

#18 vcl6

UNITED STATES COAST GUARD

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



MVI
(CARL D. BRADLEY a-9 Bd)
7 JUL 1959

Commandant's Action

on

Marine Board of Investigation; foundering of the
SS CARL D. BRADLEY, Lake Michigan, 18 November
1958 with loss of life

1. The record of the Marine Board of Investigation convened to investigate subject casualty together with its Findings of Fact, Opinions and Recommendations has been reviewed.

2. The SS CARL D. BRADLEY, Official Number 226776, a self-unloading bulk freighter of 10,028 gross tons, built in 1927, departed Gary, Indiana, on 17 November 1958 en route to Calcite, Michigan, in ballast. At the time of departure the wind was 25 - 35 MPH from the south and the weather forecast was for whole gale winds, 50 to 65 MPH from the south shifting to the southwest. The BRADLEY proceeded up the Wisconsin shore at distances off varying from 5 to 12 miles. Although the wind velocity increased during the period, sea conditions were not considered severe and the vessel was riding smoothly. Sometime early in the afternoon of 18 November in the vicinity of Cana Island course was altered to 046 degrees True to cross Lake Michigan toward Lansing Shoal. While proceeding on this course the wind reached a velocity of 60 to 65 MPH from the southwest. The speed of the vessel was between 14 and 15 knots. The seas were slightly on the starboard quarter and according to the Chief Mate, who was on watch at the time of the casualty and was one of the two survivors, the seas were estimated to be 20 feet in height with 50 to 75 feet between the crests. The vessel continued to ride smoothly, however, both as to roll and to pitch. At 1730 just at dusk while still on course 046 a noise described as a thud followed by a vibration was heard. The Chief Mate looked aft and saw the stern of the vessel sagging and it was immediately realized that the vessel was in serious trouble. The general alarm was sounded and the crew prepared to abandon ship. Distress calls on the radio-telephone were made by the Chief Mate who gave the vessel's position as 12 miles southwest of Gull Island Light. These calls were received by several radio stations, both commercial and Coast Guard. Within two or three minutes the BRADLEY heaved upward near No. 10 hatch, which is approximately amidships, and broke in two. The bow settled from aft, then rolled over and sank. The liferaft stowed forward which was being readied floated free. The stern settled from forward, then plunged with a flash of flame and smoke as the water reached the boiler room. Four crew members managed to board the liferaft immediately after the casualty but two were lost during the night.

3. A 254' German cargo vessel, the M/V CRISTIAN SARTORI, was approximately four miles from the BRADLEY at the time of the casualty and observed the flash of flame from which she concluded the BRADLEY had exploded. Course was immediately altered for the scene but due to the adverse sea conditions she did not arrive at the estimated position of the sinking until approximately one and one-half hours later.

4. Coast Guard air and surface units, assisted by the SARTORI until 0200, 19 November, searched the area throughout the night with the aircraft providing flare illumination. Weather conditions and darkness severely handicapped the search and it was not until 0825, 19 November, that the raft carrying the only two survivors was located. After daybreak eight other merchant vessels joined the search. Later in the morning the lifeboat from the after end of the BRADLEY was located in an overturned condition. Of the thirty-five persons reported to have been aboard the BRADLEY there were, in addition to the two survivors, eighteen bodies recovered. Fifteen are still missing and are presumed dead. At the present time efforts to locate and identify the wreck of the BRADLEY are still continuing.

REMARKS

1. Concurring with the Board, it is considered that the BRADLEY did not strike Boulder Reef but rather that she broke in two and the eruption of steam and combustible materials as she went down gave rise to the mistaken assumption on the part of the CRISTIAN SARTORI witnesses that the vessel exploded.

2. Although in all probability the vessel broke in hogging, the implication in the Board's conclusion that the fracture resulted because the vessel encountered an unusual wave condition while in ballast is not supported in the record. In the absence of any evidence of improper or unusual ballasting such reasoning would necessarily require an assumption that the waves were unique in the vessel's twenty-one year history of navigation in the Great Lakes. This premise and the conclusion must therefore be rejected, particularly in view of the survivors' description of how smoothly the vessel was riding; a point of which the Board took special note and which was further supported by the statement of the Second Mate of the SS JOHNSTOWN. For this reason the Board's conclusion that the Master of the BRADLEY exercised poor judgment in proceeding across northern Lake Michigan from Cana Island toward Lansing Shoal is also disapproved.

3. The Board has offered no other conclusions as to the possible cause of this disaster and an exhaustive review of the record has likewise failed to yield any positive determinations in this regard. Contrary to the Board's opinions, however, the following factors may have had some causal connection and cannot be discounted merely for the lack of probative evidence:

a. The unexplained presence of the hairline cracks discovered in the vessel's underbody amidships during drydocking in Chicago in May 1957 strongly suggest the possibility of structural weakness.

b. The two unreported groundings experienced by the BRADLEY in the spring of 1958 and November of 1958 may have introduced unusual hull stresses. It is because such possibilities exist that 46 CFR 136.05-1 requires a Notice of Marine Casualty to be filed with the Coast Guard in all cases of stranding or grounding whether or not there is apparent damage.

