

UNITED STATES COAST GUARD

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



MVI
(GEORGE MacDONALD C-7 Bd)

4 AUG 1961

Commandant's Action

on

Marine Board of Investigation; engine room casualty on 27 June 1960 and subsequent foundering on 30 June 1960 of the SS GEORGE MacDONALD, approximately 165 miles east of Savannah

1. The record of the Marine Board of Investigation convened to investigate subject casualty including its Findings of Fact, Conclusions and Recommendations has been reviewed.
2. At about 1900, 27 June 1960, the SS GEORGE MacDONALD, a T-3 tank vessel, while approximately 165 miles east of Savannah, Georgia, suffered a ruptured water box on her main condenser which resulted in flooding of the after spaces and eventual foundering. All crew members were safely removed from the vessel before she went down.
3. The GEORGE MacDONALD was en route from Houston, Texas to Brooklyn, New York with a cargo of Bunker C fuel oil. All tanks were full except number 5 wings which were empty and numbers 1 and 7 centers which were slack.
4. On the morning of 27 June the electric motor driving the main circulating pump overheated. The auxiliary circulating and Butterworth pumps were placed on the main condenser, the engine slowed to 41 rpm, the main circulating pump secured and repairs commenced. At 1845 the motor was reassembled and ready for tests. The main circulating pump was started and the high injection partially opened. After two or three minutes of normal operation, the pump was speeded up and the motor arced severely. The pump was stopped and the high injection valve closed. The commutator and brush rigging were cleaned and again the motor was started while the first assistant engineer took position to observe the opening and closing of the relays. The starting coils engaged, the first and second automatic contacts closed and when the third contact closed the starting relay arced and opened. At the same time a sound described as a thump or explosion was heard and a 20 inch stream of water was observed flowing from the bottom of the outlet box on the starboard ejection end of the condenser. The auxiliary sea suction was closed and the main engine was secured. Two men went into the lower engine-room to close the 24 inch overboard valve. On this particular vessel the

valve stem pointed downward. The valve wheel turned freely but required about 60 turns to close. While the valve was being closed, the water continued to rise and the main generators were secured when the level reached the electrical ends of some of the pumps. When the water was between the knees and the ankles of the men closing the overboard valve, the chief engineer ordered the watertight door to the fireroom secured and the engineering spaces abandoned. The overboard valve was estimated to be between one-third and two-thirds closed at that time. The chief engineer attempted to start the auxiliary diesel generator but finding the switchboard badly burned, ceased his efforts. On deck the master ordered all watertight closures secured, sent a distress message, mustered the crew with life preservers and prepared to swing out boats. An attempt was made to gravitate cargo from number 8 tanks to the forward tanks and to the sea but when neither appeared to be successful the valves were closed. The flooding continued at a rapid rate until the water level in the engineroom reached the level of the sea. The flooding rate then decreased but the vessel continued to settle.

5. At 2058, 27 June, the ESSO SCRANTON arrived on the scene and 28 crew members were transferred by lifeboat. The master and 13 others remained aboard the MacDONALD. At approximately 2130 the destroyer escort USS ROBINSON arrived on the scene and offered to put damage control parties aboard and/or take her in tow but both offers were declined. The master had been advised by radio that the commercial tug SAVANNAH and the Sinclair tanker SS J. E. DYER were en route to take the MacDONALD in tow. At 0330 and at 0500, 28 June, 10 more crew members were removed by the ROBINSON leaving only the master, 2nd mate and one able seaman aboard. The SAVANNAH subsequently returned to port due to engine trouble and at 1530 on 28 June the J. E. DYER arrived on the scene and took the MacDONALD in tow. At 1730 the master and two remaining crew members were removed from the MacDONALD by the USCGC PAPA. At 0240 on 29 June the towline parted during poor visibility and when visual contact was again established only the bow of the MacDONALD was projecting above the surface. No further attempt was made to tow the MacDONALD and her bow remained above the water for approximately 24 hours and finally sank in 75 fathoms at about 0215 on 30 June.

