

REPORT

OF A

MARINE BOARD OF INVESTIGATION

Convened 31 March 1956 at the Community House, Humble
Oil and Refining Company, Baytown, Texas,

by order of

Commandant, U. S. Coast Guard, Washington, D. C.

To investigate into the explosion and fire that occurred
on the SS ESSO PATTERSON at Baytown, Texas on 29 March 1956.

Ordered on 30 March 1956

UNITED STATES COAST GUARD

MVI

9 May 1957

(ESSO PATERSON C-8 Bd)

Commandant's Action

on

Marine Board of Investigation; explosion and fire on
SS ESSO PATERSON at Baytown, Texas, on 29 March 1956

1. Pursuant to the provisions of Title 46 CFR 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 ESSO PATERSON, a T-2 tanker of 10,478 g. t., on 29 March 1956 was loading cargo at Baytown, Texas. The previous cargo carried in No. 8 tanks was gasoline. At about 1925 the valve on the 16 inch dock line connected to an 8 inch hose was partially opened and began feeding kerosene by gravity into No. 8 port and starboard wing tanks. A 12 inch centrifugal pump driven by a 600 HP motor was put into operation and was pumping at full rated capacity of 4,000 gallons per minute shortly before the explosion. At about 1936 explosions occurred in No. 8 port and center tanks, apparently caused by static electricity generated by the turbulence of the kerosene in the loading operations. All firefighting equipment operated satisfactorily and the fire was extinguished. The burning magnesium anodes were most difficult to extinguish, and foam was the most effective agent for this purpose. No lives were lost as a result of this casualty; however, two crew members were injured and the damage to the vessel was estimated at \$290,000.
3. The Findings of Fact, Conclusions and Recommendations of the Marine Board of Investigation convened to investigate subject casualty are approved.

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

Subj: Fire and explosion aboard SS ESSO PATERSON, Humble Oil and Refining Company Dock, Baytown, Texas, 29 March 1956

FINDINGS OF FACT

1. The SS ESSO PATERSON is a steam T-2 tanker of 10,478 gross tons, bearing official number 242532, with home port Wilmington, Delaware. The vessel is owned and operated by Esso Standard Oil Company, 30 Rockefeller Plaza, New York, N. Y. At the time of subject casualty, Henry J. Koenigs, 40, Eight Street, Fairview, New Jersey, was Master of the vessel.

2. The vessel's characteristics are as follows:

Construction of hull - Steel

Length - 504 feet

Beam - 68.2 feet

Draft 5' 00" Forward; 19' 00" Aft (approx. at time of explosion)

Number of cargo tanks - 26

Date and Port of last inspection - 1 July 1955 at Baltimore, Md., and Certificate of Inspection was issued for "Oceans."

The vessel was manned and equipped in accordance with her Certificate of Inspection.

3. The PATERSON has not been altered other than removal of the cargo heating coils and installation of a corrosion inhibitor system. Briefly this system consists of spray nozzles in all except #2, 6 and 8 cargo tanks for washing with a chemical solution called nitrox. This inhibitor system was installed on the PATERSON in June 1955, and is the same as installed on six other Esso Tankers, including other T-2 types. Numbers 2, 6 and 8 tanks are used for ballasting and are fitted with a system of magnesium anodes. These anodes are about 93% pure magnesium and 6% aluminum and 1% impurities. They weigh about 52½ pounds each and there are 92 fitted in each of the center tanks, and 60 in each wing tank. Tests by Esso Shipping Company show that when in contact with salt water about 1/100 cubic foot of hydrogen gas per anode per hour is generated. They are inert with all the various types of cargo carried. An escape vent line is installed in the forward end of each tank fitted with anodes to permit this gas and other entrapped vapor to escape. This line is led over the deck to the expansion trunk.

4. The PATERSON's last cargo carried in #8 tanks prior to the explosion was Esso Gasoline (regular gasoline), and it was discharged on 19 and 20 March 1956, in Charleston, S. C. Salt water ballast was taken aboard in #2, 6 and 8 tanks across in Charleston on 20 March 1956.