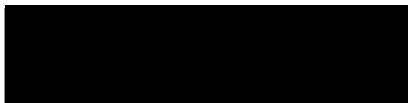
c. The extensive renewal of cargo hold side slopes, screen bulkheads and tank tops planned by the company for the 1958 - 1959 winter lay-up is in itself indicative of wear and deterioration and raises the obvious question as to the general condition of the vessel's structure.

The possibilities raised by the foregoing coupled with the fact that the vessel broke up and foundered under conditions which, while severe, she should easily have been able to weather, leads inevitably to the conclusion that the vessel had developed an undetected structural weakness or defect. Due to the significance of such a possibility, particularly with respect to other vessels of similar design and vintage, consideration will be given to the initiation of an underwater survey of the BRADLEY depending, of course, on when and where the vessel is ultimately located and any other practical aspects which might limit the benefits to be derived from such examination.

4. Regardless of any other determinations, this casualty has emphasized the need for the program of technical evaluation to determine if there is any evidence of structural defects in other vessels of the Great Lakes fleet. Such a program has been initiated. In addition, a reappraisal of present inspection procedures as applied to Great Lakes vessels is indicated looking toward the adoption of such standards and methods that will increase the likelihood of early detection of possible structural weaknesses particularly in the case of the older vessels. The Commander, Ninth Coast Guard District has been directed to make such a study with due regard for the peculiarities and problems attendant to the seasonal operation of Great Lakes vessels. In the course of such study the Commander, Ninth Coast Guard District has been directed to adopt any reasonable procedure within the framework of present laws and regulations and to make further recommendations for any legislative or regulatory changes which appear necessary. Finally, it is considered that this casualty has dictated a need for owners and operators to re-examine their responsibilities to establish and maintain safe operating and maintenance standards.

5. The Board's recommendations concerning life jacket crotch straps, an additional liferaft, lifeboat mechanical disengaging apparatus, lifeboat painters and parachute type distress signals merit further consideration and will be made the subject of study by the Merchant Marine Council.

6. 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

After full and mature deliberation, the board finds as follows:

FINDINGS OF FACT

1. The particulars on SS CARL D. BRADLEY:

Name: CARL D. BRADLEY
Owner: Michigan Limestone Division, U.S. Steel Corporation
Official No.: 226776
Tonnage: 10028 Gross; 7706 Net
Home Port: New York
Type Vessel: Self-unloading bulk freighter
Dimensions: 623' x 65' x 33'
Propulsion: Steam, single screw, turbo-electrical, two Foster-Wheeler boilers 450#
Classification: Lloyd's Register of Shipping, 100AL and LMC
Builder: American Shipbuilding Company, Lorain, Ohio, yard, 1927, hull number 797
Master: [REDACTED]
Chief Engineer: [REDACTED]

2. The CARL D. BRADLEY was given her last annual inspection at Calcite, Michigan, by Commander Mark L. Hocking and Lieutenant [REDACTED], inspectors from the OCMI Office, St. Ignace, Michigan. This inspection started on 30 January 1958 and was completed on 17 April 1958, and a certificate of inspection was issued on that date.

3. The CARL D. BRADLEY had an established load line. The current certificate issued by Lloyd's Register of Shipping was last endorsed on 26 February 1958 by Mr. [REDACTED] and [REDACTED] surveyors.

4. During the 1957-58 winter lay-up, miscellaneous cargo hold repairs were effected. These included the replacement of deteriorated and loose rivets by carriage bolts in the hopper side slope plates. Although the Coast Guard had not given prior approval to these repairs, they were considered adequate by Lieutenant [REDACTED] when he viewed the work in progress. These repairs were later reported by the Master to be holding satisfactorily, and there was no report of leaking in the side tanks during the 1958 season.

5. The CARL D. BRADLEY was scheduled for extensive cargo hold renewal and replacement during the 1958-59 winter lay-up. This work was to be performed at Manitowoc Shipbuilding Company, Manitowoc, Wisconsin, and was to consist primarily of the reconstruction of the tank top, renewal of the cargo hold side slopes and screen bulkheads, and the installation of a centerline bulkhead between frames 32 and 170, as shown on H. C. Downer and Associates Drawings YD 411-S9-3-1 (Appendix "W") and YD 411-S11-11-1 (Appendix "Z"), approved by the Coast Guard on 25 February 1958 and by Lloyd's on 11 October 1957. A comparison of the midship section, as originally built (Exhibit 6), and that shown on H. C. Downer Drawing YD-411-S11-11-1 (Appendix "Z") indicates that the above work would have increased the longitudinal strength by a moderate amount. It was also the owner's intent to dry-dock the vessel in

Chicago after the completion of the work in Manitowoc for its five-year survey, the last five-year survey docking having been accomplished in Lorain, Ohio, in 1953.