REMARKS

1. Concurring with the Board, it is considered that the loss of the vessel resulted from a rupture of the outlet on the ejection end of the main condenser followed by uncontrolled flooding which eventually sank the ship.
2. The Board concluded that the cause of the condenser header box failure could not be determined but suggested the possibility of an unusual hydraulic or thermal shock. There is nothing in the record to support this conjecture nor does there appear to be any connection between the failure and the testing of the main circulating pump motor which was in progress at the time. The

Board made no determination of the age of the condenser although it was noted that the vessel itself was 17 years old at the time of the casualty. Of possible significance is the fact that examinations of condenser heads on vessels of similar type and age subsequent to this casualty have disclosed instances of advanced wastage. While the testimony would tend to discount the possibility of wastage in this case the seriousness of this type of casualty dictates the need for a thorough examination of the condenser heads of older vessels on every occasion when opened for inspection and renewal of zinc or mild steel plates. Navigation and Vessel Inspection Circular No. 4-61 dealing with this subject was promulgated on 18 May 1961.

3. The Board expressed the opinion that the chief engineer's order to abandon the engineroom was premature but did not constitute actionable fault. This opinion is concurred in. Although each turn of the ejection valve would have resulted in a corresponding reduction in the flooding rate, recognizing the possibility that crew members might have been trapped in the space if delayed too long, the order to abandon the engineroom given in the stress of the emergency cannot be criticized.

4. The Board's opinion that the decision of the master to refuse the assistance of a damage control party offered by the USS ROBINSON demonstrated good judgment and seamanship is not concurred in. After the water in the engineroom reached the level of the sea it should have been readily apparent to the master that the vessel was not going to sink unless the flooding progressed to other compartments. With the engineroom flooded, only the fireroom, the pumproom, the cofferdams and the steering engineroom remained to provide the buoyancy necessary to keep the vessel's stern section afloat. Aside from the unsuccessful attempts to gravitate cargo from number 8 tanks the record reflects that the only other damage control measures consisted of closing watertight doors and ports. When the vessel continued to settle thereafter, the only reasonable conclusion which could have been reached was that flooding of other spaces was in progress. Having apparently exhausted his own resources and recognizing that Navy personnel are especially trained in damage control, it is considered that the master should have availed himself of the Navy's offer of damage control assistance despite any reservations he may have had as to its ultimate success.

5. The Board further considered that the decision of the master to decline the Navy's offer of a tow was an error in judgment. This suggests that the master's decision under the existing conditions and in the light of what was then known was consistent with the principles of good seamanship. Such a view is not supported by the record. The master knew his vessel was settling steadily from the outset and must have recognized that it was just a matter of time before she would founder. Other than the fact that he had received word from his company that a vessel was en route to take the MacDONALD in tow he offered no justification for refusing the ROBINSON's offer. His statements in the record that his vessel's midship section would

have been subjected to a severe stress due to the necessity for changing course upon being taken in tow and the Board's suggestion that towing by the ROBINSON might have accelerated the flooding are not compelling arguments in view of the fact that these possibilities would still have to be faced when the company vessel arrived.

6. Based on this casualty the Board recommended that the low suction and the overboard valve on the main condenser on all T-2 and T-3 tank ships be provided with means for manual closing from a point at least 30 feet above the keel. If valid, this recommendation should not be restricted to tank ships but should be applied to all vessels similiary equipped; however, such a requirement is not considered justified either by this case or by prior casualty experience. The likelihood of the repetition of the gross failure that occurred in this instance is remote and if owners and operating personnel embark on a conscientious program of regular examinations and maintenance of the main condenser, associated piping and valves, no other action should be necessary to prevent recurrence.

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



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

UNITED STATES COAST GUARD

ADDRESS REPLY TO:
COMMANDER
7TH COAST GUARD DISTRICT
150 S. E. THIRD AVE.
MIAMI 32, FLA.



A25

JUN 28 1960

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

Subj: SS GEORGE MAC DONALD, O.N. 251237; sinking of on 30 June 1960
in the Atlantic Ocean

Findings of Facts:

1. The SS GEORGE MAC DONALD, O.N. 251237, a T3 tankship, while on a voyage from Houston, Texas, to Brooklyn, New York, suffered a broken water box on her main condenser at approximately 1900 on 27 June 1960. The vessel was taken in tow at 1630 on 28 June 1960, by the SS J.E. DYER, but at approximately 0240 on 29 June 1960, the tow lines parted and the stern of the SS GEORGE MAC DONALD sank in seventy-five fathoms of water. The bow of the vessel sank several hours later. No lives were lost in the casualty, and only one relatively minor injury was suffered by crew members or assisting personnel.

