officer remain on the MOBIL PEGASUS to facilitate communications. Resuscitation of the steward was attempted in the lifeboat but was unsuccessful. He was later pronounced dead aboard the MOBIL PEGASUS by a U. S. Navy Medical Officer and the body was taken to Paulsboro, New Jersey aboard that vessel.

17. The boat returned to the bow section of the SAN JACINTO at about 0100 26 March and picked up the Master and Chief Mate who had completed ballasting. In addition to ballasting No. 6 wings it had been found necessary to ballast No. 4 starboard sufficiently to overcome a port list which had developed. The boat transported the Master and Chief Mate to the stern section where all hands climbed aboard by means of a ladder. On arrival on the stern section the Master and Chief Mate immediately started ballasting #10 tanks. At about 0345 the two sections of the vessel separated.

18. All personnel with the exception of the Radio Officer and the Steward remained on the stern section until both sections were towed into Newport News Shipyard on 28 March 1964. All services aboard the stern section were maintained. There was no panic at any time during or after the casualty and all personnel performed their duties as directed.

19. There were no known deficiencies in any of the wiring circuits on the main deck and no portable electrical machinery, tools or lights were in use or had been used in that vicinity. The P-V valves had been dismantled for cleaning and overhaul and the internals were lying on the catwalk.

20. There was testimony that the vessel had vibrated at certain RPM's and in various conditions of loading, particularly prior to removal of the stern tube bushing in 1963, but there was no appreciable vibration just prior to the casualty. The vessel was riding well and was not laboring.

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21. While at the Newport News Shipyard the vessel was viewed by members of the Board and a deck inspector from the Marine Inspection Office, Portsmouth, Virginia. The two sections were also viewed while in drydock. On the stern section of the hull plating from frame 52 aft was intact. Cargo tanks No. 10 port, center and starboard were intact. The forward bulkhead of cargo tank No. 9 port, center and starboard (frame 53) was ruptured and No. 9 tanks were open to the sea. A major portion of bulkhead 53 was carried away in way of the center tank and was folded back into No. 9 center tank. An inverted portion of decking from No. 8 port and center tanks was folded aft and to starboard and was over-riding cargo tanks No. 9 port and center. The mainmast was lying diagonally across the deck over tanks No. 9 center and starboard. Cargo tank ladders in No. 8 port and starboard were mangled and apparently blown outboard. The ladder in No. 8 center was lodged against the forward bulkhead.
22. In way of No. 8 tank the major portion of the shell plating with its internals was missing both port and starboard. Deck plating, with the exception of that folded back over No. 7 and No. 9 tanks was also missing. A large portion of the bottom plating with internals in way of no. 8 tank was still attached to the stern section. Strakes A, B, and C starboard, severed just forward of frame 55, had been folded sharply down and a large section had been removed prior to drydocking. The starboard longitudinal bulkhead of No. 8 tank was missing. A portion of the port longitudinal bulkhead of No. 8 tank was missing. A large portion of it was collapsed outboard. Another portion, with approximate weight of 2400 pounds was lodged against the starboard after corner of the midship house outside the Radio Operator's room.
23. On the bow section the shell plating from frame 57 to the bow was undamaged. The after bulkhead of No. 7 cargo tank, port, center and starboard, was holed at various places and open to the sea. A section of deck plating from the starboard side of No. 8 tanks, together with its internals was inverted and lying diagonally over the deck of No. 7 center and starboard tanks. The deck plating over No. 7 center and starboard tanks was also folded back for a short distance. All strakes of the shell plating from approximately frame 56 to 56½ were bent, buckled and torn. The bottom plating was severed in a somewhat irregular pattern approximately between frames 55 and 56 or just aft of the bulkhead between No. 7 and No. 8 tanks. There were no indications of an explosion from an external source.
24. Gauging of strength members in way of the damaged area did not reveal any wastage deemed critical. Visual examination revealed excessive wastage of the 18" top margin plates in bulkheads 53 and 56 in way of the wing tanks, bulkhead 53 being wasted considerably more than 56. There were no indications that a hull fracture may have preceded the explosion.
25. A loose and badly wasted magnesium anode was found lying on deck. This was reported to have been found in No. 5 starboard cargo tank and brought up during tank cleaning operations. It was also noted that in the area of

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No. 8 tanks there were anodes showing various degrees of wastage as well as some anode brackets from which the anodes were missing entirely. Also noted was a 2½ inch black rubber hose with one end inserted through the expansion trunk of No. 8 center tank in its inverted position lying over No. 7 cargo tank. The other end of the hose was adrift and hanging down abaft bulkhead 56. An inventory later accounted for all tank washing machines.