6. The CARL D. BRADLEY was in drydock for period 9-15 May 1957 at Chicago, Illinois, to effect repairs incident to damages sustained on 3 April 1956 in a collision with M/V WHITE ROSE at South East Bend, St. Clair River. These repairs consisted of inserting one (1) new bilge plate 21 feet long to replace damaged sections of Plates E-14 and E-15 starboard, and minor fairing and riveting to shell plates K-8 and K-9 port side. In addition, hairline fractures in the transverse direction, located for the most part at the after edge of the riveted lap butts, were found in bottom plates B-16, D-16, D-18, D-19 starboard, and B-14, B-15, C-9, C-16, and D-12 port. These plates were repaired by cropping out the fractured sections of the plates and the adjacent riveted lap butts and inserting a new full-width section approximately six feet in length. In effecting these repairs, the butts were flush welded and the seams were riveted. Satisfactory temporary repairs were also made to shell plate J-20 aft on the port side in way of the engine room forward bulkhead and internals in way of this plate and miscellaneous repairs were also made on the starboard side aft, exact location unknown.

7. On two known occasions between the drydocking in May 1957 and the casualty, the CARL D. BRADLEY sustained bottom damage. In the spring of 1958, the vessel rubbed bottom while proceeding out of Cedarville, Michigan, and damage was incurred just aft of the collision bulkhead in way of No. 1 water bottom, port. The owners considered this damage to be of such a minor extent that no repairs were necessary. In early November 1958, the vessel again rubbed bottom while turning at Cedarville, and damage was sustained in way of No. 7 water bottom, port, in the A and B strakes. This damage, a transverse fracture approximately 14" long, was repaired afloat at Calcite, Michigan, by the owners' repair force by welding a channel bar over the fracture and blanking each end to form a cofferdam. The size of this channel is not known.

8. Neither of the above-mentioned damages was reported to the Coast Guard or Lloyd's, and the repair in No. 7 water bottom was neither reported to nor approved by the Coast Guard.

9. On 30 October 1958, a safety inspection was conducted on board the CARL D. BRADLEY by Lieutenant [REDACTED]. This inspection consisted of a fire drill and a boat drill, during which both boats were swung out and No. 2 boat was lowered into the water and 28 crewmen exercised under oars to the satisfaction of the inspector. It was during this visit to the vessel that the Master reported that the repairs to the side tanks were holding up satisfactorily.

10. The CARL D. BRADLEY was of typical arrangement for self-unloading type vessels with a forepeak and large cargo area, and hawing propulsion machinery aft. These areas were separated by two transverse watertight bulkheads, the collision bulkhead at frame 12 and the engine room forward bulkhead at frame 173. The cargo hold space was divided into five compartments by screen bulkheads above the tunnel and the unloading machinery was located in the conveyor room just forward of the cargo spaces. The entire 475 foot length of the cargo spaces was open

longitudinally through the tunnel and conveyor room.

11. The CARL D. BRADLEY was engaged in the limestone and coal trade, operating primarily between the limestone ports on Lake Huron and unloading ports on Lakes Michigan and Erie. The 1958 season began on 22 April and the CARL D. BRADLEY had completed 43 round trips before the casualty. The vessel was not in operation for a period of about three months commencing about 1 July and ending about 1 October by reason of business lag. During this period, the vessel lay at Calcite, Michigan, with only a watchman on board.

12. Captain [REDACTED] had been sailing as Master of the CARL D. BRADLEY since 1954. Chief Engineer [REDACTED] had served on the CARL D. BRADLEY for almost the entire life of the vessel and as Chief Engineer since 1952.

13. The manager of the Bradley Transportation fleet is Mr. [REDACTED] and he has held his present position for approximately two years. He has had no sailing experience, but has been in the employment of Michigan Limestone Division for some 33 years in various capacities. His last previous assignment was in the traffic department.

14. Present management knew of no company instructions issued concerning the sequence of loading, unloading, or ballasting of their vessels. They consider that the responsibility in these matters is vested in the ships' masters. There were certain practices followed on the CARL D. BRADLEY which developed into recommended procedures as a result of the experience of vessel personnel and which were passed on by masters and mates to their successors.

15. The Master and Chief Engineer of the CARL D. BRADLEY were charged with the responsibility of keeping the management advised as to the repairs, maintenance and upkeep requirements. The management structure of the Bradley Fleet, which consisted of nine vessels, did not provide for a fleet captain or a fleet engineer.