2. The SS GEORGE MAC DONALD was a T3 tank vessel owned and operated by the Sinclair Refining Co., 600 Fifth Avenue, New York 20, N.Y. The vessel was built by the Bethlehem Ship Building Corporation, at Sparrow Point, Maryland, in 1943. The vessel was last inspected at Jacksonville, Florida, on 28 January 1959, and last dry docked 7 August 1959, at Jacksonville, Florida. The vessel was propelled by a single screw. She was fitted with two watertube boilers supplying steam at 450 p.s.i. and 750° F superheat. Other particulars of the vessel follow:

Gross tonnage	10,164
Net tonnage	6,113
Dimensions	501' x 68' x 37'
Shaft Horsepower	7,700

3. The vessel departed Houston, Texas with approximately 102,000 barrels of bunker C fuel oil as cargo on 27 June 1960. All tanks were full (3'6" ullage) except #5 wing tanks which were empty, and #1 and #7 centers, which were slack. The vessel had on board 4400 barrels of bunkers in her after fuel tanks. The draft forward was 30.06 aft 31.02. The after peak was full of fresh water, 91 tons, and there was an additional 103 tons of fresh water in double bottoms, domestic tanks and distilled tanks. At noon on 27 June, the vessel had 3360 barrels of bunkers and 100 tons of fresh water remaining on board.

4. Following hereto is a list of officers and crew members who were aboard the vessel on her last voyage, and who have significant knowledge of the casualty:

Perry Lowe	1st Mt	1325 9th St., Port Arthur, Texas
Roy Thomaston	2nd Mt	5007 Chester Ave., Philadelphia, Pa.
Charles White	Ch Engr	2204 San Jacinto, Pasadena, Texas
William Schell	1st Engr	2614 Franklin Ave., New Orleans, La.
Charles Foreman	2nd Engr	1504 Market St. Loop, Baytown, Texas
Lee Gaskin	3rd Engr	723 Blackwell Ave., LaPorte, Texas
Oscar Pearce	Rad. Off.	1816 Elmen, Apt. #5, Houston, Texas
Stanley Anderson	BOSN	44 Dennett St., Portland, Maine
Robert Manville	A B	Seamans General Del. New Orleans, La.
Frank Petties	A B	711 E. 103rd Pl., Los Angeles, Calif.
Peter Long	O S	5201 Spencer Hwy., So. Houston, Texas
O'Neil Bush	A B	1329 Waco Ave., Port Arthur, Texas
Vernon Haar	A B	3104 Overhill Dr., Jacksonville, Fla.
Reno Rivers	A B	4519 S. Cameron Ave., Tampa, Fla.
Nick Barbieri	CH Pump	1019 Market St., Marcus Hook, Pa.
Randolph Thomas	2nd Pump	326 Market St., Marcus Hook, Pa.
Thomas Dallas	Oiler	2416 Wentworth St., Houston, Texas

Other crew members aboard the vessel are set forth in the crew list, Exhibit "0".

5. The SS GEORGE MAC DONALD was driven by a cross compound geared turbine. The turbine exhausted into a condenser located below and forward of the main turbines. The condenser was of single pass construction, with a conventional steel shell, and tubesheets secured across the ends of the shell with the tubes inserted between the headers. Grey cast iron boxes were bolted across the header on both the inlet and the outlet side. These cast iron boxes provided space for injecting and ejecting cooling water into and out of the condenser. These grey iron castings comprising the boxes were originally 1-3/8" thick. Openings, closed by bolted covers, provided access to the interior of the boxes. Swedish iron plates were secured to these covers, and were renewed at regular intervals. Nozzles of approximately 2 1/4" diameter were cast as part of the boxes.