26. Prior to the casualty the only known cracks or wasted areas were in way of No. 8 tanks. There was a known cracked weld in the shell plate in No. 8 port in way of a transverse frame at longitudinal #12. There was a weep in the bulkhead between No. 7 port and No. 8 port at the 10th longitudinal and a crack in the longitudinal bulkhead between No. 8 center and No. 8 starboard at #55 transverse. There were also known leaks due to wastage in the top sections of the transverse bulkheads between No. 8 starboard and No. 9 starboard and between No. 8 port and No. 9 port. All of these areas were scheduled for repair while in the shipyard at Jacksonville. While these cracks and leaks had been known for some time they were considered as routine in tanker service and were not considered important enough to warrant repair prior to the scheduled shipyard overhaul period. The master had been in the tanks and inspected the cracks and wasted areas at sometime within a three months period preceding the casualty. The Chief Mate had last inspected No. 8 center on 13 March 1964. At that time he had inspected the leak between No. 8 center and No. 8 starboard. Also about this same time he had noticed a loose bolt in the top of the ladder in No. 8 center but had determined the bolt was so rusty it would be necessary to cut it off. He had checked the repair list and found that this was not included so he made a mental note to have it done while in the shipyard.

CONCLUSIONS

1. It is concluded that while there was variance in the testimony as to the number of explosions heard there likely was only one explosion. This originated in No. 8 center tank. Vapors in No. 8 port and starboard cargo tanks were apparently detonated almost simultaneously with those in No. 8 center as the bulkheads between the tanks gave way. The falling of the mast and other debris on deck, the impact of the large section of tank bulkhead blown against the starboard aft corner of the midship house may well have felt and sounded much like an additional explosion.
2. While the cause of the explosion could not positively be ascertained, the falling of a magnesium anode in No. 8 center tank and striking either an internal structural member or the bottom plating, thus creating a spark, is considered the most probable cause. The fact that anodes fell from their supports quite frequently and, further, since anodes showed various degrees of wastage, and since some were missing entirely, as was observed in way of the explosion in the No. 8 tanks, support is lent to this conclusion.
3. The possibility of the explosion being caused by a spark from the loose bolt in the ladder in No. 8 center tank or from a spark caused by the minor cracks and/or wasted margin plates in the vicinity of the explosion cannot be discounted entirely, however, it appears improbable. Neither can the possibility that the explosion was precipitated by structural failure immediately preceding the casualty be conclusively eliminated. However, an explosion from these causes is deemed considerably less likely than from a falling anode.
4. It is concluded that the action of the master and chief mate in ballasting promptly may have contributed to the successful salvage of the bow section.
5. There was no evidence of negligence, inattention to duty or misconduct on the part of ship's personnel. While there were no outstanding feats of heroism the entire crew performed their duties in a commendable manner and in accordance with the best traditions of the sea.
6. It is concluded that the death of Martin DOTILIA was from natural causes and was not due to injury.
7. It is concluded that the 2½ inch rubber hose found in the expansion trunk of No. 8 center tank was the hose through which the "slops" from other tanks had been discharged into No. 8 center and that it had been inadvertently left in the expansion trunk. The fact that all tank washing machines were accounted for after the casualty, appears to preclude the possibility that a machine had been left suspended within the tank on a "Butterworth" hose, thereby presenting an opportunity for the machine to strike the ladder and cause a spark.

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8. "Slopping" of the strippings of all other tanks into No. 8 center tank introduced a sufficient amount of gasoline into this tank to provide a more highly explosive mixture than that present from the vapors of No. 2 fuel oil which had been carried in the tank.

9. In regards to the anode installation it is concluded the inspection and replacement program in effect aboard the SAN JACINTO was not adequate and further, that a truly effective program would be extremely difficult to achieve.

RECOMMENDATIONS

1. It is recommended that Rules and Regulations for Tank Vessels (CG-123) be amended to:

(a) Prohibit use, in cargo tanks used for the carriage of inflammable or combustibile liquids, any sacrificial anodes of a type capable of producing an incendive spark as a result of falling.

(b) Require all tank vessels fitted with lifeboats amidships and aft to carry a suitable portable emergency radio transmitter to be stowed in the after deckhouse.

2. Other than as stated above it is recommended no further action be taken and the case be closed.



H. J. WUENSCH
Rear Admiral, USCG
Chairman

G. F. PERRY
Captain, USCG
Member

T. L. WILLIS
Commander, USCG
Member and Recorder