16. The safety director of the Bradley Transportation fleet had not, in his four (4) years in his present capacity, received any complaints of unsafe or hazardous operating conditions on the CARL D. BRADLEY. It is noted that the safety program, as administered by the safety director for the Bradley fleet, was almost solely devoted to industrial-type safety conditions and did not encompass vessel material conditions. For success in this field, the National Safety Council presented an award of honor to the Bradley Transportation Line, Michigan Limestone Division, Rogers City, Michigan, for the world's record in having 2,228,755 injury-free man hours, 24 April 1955 to 31 December 1957. The present safety director had not at any time personally made a material condition inspection on the CARL D. BRADLEY.

17. The CARL D. BRADLEY departed Gary, Indiana, bound for Calcite, Michigan, at approximately 2200 on 17 November 1958. Prior to departure, the Master and Mate had knowledge of the weather forecast, which at 2000 warned of whole gale winds (50-65 MPH) from the south, shifting to southwest. At the time of departure, the wind was fresh (25-35 MPH) from the south and there was no sea.

18. When the CARL D. BRADLEY was secured for sea, special attention was given to the hatch clamps and boom stays, because of the impending weather. The vessel was in a light condition with the forward tanks only partially ballasted. The ballasting of the after tanks (5, 6, and 7, and Trim) was handled by the engineering force, and the amount of water in the after tanks during this voyage could not be determined. However, normal practice was to have the vessel ballasted full aft to get the propeller down, and the vessel would, therefore, have had a draft between 17'6" and 18' aft. The forward draft was not measured at the time of departure. The above was the normal ballasting procedure for departing port without cargo.

19. At 0400 on 18 November 1958, the CARL D. BRADLEY passed Milwaukee at a distance of 11 miles, making approximately 15 MPH, and was abeam Sheboygan at 0700, a distance of seven miles. Two lake freighters, SS GOVERNOR MILLER and RICHARD TRIMBLE, were running parallel with the CARL D. BRADLEY and closer to shore. The wind increased steadily after 0400, and during the 4-8 watch, the water ballast was increased to the maximum practical condition of 10, 16, 18 and 18 feet in tanks #1, 2, 3 and 4 respectively. The vessel remained ballasted in this manner until the casualty.

20. The CARL D. BRADLEY continued up the Wisconsin Shore at distances off varying from five to twelve miles. From a point off Cana Island, a course of 046° true was set across Northern Lake Michigan toward a point midway between Seul Choix Point and Lansing Shoal. Sometime prior to 1600 speed had been reduced by about 10 RPM so that the vessel was making approximately 14-15 MPH. At 1519 a fix was plotted by the Second Mate from visual bearings, and this position indicated the vessel to be slightly to the south of the line drawn on the chart for the route across Lake Michigan.

21. At 1600, when First Mate [REDACTED] came on watch, the master was on the bridge and in charge of the navigation. The CARL D. BRADLEY was past Poverty Island on course 046° true and was riding comfortably with a heavy following sea slightly on the starboard quarter. The wind had increased to whole gale force (60-65 MPH) and had shifted to southwest.

22. The SS JOHNSTOWN, ahead of the CARL D. BRADLEY by several hours, passed Boulder Reef at about 1317, and had reported encountering a very heavy sea there at that time. The only other lake freighter which reported passing Boulder Reef was the SS CHARLES L. HUTCHINSON, which passed the reef at 0554 on the 18th, downbound and loaded. This vessel reduced speed at 0700, because of heavy seas. All other lake vessels that reported having been in the northern

Lake Michigan area at this time reported that they had sought shelter, and at least eight vessels were anchored or proceeding to anchor at the time of the casualty, either in Green Bay, at Garden Island, or in the Straits of Mackinac.

23. Sometime after 1600, the radar was placed in operation and was used for all subsequent navigation, except for an RDF bearing of 051° true obtained on Lansing Shoal sometime before 1700. After the fix obtained at 1519 was plotted on the chart, no later positions were plotted. However, radar observations indicated that on the course being steered (046° true), the vessel would clear Boulder Reef and Gull Island by at least five miles. At about 1720, radar ranges were taken on the north end of South Fox Island and on Point aux Barques, which again showed the vessel to be slightly to the right of the course line drawn on the chart.

24. Within one-half hour before the casualty, both survivors, [REDACTED] and [REDACTED], had occasion to traverse the length of the vessel from the forward house to the after house on the weather deck, and neither one saw nor heard anything out of the ordinary which would have caused them to be concerned with the safety of the vessel. In addition, [REDACTED] also went aft to the engine room and returned to the fore part of the vessel through the tunnel, and, again, neither saw nor heard anything unusual. Up to the time of the casualty, the vessel was riding easily, taking no water over the deck, and with so smooth a motion that the sideboards were not necessary on the mess table. Accordingly, persons on board were not aware of any reason to be concerned for the safety of the vessel.