6. Engineering records indicate no abnormal corrosion or other significant phenomena concerning these boxes. They were last opened on 5 May 1960. The interior appearance was then normal. The protective material which had been applied at the vessel's last dry docking on 7 August 1959, still covered most of the interior surfaces. The heads showed corrosion in scattered pits, one to two inches in diameter with maximum depth of 1/4". Maintenance of the boxes consisted of cleaning and painting with various protective compounds. No grooving was ever noted in the boxes.

7. The box on the outlet (starboard) side of the condenser was connected on top to a 2 1/4" ejection line which rose 5' from the top of the outlet box and ran outboard to the ship's starboard side through a 2 1/4" main overboard discharge valve. The overboard discharge was approximately 18' above the keel. The stem of this valve was pointed directly down. It required 50 or 60 turns to close.

8. The box on the inlet side was connected through the bottom to a 2 1/4" inlet pipe which connected through conventional piping to the main and auxiliary circulating pumps, and the Butterworth service pump. The main circulating pump was an electrically driven centrifugal pump. The main pump shaft was vertical, with the motor on top and pump on the lower end of shaft. The suction for this pump was taken through the ship's main high and low suctions which were located on the port side of the lower engine room. The low suction was approximately 7 1/2' above the keel. The high suction was approximately 18' above the keel.

9. Between the main circulating pump discharge and the condenser inlet box, a line from the auxiliary circulating pump entered the injection line. The Butterworth service pump also discharged into this line. Both the auxiliary circulating pump and the Butterworth pump took sea suction from an auxiliary sea chest located at frame 30, approximately 6' above the keel. It is to be noted that when the Butterworth and auxiliary circulating pumps were serving the main condenser with the main circulating pump stopped and either the high or low sea suction open, water could be pumped out through these injection valves instead of flowing on through the condenser.

10. The vessel had eight main cargo tanks which are each subdivided into three individual tanks by two longitudinal bulkheads installed throughout the cargo spaces. Forward of the cargo tank was a pumproom, dry cargo hold, storage spaces and a forepeak tank. These spaces are not considered significant.

11. The following large watertight spaces were located aft of the cargo tanks.

a. Pumproom, access by dogged door on after side of pumproom house. There were skylights on top of the pumproom house.

b. Cofferdams outboard of pumproom. Access was by small circular hatches fitted on the main deck approximately 3' high. Pressure vacuum valves were fitted on top of the hatches.

c. Engine room. Access was from main deck by non-watertight doors, and from the fire room by watertight doors.

d. Boiler room. Access from engine room through watertight doors and from main deck level through non-watertight doors.

e. Steering engine room accessible only through watertight doors.

f. Engine room double bottoms, access through piping, vents, and bolted manholes.

g. Afterpeak tank. Accessible only through bolted manholes.

It is noted that the main cargo pump motors were located in the engine room, and that the pump shafts penetrated the bulkhead between engine and pump rooms. A gland fitted with flax packing, protected the watertight integrity of this bulkhead where the pump shaft passed through. Considerable leakage was observed through these glands after the engine room was flooded.

12. The weather at the time of the fracture (1900 27 June 1960, 32.03 N 77.55 W) was wind velocity 18, direction 040°

2400	27 June	wind velocity	16	130°
0400	28 June	wind velocity	14	120°
0800	28 June	wind velocity	15	030°
1200	28 June	wind velocity	15	270°
1600	28 June	wind velocity	15	180°
2000	28 June	wind velocity	10	200°
2400	28 June	wind velocity	10	210°

The weather observations above are from the log of the USS ROBINSON. This vessel stood by the SS GEORGE MAC DONALD from approximately 2100 on 27 June to 1000 on 28 June. During all relevant times the USS ROBINSON was 20 to 50 miles from the SS GEORGE MAC DONALD.

13. The visibility throughout the period from 1900 27 June to 0200 29 June was good, except for normal darkness and a period of some two hours prior to the ultimate sinking of the SS GEORGE MAC DONALD, at which time heavy rain squalls interfered with both visual and radar observation of the SS GEORGE MAC DONALD.

14. At 0600 on 27 June, the electric motor driving the main circulating pump overheated. The auxiliary circulating and Butterworth pumps were placed on the main condenser, the engine slowed to 41 rpm, the main circulating pump secured, and repairs commenced. At 1845, the motor was reassembled and ready for test.