5. On 29 March 1956, the ESSO PATERSON arrived at Baytown, Texas at about 3:00 p.m., and moored starboard side to berth #3 at Pier #2, Humble Oil and Refining Company docks. No heavy or unusual weather was encountered on the voyage to Baytown except intermittent rain just prior to arrival. Number 8 starboard, center and port tanks were full of salt water ballast, and most ballast in #2 and 6 tanks had been discharged prior to arrival at the dock.

6. Upon arrival a fueling hose was connected from the dock to the after fueling connection, and bunker C fuel was started aboard into forward deep tanks and after fuel tanks. All ballast was stripped from all #2, 6 and 8 cargo tanks to storage ashore through the port cargo line. Stripping of #8 tanks was done last and completed at approximately 6:45 p.m. when all ship's pumps were secured. These tanks were not gas freed or washed after deballasting.

7. The ship was then lined up for loading cargo as follows: One 8 inch hose was connected from a 16 inch dock line to the #7 drop with valves open to #8 port wing and #8 starboard wing tanks only for loading kerosene; one 8 inch hose to the port line for loading railroad fuel; two 8 inch hoses to the center line for white gasoline and Esso; and one 8 inch hose to the starboard line for Esso Extra. The line-up was as described by the Chief Mate, who was in charge of loading. He testified that in lining up for loading, he shut all the deck cross-overs; the Master valve between 8 and 9 on the port line; the cross-overs in the pumproom, top and bottom; and left the port line and the starboard line in the pumproom to be open, so as to lead through those two lines in the pumproom. He had intended to load the kerosene, which was to go into 7 across and 8 wings, on the connection at 7 drop, and on the port line through the pumproom with the railroad diesel into 9 across and then 8 center. Forward on #5 drop (on the midships line), that is, at 5 drop, he was going to load the white gasoline and all of the Esso. The Esso Extra was to be loaded on the starboard line through the pumproom into 3 center and starboard, and then by that time, the white gasoline would have been on board. He would have been loading the Esso on the center line and it would just be a matter of opening the cross-overs. All tank hatch covers were dogged tight. Ullage opening covers were open wide on their hinges and all screens were in place.

8. At approximately 7:05 p.m., 29 March, an attempt was made to gravitate kerosene through the #7 drop connection into #8 port and starboard wing tanks. Only a small amount of kerosene entered, and it was found that a valve in the line ashore about one mile from the dock was closed. This was corrected and kerosene started into the two #8 wing tanks by gravity at about 7:25 p.m. The dock valve on the 16 inch line was opened only partially at this time.

During the time between 7:05 and 7:25 p.m., the Chief Mate in charge of loading went forward and started Esso (white gasoline) into #4 center tank by gravity and had the pump started on this cargo at 7:25 p.m. At approximately 7:32 p.m. the pump on the kerosene into #8 wing tanks was started.

9. At approximately 7:36 p.m. an explosion was heard and fire was seen at #8 port tank. This was described as two explosions close together. The first was dull followed by fire from the ullage opening, and the second was heavy and opened up the ship's side and deck. It was generally agreed by the witnesses that there were two explosions, but a disagreement on whether the first or second was the loudest.

10. Just prior to the explosion the weather conditions were normal. The skies were clear; the wind was light and variable; temperature approximately 70 degrees Fahrenheit; and relative humidity about 68 per cent. All machinery was operating normally, and no pumps or motors were being started or stopped, nor lights being turned on or off. No unusual or questionable activity was going on, on the ship, the dock, or water adjacent thereto.

11. It was estimated that at the time of the explosion kerosene was being delivered to the ESSO PATTERSON at a rate of 4000 gallons per minute, or 5700 barrels per hour by a 12 inch centrifugal pump driven by a 600 h.p. motor. Suction was from a full storage tank and the pump was up to full speed a few minutes prior to the explosion.