25. The bulkhead at the forward end of the engine and boiler spaces, "Blk #173" was fitted with a dogged watertight door which opened forward into the tunnel. This door was normally kept closed, although rarely if ever completely dogged. Just prior to the casualty, when Mays was aft to pump the water from the sump at the after end of the tunnel, he used this door, and when last leaving it, tightened at least one dog. The sumping of the water in the tunnel was a regularly assigned duty of the deck watch to be performed each watch, and on this occasion Mays found no more than the normal amount of water in the tunnel.

26. At approximately 1730, without warning, a sound described as a thud was heard on the bridge of the CARL D. BRADLEY. The thud, which [REDACTED] could not more adequately describe, was followed by a vibration similar to that which is felt in a vessel pounding into a sea, with the propeller out of water, but the thud was such as to cause [REDACTED] to instinctively realize that the vessel was in serious trouble. Looking aft, [REDACTED] noted that the stern of the CARL D. BRADLEY was sagging.

27. After pumping the sump aft, Mays proceeded through the tunnel on the tank top to the conveyor room forward and was there when he also heard the thud which he was totally unable to describe. However, he, too, realized that the vessel was in serious trouble and ran immediately for the ladder leading topside. As he departed this compartment, he neither heard nor saw that section of the vessel being flooded.

28. Back on the bridge, the Master immediately sounded the general alarm and began to blow the whistle, while [redacted] broadcast "MAY DAY" on channel 51 (2182 kc). This broadcast, which was immediately answered by radio station WAD, Port Washington, Wisconsin, gave the CARL D. BRADLEY's position as 12 miles southwest of Gull Island. Upon request by WAD, the CARL D. BRADLEY verified this position. There had been just enough time to put out two "MAY DAY" messages before the power failed and the lights forward went out. There were no further signals heard from the CARL D. BRADLEY. The "MAY DAY" was heard and recorded by a large number of stations, including the Coast Guard Lifeboat Station at Charlevoix, Michigan, and primary radio station NMD at Chesterland, Ohio.

29. At 1730, the CARL D. BRADLEY was still on course 046° true, was riding easily and making about 14.5 MPH. The vessel was ballasted to the maximum practical extent with estimated drafts of 13'9" forward and 17'6" aft. The wind was southwest 55-65 MPH, and the sea was heavy, steep, and about 25 feet high from $\frac{1}{2}$ -point on the starboard quarter. The approximate air and water temperatures were 40°F and 50°F , respectively. The sun had set at 1710 and there was still 14 minutes of twilight which would end at 1744.

30. The German M/V CRISTIAN SARTORI, a 254' general cargo vessel, was at 1730 about four miles distant from the CARL D. BRADLEY, and although the CRISTIAN SARTORI did not hear the "MAY DAY", officers on the bridge witnessed the casualty. The CRISTIAN SARTORI, southbound, passed Lansing Shoal at 1200. The JOHNSTOWN later reported sighting her at about 1400, one to two miles off her portside, when the JOHNSTOWN was abeam Gull Island light, distance three to four miles on course 050° true. This put the CRISTIAN SARTORI approximately five miles off Gull Island. At about 1700, the CRISTIAN SARTORI was on course 215° true making about two MPH when she sighted the CARL D. BRADLEY ahead $10-15^{\circ}$ on her starboard bow. At 1720, the CRISTIAN SARTORI came right to course 240° true to pass the CARL D. BRADLEY on her portside, and by 1730 the CRISTIAN SARTORI was approximately six miles distant from Gull Island, bearing 260° true from Gull Island Light, with the CARL D. BRADLEY $10-15^{\circ}$ on her port bow. The only side light of the CARL D. BRADLEY seen at any time by the CRISTIAN SARTORI was her red light, and at no time was the green side light visible to the CRISTIAN SARTORI.

31. When the alarm sounded, the crew responded quickly and sought to abandon ship. With the exception of the Second Mate, who tried to go aft toward the boat deck (body not recovered), those forward donned life jackets and went to the 15-person emergency life raft aft of the pilot house. Men aft were observed to be on the boat deck and lowering the starboard lifeboat. The two lifeboats were 25-person boats on the boat deck aft and were equipped with quadrantal-type mechanical davits, Manila falls, and common hooks.

32. Two or three minutes after the thud and after the stern had been noted to sag, the vessel heaved upward near hatch #10 and broke in two resulting in two sections approximately 300' in length, 65' wide, and 90' high, including the deck houses and superstructure. As the sections parted, the forward end of the stern section, with the lights still on, swung to port, and the after end of the bow section swung to starboard. The bow section, maintaining an even keel, settled from the after end until the spar (weather) deck was completely submerged, then listed to port, rolled over, and sank. The life raft floated free.