15. During all the sequence of events set forth below, Charles White, Ch Engr., was in the engine room and in direct control of operations. The main circulating pump was started and the high injection partially opened. After 2 or 3 minutes of normal operation the pump was speeded up and it then arced severely. The pump was stopped and the high injection valve closed. Further attempts were made to clean the commutator and brush rigging, and it was then decided to attempt to start the motor while observing the action of the starting relays. The cover of the relay box was removed and William Schell, 1st Engr., stationed in a position to observe the opening and closing of the relays actuated by the starting currents. Mr. Schell observed the starting coils engage, the first and second automatic contacts close, but when the third contact closed the starting relay arced, and opened. At that time a sound was heard variously

described as a thump, a bang, an explosion. A large amount of water was observed flowing from the bottom of the outlet box on the starboard ejection end of the condenser.

16. Estimates of time as to the succeeding events vary widely, and are of little value but all witnesses agree on the following events and their sequence. The Ch Engr., White, started to secure and brake down the main engine. The 1st Engr., Schell and the 3rd Engr., Gaskin, started to close the overboard discharge valve. The 2nd Engr., Foreman, went to the lower engine room and observed the rapidly rising water. The 4-8 oiler, Dallas, was instructed to close the auxiliary sea valve. When the valve was partially closed, the 2nd Engr., Foreman, ordered the oiler to the operating flat and finished closing the auxiliary sea suction himself. Foreman then returned to the operating flat and requested permission from the Chief to secure the main generators, as salt water had reached the electrical end of some pumps. The Chief consented and when Foreman secured the generator, ordered Schell and Gaskin to abandon the overboard valve and leave the engine room. All of the engineers then departed the engine room by way of the fire room, securing the watertight doors behind them. The Chief Engineer then attempted to start the auxiliary diesel generator, but desisted when he noted that the auxiliary generator switchboard was critically burned.

17. When Schell and Gaskin left the overboard valve it was closing freely, and was estimated to have been one-third to two-thirds closed. The water was then between Gaskin's knees and his ankles. Gaskin was standing on pipes 18" to 24" above the floor plates of the lower engine room.

18. The flooding of the engine room was rapid. The water was within 10' of the outside water level within 20 minutes after the fracture. The Master, Burnthorn, when advised of the fracture by the Ch Engr. instructed the deck watch officer to obtain the ship's position and departed to examine the engine room. He instructed the radio operator to send a distress signal, and ordered the deck officers to muster the crew with life preservers, and to prepare to swing out boats. The whole crew assisted in closing watertight doors, portlights, deadlights and all other openings throughout the ship.

19. Attempts were made at this time to gravitate cargo from #8 and other after tanks to the sea, or to forward tanks. The attempts were unsuccessful as the trim of the vessel was such that the after tanks would flow neither to the forward tanks nor to the sea.

20. The flooding continued at a rapid rate until such time as the water level in the engine room was level with the sea. The rate of flooding decreased, but the vessel at all times between the fracture and getting underway under tow, continued to flood at a significant rate.