12. The kerosene being loaded was no different from that made by the Humble Oil Refinery in Baytown for last 5 years. The API gravity was 41.9; the flashpoint (closed cup test) was 135 degrees Fahrenheit; and the temperature in the storage tank at about 7:00 p.m. on 29 March 1956, was 74 degrees Fahrenheit.

13. The estimated amounts of cargo on board at time of explosion are as follows:

- 380 barrels of kerosene in #8 port tank (innage 3' 9")
- 370 barrels of kerosene in #8 starboard tank
- 2300 barrels of bunker C fuel in after fuel tanks
- 900 tons of bunker C fuel in forward deep tanks
- 967 barrels of white gasoline (Esso) in #4 center tank

14. The bottom of the lowest magnesium anodes were an estimated 3' 6" from the bottom of #8 port wing tank. There was an estimated 3' 9" of kerosene in this tank at the time of the explosion.

15. All firefighting equipment operated satisfactorily. The foam was the most effective agent used. Steam smothering, fog nozzles, water spray and solid stream were also used. The burning magnesium anodes were most difficult to extinguish.

16. The structural damage amounted to an estimated \$290,000.00 and was briefly as follows:

- (1) The deck plating and supporting members over #8 tanks were folded back inboard for about 18 feet from gunwale to the riveted doubler strengthening strap.
- (2) The side plating and structural members were severed at the #8 tank forward and after bulkheads down to the bilge strake riveted doubler strengthening strap and was folded down. (This had to be cut off before the ship could be drydocked).
- (3) The bulkhead between #8 port and #8 center tank was crumpled and blown out from the ship to port about 100 feet.

17. The connection of the static line to the ESSO PATERSON was poorly made and was ineffective. The ship end of the line was fitted with a 2 inch x 5 inch x 1/8 inch brass plate with a hole in the center for bolting to a pipe flange or other connection. This plate had been driven not too tightly into the space between the blank flange and the flange of the elbow on the deck where the old steam cargo heating line entered #7 starboard tank. The space was full of rust, scale and paint.

18. The cargo hose used on the ship was tested after the explosion and they were all found to be within safe limits for conductivity and pressures.

19. Witnesses interviewed were:

Henry J. Koenigs, Master, ESSO PATERSON
Lawrence B. Jones, Chief Engineer, ESSO PATERSON
Donald W. Ayers, Able Seaman, ESSO PATERSON
William T. Mulhall, Able Seaman, ESSO PATERSON
Howard E. Jackson, Able Seaman, ESSO PATERSON
Joseph E. Weller, Ordinary Seaman, ESSO PATERSON
Victor J. Jakubowski, Ordinary Seaman, ESSO PATERSON
James L. Gilmore, Ordinary Seaman, ESSO PATERSON
John Danko, First Ass't. Engineer, ESSO PATERSON
Jeremiah W. P. Dunlop, Oiler, ESSO PATERSON
Leoncio Munoz, Fireman/watertender, ESSO PATERSON
Charles A. Bujol, Oiler, ESSO PATERSON
Joe Garcia, Chief Pumpman, ESSO PATERSON

Name of Witnesses - continued.