33. The stern section settled from the forward end on an even keel and then plunged, still on an even keel, with the counter going down last. The starboard lifeboat swung forward on its falls. Whether the boat was completely launched before the sinking could not be determined. When recovered, it was upside down, and there was no evidence that it had been occupied. As the section plunged, there was a sudden eruption of steam, bright flame, and smoke.

34. The first indication of anything unusual about the CARL D. BRADLEY, as noticed by the CRISTIAN SARTORI, was about 1730 when the lights in the forward end were observed to go out. This was followed several minutes later by an explosion with considerable illumination and heavy smoke. When the smoke cleared, the CARL D. BRADLEY had disappeared from view and, whereas they had been getting a good image on the radar, there now was none. The CRISTIAN SARTORI changed course to 195° true and headed toward the CARL D. BRADLEY's position and began a search for survivors which lasted until relieved at 0200, 19 November. Searching proved negative. Approximately one hour after the casualty, the CRISTIAN SARTORI sighted flares on the water about one mile off her port bow between the ship and Boulder Reef Buoy and in line with the buoy.

35. The following Coast Guard units participated in the SAR emergency:

a. Plum Island Lifeboat Station -- Heard "MAY DAY" at 1730 and dispatched CG-40300 at 1800. Due to heavy seas, this boat was unable to proceed and was recalled at 1900, arriving back at 2000.

b. Charlevoix Lifeboat Station -- Heard "MAY DAY" at 1731 and dispatched CG-36392 at 1815. This small boat was recalled at 1855 on the recommendation of Commanding Officer, CGC SUNDEW, due to heavy weather.

c. Beaver Island Moorings -- CG-36505 held in readiness and was not dispatched to the scene, due to the prevailing weather conditions and inexperience of the available personnel.

d. USCGC SUNDEW (WAGL 404) -- Moored at Charlevoix, Michigan, in a 12-hour stand-by status. The SUNDEW was alerted at 1740 by the Group Commander, Charlevoix Group. The SUNDEW got underway at 1820 and arrived in the search area at 2240. The Commanding Officer, CGC SUNDEW, took over operational control of the search and coordinated the efforts of all units from this time on.

e. CG Air Station, Traverse City, Michigan -- This unit had one aircraft, UF 1273, returning from an air search in southern Lake Michigan and one aircraft, UF 2135, in a maintenance status. In addition, the station had two helicopters ready for flight; however, these were held in readiness, due to the prevailing weather conditions. UF 1273 was directed to proceed to the scene and arrived at 1915. The ceiling in the search area was 2,000 feet, and this aircraft was used throughout the night in the search and also to provide flare illumination for the surface vessels. A total of 88 flares were dropped during the night of 18-19 November. At daybreak, three HO3S helicopters joined in the search, and the UF 2135 was dispatched to Beaver Island to provide gasoline for the helicopters.

f. CGC HOLLYHOCK (WAGL 220) -- Moored at Sturgeon Bay, Wisconsin, in a 2-hour stand-by status. The HOLLYHOCK was alerted at 1815 by Operations, Ninth Coast Guard District, Cleveland, Ohio, and was underway at 1830. The HOLLYHOCK arrived on the scene at 0230 and reported to the SUNDEW.

36. The SS ROBERT C. STANLEY, anchored at Garden Island, heard the "MAY DAY", got underway at 1824, and proceeded to the search area, arriving at midnight. This vessel was joined by other lake vessels and numerous military and civilian aircraft as the weather moderated and daylight on the 19th commenced. CG-40561, from Beaver Island Moorings, and CG-40499, from Charlevoix Lifeboat Station, joined the search on 19 November.

37. Four crewmen, including [redacted] and [redacted], were able to board the life raft, which drifted rapidly away from the scene of the disaster. During the night, the other two were lost overboard as the raft flipped over several times in the heavy seas. The sea anchor also parted, leaving the raft completely at the mercy of the elements. At 0825 on 19 November, the SUNDEW sighted the raft with the two survivors, and [redacted] and [redacted] were rescued at 0837 at a position $5\frac{1}{2}$ miles east northeast of Gull Island. An overturned

lifeboat was sighted at 0930 at a position four miles east of Gull Island. This boat was not occupied and was later recovered off the southeast tip of High Island on the 21st. During the day, 17 bodies were recovered by Coast Guard units in the area adjacent to and north of Gull Island. One body, that of Gary Strzelecki, one of the persons lost overboard from the raft during the night, was recovered by merchant vessel M/V TRANS ONTARIO at 1314 at a position close to the west shore of High Island. Each body recovered had an approved cork life jacket on, as did the two survivors.