21. At 2058, the SS ESSO SCRANTON arrived on the scene. At 2150 and 2235, twenty-eight crew members were transferred via life boat, to the SS ESSO SCRANTON. The Master, Chief Mate, and Second Mate, two Third Mates, Chief Engineer, Radio Officer, six A Bs and the Second Pumpman remained aboard the SS GEORGE MAC DONALD.
22. At approximately 2130, the USS ROBINSON arrived on the scene and her Commanding Officer was designated On Scene Commander. The USS ROBINSON offered to put damage control parties aboard the SS GEORGE MAC DONALD and/or to take her in tow. Both offers were declined.
23. During the night the polypropylene tow lines aboard the SS GEORGE MAC DONALD were broken out by the party aboard the SS GEORGE MAC DONALD and stowed on the forecastle head. It was also discovered that a skylight in the pump room was defective and was not completely closed. At 0330, nine more crew members were taken aboard the USS ROBINSON. At 0500, three more men were transferred to the USS ROBINSON. This left the Master, Second Mate, and one A B aboard the SS GEORGE MAC DONALD. The emergency batteries failed at approximately 0500 on 28 June, after having produced sufficient current to operate the emergency transmitters for a period of approximately 10 hours of almost continuous service.
24. At 0830, USCGC 95313, arrived on scene. At 0900, USCGC PAPA W, arrived and at 1000 relieved USS ROBINSON as On Scene Commander.
25. The ETA of the Tug SAVANNAH was 1300 28 June, and the SS J. E. DYER, 1100 28 June. The Tug SAVANNAH had engine trouble and returned to Savannah. The Sinclair Refining Company's vessel SS J. E. DYER arrived On Scene at 1400 and prepared to take the SS GEORGE MAC DONALD in tow. At 1530 one tow line was secured and at 1558 the second hawser was made fast. At 1635 the SS J. E. DYER took a strain on the tow lines and started for Charleston Harbor entrance. Estimated speed of the tow was three to four knots. It is to be noted that the SS GEORGE MAC DONALD had ten degrees left rudder when power failed and the rudder remained locked in this position.
26. A considerable height of water built up immediately forward of the poop deck, and this water sometimes raised to a height above the pump room skylight. Some and possibly considerable, flooding of the pump room occurred through the defective pump room skylight.
27. At 1730, on the 28 June, a boat from the USCGC PAPA W removed the Master and two remaining crew members from the SS GEORGE MAC DONALD. The SS GEORGE MAC DONALD was kept under observation by illumination with searchlights and by radar observation. There were occasional heavy rain squalls and neither visual nor radar contact with the SS GEORGE MAC DONALD was continuous.

28. At 0240, on 29 June, the tow line parted. Visual contact had been lost and the image representing the SS GEORGE MAC DONALD on the SS J. E. DYER's radar screen gradually diminished. The visibility improved and when visual contact with the SS GEORGE MAC DONALD was reestablished, her bow was discovered projecting above the surface of the sea at position 32°25' N, 78°50' W.

29. The bow of the SS GEORGE MAC DONALD remained afloat for approximately 24 hours and finally sank at or about 0215 on 30 June. All crew members of the SS GEORGE MAC DONALD were then placed aboard the SS J. E. DYER. This vessel proceeded to Jacksonville and disembarked all crew members except the Third Mate, Henry Robinson, who injured his leg while transferring from USCGC PAPA W towards the SS J.E. DYER. Mr. Robinson remained aboard the USCGC PAPA W and was put ashore at Charleston, S.C.

30. After the ultimate sinking of the SS GEORGE MAC DONALD the Commanding Officer of the USS ROBINSON advised that, had the SS GEORGE MAC DONALD accepted damage control assistance and/or a tow offered by the USS ROBINSON the SS GEORGE MAC DONALD would have been saved. This opinion appeared to be based upon the Commanding Officer's belief that the USS ROBINSON could have placed enough dewatering equipment aboard the SS GEORGE MAC DONALD to stop or to slow down the critical flooding and appeared to be based upon the elapsed time between the time an offer was made to tow by the USS ROBINSON and the time the SS J.E. DYER eventually took the SS GEORGE MAC DONALD in tow, an interval of some 15½ hours.

31. The SS GEORGE MAC DONALD was insured for \$945,250.00, and her cargo for \$161,076.69. Total \$1,106,326.69.

32. Witnesses other than crew members interviewed by the Board of Investigation were:

CDR Walter P. Smiley, USN
Commanding Officer, USS ROBINSON
c/o Commander, 6th Naval District
Charleston, South Carolina

LCDR Maurice V. Hawley, USN
Executive Officer, USS ROBINSON
c/o Commander, 6th Naval District
Charleston, South Carolina

LTJG William H. Higgins, USN
Engineering Officer, USS ROBINSON
c/o Commander, 6th Naval District
Charleston, South Carolina

Thurland T. Wilkensen, Mgr. of Engineering Dept.
Sinclair Refining Co., 600 Fifth Avenue,
New York 20, New York

Conclusions:

33. It is the opinion of the Board that the vessel was lost as a direct result of the fracture of the outlet box on the ejection end of the main condenser. Unexpected leakage into presumed watertight compartments was a contributing factor.