Jack I. Motro, Second Punoman, ESSO PATERSON
Samuel P. McRoberts, Messman, ESSO PATERSON
John R. Combs, Petroleum Cargo Inspector, Humble Oil and Refining Co.
John H. Hacklin, Third Mate, ESSO PATERSON
Alfred R. Weatherington, Third Ass't. Engineer, ESSO PATERSON
Edward B. Kerby, Radio Operator, ESSO PATERSON
Delbert W. Lacy, Second Mate, ESSO PATERSON
James J. Spring, Jr. Third Mate, ESSO PATERSON
Jerome J. McElvey, Second Ass't. Engineer, ESSO PATERSON
Thomas G. Neal, Dockman, Humble Oil and Refining Co.
Herbert R. Atwood, Dockman Helper, Humble Oil and Refining Co.
W. R. Jones, Second Helper (gauger in gauging dept.), Humble Oil and Refining Co.
F. W. Leslie, Dock Helper, Humble Oil and Refining Co.
Herman J. Klossel, Supervisor (Shift Foreman) Humble Oil and Refining Co.
Joseph R. Nelson, Maintenance Engr., Humble Oil and Refining Co.
R. C. Odom, Electrician, Humble Oil and Refining Co.
Robert W. Presnal, General Foreman of Pumping and Gauging Dept., Humble Oil and Refining Co.
Charles J. G. Lesseman, Chemist, Humble Oil and Refining Co.
John P. Wiley, Ass't. Manager Operating Dept., Esso Shipping Co.
G. P. King, Watchman, L. D. Pierson Agency
Howard McCartney, Chief Mate, ESSO PATERSON

20. Immediately after the explosion, the Chief Mate climbed over the railing at #8 starboard tank, and hung on to the side of hull. The heat from the fire became so intense that the Mate was forced to let go his hold, and he fell to the dock breaking his left leg. He was taken to the San Jacinto Hospital, Baytown, Texas. The Second Punoman, did not know how he got off the ship, but the next thing he knew after the explosion he was in the water alongside the ship. He didn't know whether he was blown off the ship or lowered himself down by a line. He was also admitted to the San Jacinto Hospital, Baytown, Texas, for observation and was released from the hospital on 2 April 1956, fit for duty.

CONCLUSIONS

21. On 29 March 1956, between 7:30 p.m. and 7:40 p.m., while the ESSO PATERSON was moored starboard side to in berth #3 at Pier #2, Humble Oil and Refining Company docks, Baytown, Texas, an explosion and fire occurred in the #8 port and center tanks during loading operations causing severe damage to the hull structure. The source of ignition is unknown, however, it is believed to have been due to the discharge of the charge of static electricity; the static charge having been created by subjecting the kerosene to extreme turbulence.

22. As a result of the casualty two crew members were injured; the Chief Mate, Howard McCartney, Z-339479, and the Second Pumpman, Jack I. Netro, Z-415564.

23. The tanks were properly stripped and approved for loading by the Humble Oil, Tank Inspector, and all the usual and normal precautions were taken prior to and during the loading operations up to the point of the explosion, with the exception of the questionable static line connection.

24. All fire fighting equipment operated satisfactorily. The foam being the most effective agent used. The steam smothering, fog nozzles, water spray and solid stream were also used. The burning magnesium anodes were most difficult to extinguish, and foam was the most effective agent used on them.

25. Prompt and intelligent action by the Chief Engineer of the ESSO PATERSON, assisted by numerous crew members from all 3 ships at the Humble docks and by Humble employees probably prevented further explosions and untold damage.

26. There were no deaths as a result of this casualty.

27. There was no failure of machinery or other material defect of the ESSO PATERSON which caused or contributed to this casualty.

28. This casualty was not the result of any act of misconduct, incompetence, inattention to duty, culpable negligence, or violation of any law or regulation by licensed or certificated or other personnel of the ESSO PATERSON and, therefore, action under R. S. 4450, as amended, or assessment of any penalty is not applicable.

RECOMMENDATIONS

29. That complete technical data on the anode system be obtained and analyzed by qualified personnel to determine its possible association with this casualty.

30. That consideration be given to requiring that all tanks into which kerosene is to be loaded shall be gas freed or inerted prior to loading the kerosene.

31. That the Chief Engineer, Mr. Lawrence B. Jones, DT-12746, be tendered a letter commending him for his leadership and courage in combating the fire.

(signed) Claude H. Broach
CLAUDE H. BROACH
Captain, U. S. Coast Guard, Chairman

(signed) Robert B. Scott
ROBERT B. SCOTT
Commander, U. S. Coast Guard, Member

(signed) Charles F. Kaminski
CHARLES F. KAMINSKI
Commander, U. S. Coast Guard, Member
and Recorder