38. a. The following men survived: Total 2:

- (1) [REDACTED]
- (2) [REDACTED]

b. The bodies of the following persons have been recovered; cause of death -- drowning: Total 18:

- (1) Carl R. Bartell, [REDACTED]
- (2) Alfred Boehmer, [REDACTED]
- (3) Richard J. Book, [REDACTED]
- (4) Alva H. Budnick, [REDACTED]
- (5) William T. Elliott, [REDACTED]
- (6) Erhardt O. Felax, [REDACTED]
- (7) Cleland E. Gager, [REDACTED]
- (8) Paul C. Heller, [REDACTED]
- (9) Paul Horn, [REDACTED]
- (10) Raymond J. Kowalski, [REDACTED]
- (11) Joseph Krawczak, [REDACTED]
- (12) Alfred Pilarski, [REDACTED]
- (13) Gary N. Price, [REDACTED]
- (14) Leo Promo, Jr., [REDACTED]
- (15) Bernard Schefke, [REDACTED]
- (16) Gary Strzelecki, [REDACTED]
- (17) Edward N. Vallee, [REDACTED]
- (18) John Zoho, [REDACTED]

c. The following men are missing: Total 15

- (1) [REDACTED]
- (2) [REDACTED]
- (3) [REDACTED]
- (4) [REDACTED]
- (5) [REDACTED]
- (6) [REDACTED]

(7)
(8)
(9)
(10)
(11)
(12)
(13)
(14)
(15)

39. All the persons reported to have been on watch in the engine room are among those still missing. Of the 18 bodies recovered, eight were from the forward end crew and ten were from the after end crew.

40. Radio station WAD, Port Washington, assumed the radio control on channel 51 (2182 kc) in the SAR emergency and broadcast an order for radio silence at 1740. This initial order was repeated a number of times by WAD and other stations in the mideastern and eastern United States. The imposed radio silence was lifted at 1840 on 19 November, and the active search was discontinued on 21 November 1958 by Office of the Commander, Ninth Coast Guard District, pending further developments. Serious interference on channel 51 was reported. This interference was primarily from the unauthorized use of channel 51 by vessels on the Ohio and Mississippi Rivers, and partly from the failure of some Great Lakes area stations and vessels to maintain silence. The interference, however, was not serious enough to interfere with the on-the-scene communications among the vessels and planes actively engaged in the search.

41. Boulder Reef lighted bell buoy (LL 2163) was on station and showing its proper characteristics at 1410 on 19 November when checked by CGC SUNDEW.

42. In the vicinity of Boulder Reef, shoal water of 60 feet in depth or less extends over an area which is approximately six miles long and three miles wide. The area circumscribed by this 60-foot depth curve runs mainly to the north northeast of Boulder Reef, which is marked on its southwest edge by Boulder Reef lighted buoy. The reef has a minimum depth of 15 feet adjacent to the buoy, and shoal area of 30 feet or less extends to a distance of about $1\frac{1}{2}$ miles northward from the buoy.

43. Aircraft from Coast Guard Air Station, Traverse City, spent a total of 122 hours searching the casualty area from 18 November to 9 December. During this time, no evidence of the sunken hulks or large wreckage therefrom was sighted by the aircraft. Miscellaneous small pieces of wreckage were found, both by aircraft and searching parties, on the west shores of High and Beaver Islands. On 20 November, Coast Guard aircraft UF 2135 sighted an oil slick,

resulting from oil bubbling to the surface from an underwater source. The source of this oil slick, which was feathering out downwind, was located $5\frac{1}{2}$ miles distant from Boulder Reef Buoy on a bearing of 311° true. On 2 December 1958, the SUNDEW, sounding this area, noted on their depth recorder, type AN/UQN-IC, an irregularity in soundings which indicated a 25-foot pinnacle in 300 feet of water at the reported source of the oil slick. An immediate re-sounding of this area failed to again show the pinnacle, and later attempts to relocate it have likewise proven unsuccessful. Attempts to locate the hulks by soundings were made by CGC MACKINAW (WAGB 83) and the SUNDEW during January and February; however, unfavorable winter conditions curtailed these efforts. Further attempts will be made when weather conditions improve.

44. The Board takes judicial notice of the following facts:

a. Records indicate that November is a month of severe storms on the Great Lakes. The storm of 17-19 November 1958 has been described by various shipmasters as the most severe they have encountered. The publication "Shipwrecks of the Lakes", by Dana T. Bowen, reveals that between 1900 and 1950, over one-third of the vessels lost by foundering were lost during November, and over one-half of all strandings occurred in November.

b. The trade followed by the self-unloading-type vessels is extremely hard on the vessels. The self-unloaders load and discharge many more cargoes per year than do the conventional bulk freighters, engaged in the iron ore trade. Likewise, these vessels frequent out of the way places in shallow water and often ground and rub bottom while approaching docks. In addition, because of the short hauls between loading and unloading ports, the self-unloaders spend considerably more time at near maximum speed in the shallow rivers than do the conventional lake vessels.

c. The past inspection books, dry-dock examination books, and other official records of the Coast Guard were examined by the Board, and they revealed nothing of note concerning the CARL D. BRADLEY, except as mentioned elsewhere in the record concerning the last dry-docking in 1957 at Chicago, Illinois.

d. The official survey records of Lloyd's Register of Shipping were examined by the Board, and these records revealed nothing of note concerning the CARL D. BRADLEY. Extracts from the survey, in conjunction with the dry-docking in 1957 at Chicago, Illinois, are included with the record.

e. Section 726 of Department of the Navy Publication NWP-37, Search and Rescue, indicates that the wind current would be up to 30° to the right of the wind direction in direction of 045° true to 075° true.