34. The cause of the fracture of the condenser header box cannot be ascertained from data currently available. The amount of corrosion observed at the last examination of 5 May, was well within tolerable limits and breakdown because of corrosion without some severe aggravating factor or factors appears highly improbable. The condenser was operating at above normal temperatures when the fracture occurred. From this fact, and from data observed at the time of the fracture, a strong presumption arises that this box was subjected to unusual hydraulic or thermal shock. The evidence is conclusive in that the box did not suffer any mechanical shock such as a blow or stress. The Board is, therefore, of the opinion that the box suffered a thermal or hydraulic shock which coupled with normal corrosion and possibly a latent defect in the casting caused the fracture. The cause of such shock is unknown. Many theories have been advanced as to the cause of this shock. Some are possible, but all are improbable. Speculation with the meager data available is futile.

35. It is particularly noted that the vessel probably submerged the afterpart of her main deck immediately upon the completion of the engine room flooding. As the watertight integrity between engine and firerooms only extended to the main deck, flooding of the fireroom could be anticipated and apparently took place. It is also noted that under these conditions additional flooding might be anticipated on any T-3 vessel, both into the fireroom and into the cofferdams outboard of the pump rooms, and into the after peak and double bottom tanks. On the SS GEORGE MAC DONALD there was additionally significant leakage around the packing glands on the shafts of the main cargo pumps where they penetrated the bulkhead between engine room and pumproom, and a defective skylight in the pumproom. These conditions resulted in considerable and possibly critical flooding of the pumproom. As the crew's quarters, and other spaces in the poop of the vessel would be flooded through the engine room, once the main deck was submerged, the only space remaining in the after part of the vessel with effective watertight integrity would have been the steering engine room. This space alone did not have sufficient buoyancy to keep the vessel afloat when other after compartments were flooded.

36. The attempted salvage operations require little comment. The ten degree angle of the rudder caused the vessel to sheer occasionally, and complicated the towing problem. The fact that the amount of water in the pumproom increased materially between the time the vessel was taken in tow, and the time the Master and the remaining crew members were transferred to the SS J.E. DYER is considered significant.

37. Examination of the location of the ejection valve on a sister vessel, the SS ESSO HARTFORD, where the ejection valve stem points upwards instead of down, demonstrated that this valve can be closed with the water level at 12', or more, higher than the valve can be closed on the SS GEORGE MAC DONALD.

38. The Board is of the opinion that had the overboard valve on the SS GEORGE MAC DONALD pointed upward, the vessel would not have been lost, and flooding would have been confined to the lower engine room.

39. In view of the opinion set forth by the Commanding Officer, of the USS ROBINSON a detailed evaluation of the performance of duty by the vessel's Master and Chief Engineer is considered appropriate. The Master was in immediate and effective control of all operations directed towards the salvage of the vessel, and the rescue of the crew. He expressed satisfaction with the performance of duty by deck officers and men. It is therefore apparent that the Master alone is responsible for all critical decisions during salvage and rescue operations. Similarly, the Ch Engr. was in on-the-spot control in the engine room during the critical few minutes immediately after fracture of the water box, and he (the Chief) indicated that all orders given to the engineers and oiler in the engine room were carried out to his satisfaction. The Chief alone must bear responsibility for the actions of the engine room crew during this emergency.

40. In evaluating the Master's competency and performance of duty, the appraisal readily breaks down into three areas below:

a. Action taken after casualty to obtain assistance, secure the vessel, and place the officers and men in security, in accepting a tow from the SS J.E. DYER, and in finally abandoning the vessel.

b. The decision of the Master to refuse naval damage control parties when the assistance was offered by the Commanding Officer of the USS ROBINSON.

c. The refusal of a tow of the SS GEORGE MAC DONALD by the USS ROBINSON when it was offered at approximately 2230, on 27 June 1960.

41. The Board considers the actions of the Master in reference to (a) above to have demonstrated excellent seamanship. All watertight closures which could be reached were closed immediately. The crew were ordered to obtain life jackets, and to muster at a relatively safe place. Boats were swung out and made ready. The crew were disembarked with no panic or accidents. The Master remained aboard and in control of the vessel until it was obvious that remaining aboard longer could serve no useful purpose. The Board considers the Master to have fully and competently discharged his duty in this respect.

42. The Board considers the Master's decision to refuse the assistance of damage control parties from the USS ROBINSON to have been basically sound. It was

obvious that dewatering operations in the engine room would have been futile unless the overboard discharge valve was closed or plugged, an operation which did not appear practical. Dewatering the pumproom, fireroom, or steering engine room would have been hazardous and difficult. Getting pumps into these spaces would have been dangerous, and opening the spaces to enter pumps might well have permitted the entrance of critical amounts of water. Getting equipment aboard the SS GEORGE MAC DONALD would have been dangerous to personnel, as boats alongside the SS GEORGE MAC DONALD would have moved excessively in relation to her sheer strakes. Dewatering operations to have been effective would have required a large source of power, and no such source was available except from the USS ROBINSON. In view of the extreme submersion of the SS GEORGE MAC DONALD and the resulting immobility of the vessel, any attempt to bring a thin skinned vessel, responsive to wave action, such as the USS ROBINSON, alongside the SS GEORGE MAC DONALD, would have been an unacceptable risk. The Board is of the opinion that the decision of the Master to refuse the offered assistance demonstrated good judgment and seamanship.

43. The Board considers the refusal of the Master to accept a tow as an error in judgment. The refusal appears to have been justified when the offer was made originally, as it was then dark and evaluation of the vessel's situation was difficult. However, the acceptance of a tow from the USS ROBINSON after daylight on 28 June, would have improved the vessel's chances of survival considerably, and it appears that the minimum result which would have been achieved, would have been to get the SS GEORGE MAC DONALD to a shallow area.

44. In view of the anticipated arrival of other assistance, the favorable weather report, and the possibility that the flooding which eventually sank the SS GEORGE MAC DONALD may have been accelerated by towing, the Board does not consider this error of judgment by the Master to have been a gross error and does not believe that action under R. S. 4450, as amended, is warranted.

45. The Board considers that the critical fracture was not due to any action or lack of action by engine room personnel. The procedures taken to repair the defective main circulating pump were consistent with good marine practice. On only one point does there appear to be some question as to the performance of duty by engine room personnel, and that is in the failure to close the overboard discharge valve after the fracture. It was or should have been obvious to trained marine engineers that successful closure of the ejection valve would have restored the watertight integrity of the engine room. The valve was closing freely, and the water was not at a dangerous level. Conversely, the area was poorly lighted and evacuation in the dark might have been dangerous to personnel as the water level rose.

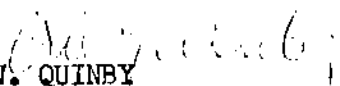
46. Evaluating all factors, the Board is of the opinion that the Ch Engr.'s order to abandon the engine room was premature, but the Board does not believe action under R. S. 4450, as amended, is warranted.

Recommendations:

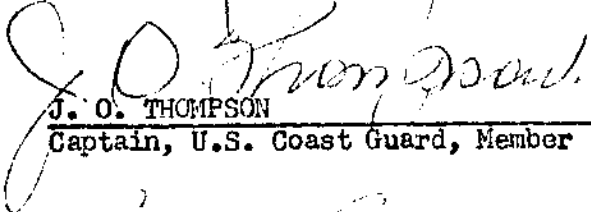
47. It is the recommendation of the Board that all T-2 and T-3 tankships have the main condenser water service so installed that the main low suction and the main overboard valve can be manually closed from a point at least 30' above the keel.

48. It is the recommendation of the Board that if the SS GEORGE MAC DONALD is ever salvaged, the fractured head of the main condenser water box be subjected to such chemical and metallurgical examination as may be necessary to determine the cause of the fracture.

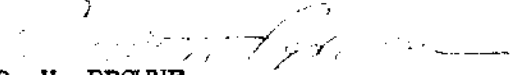
49. Subject to the recommendations above, the Board recommends that this case be closed with no further action.


C. W. QUINBY

Captain, U.S. Coast Guard, Chairman


J. O. THOMPSON

Captain, U.S. Coast Guard, Member


P. H. BROWNE

Commander, U.S. Coast Guard Reserve,
(Retired), Member and Recorder