OPINIONS

1. That the CARL D. BRADLEY did not strike Boulder Reef, but that she broke in half in deep water in a position about five miles to the northwestward of Boulder Reef.
2. That the vessel could not have proceeded for more than one mile between the time of the initial thud and the time she broke in half, and that the CARL D. BRADLEY continued on course during this period.
3. That had the vessel struck Boulder Reef, both parts of the hulk, by reason of their dimensions, would be visible in the water of less than 60-foot depth which extends for a distance of about three miles northeast of the reef along the track the CARL D. BRADLEY would have made.
4. And further, that, having in mind the manner in which the vessel broke and the way the stern section plunged to the bottom, the CARL D. BRADLEY sank in water considerably deeper than 60 feet.
5. Supporting the opinion that the CARL D. BRADLEY did not strike Boulder Reef are the facts established relative to the navigation of both the CARL D. BRADLEY and the M/V CRISTIAN SARTORI.
6. That the cause of the casualty was due to the excessive hogging stresses imposed upon the vessel by reason of her placement in a ballasted condition upon the waves encountered at the particular instant of breaking. There were no facts disclosed by the testimony, or through examination of the files on the CARL D. BRADLEY maintained by the U.S. Coast Guard, or Lloyd's Registry of Shipping, which would lead to an opinion that there existed any defects in the area where the break occurred. However, it is felt that the appearance of hairline fractures in the vessel's bottom plating, as found in drydock, may be of significance in a technical study of this casualty by the Ships' Structure Committee, or other technical body, although the Board could find no indication of a relationship between this casualty and these earlier-noted hairline fractures.
7. That the eruption of steam, flames, and smoke, noticed by the survivors and the CRISTIAN SARTORI, occurred after the vessel parted, and was caused by water rushing into the combustion chambers of the boilers as the stern section plunged. The fact that all bodies from the after end that were recovered were victims of drowning, with no indication of burns or violence, supports the conclusion that the reported explosion was actually the eruption of steam and combustible materials from the boiler out through the stack.
8. That the vessel was seaworthy at the time of completion of her annual inspection at Calcite, Michigan, on 17 April 1958, and that there is no reason to conclude from the testimony or from reasonable interpretation of other known facts that she was not in such condition upon departure from Gary, Indiana, on 17 November 1958.

9. That the vessel was properly manned and equipped in accordance with existing regulations and properly secured for sea upon departure from Gary, Indiana.

10. That the temporary repairs to the cargo hold, made in the winter 1957-58 did not contribute to this casualty.

11. That the two unreported damages known to have been incurred during the 1958 season at Cedarville, Michigan, were minor in nature and of such location on the hull as to not have contributed to this casualty.

12. That the watertight door in bulkhead 173 at the forward end of the machinery spaces was not completely dogged at the time of the casualty, and that the watertight integrity of the vessel was thereby impaired. It appears likely that the door became undogged by some reason unknown and then swung open, allowing the free entry of the water from the tunnel to the engine spaces. It is felt that, had the door been completely dogged and thus maintained bulkhead 173 watertight, additional buoyancy would have been provided, and the speed with which the stern section sank would have been materially reduced.

13. That the drownings of those crewmen whose bodies were recovered were caused by inhalation of the heavy spray. Because of the low water and air temperatures, and extremely rough seas, no type of life jacket could have enabled any person to have survived the 16-hour ordeal in the water. Further, that the type of life jacket worn by the victims caused fatigue by reason of the need to exert constant arm pressure on the jacket to keep it down on the body while in the water. It is the opinion of the Board that the cork life preservers are not a satisfactory type for sustained support in the water because of the way they fit.

14. That the drift and set of the life raft, lifeboat, and bodies carried them north of Gull Island and to the eastward. This drift and set is in fair agreement with what might be expected from the information contained in Section 726 of NWP 37, Search and Rescue Manual, although it is realized that the application of the theories developed in this manual to the relatively shallow waters of the area in question might not be unqualifiedly accepted.

15. That efforts made by the crew in attempting to lower the starboard lifeboat were thwarted by the short time the stern section remained on an even keel. With the prevailing weather conditions and the quick settling of the after section, it is considered extremely doubtful that a launching of a lifeboat in the vicinity of the vessel's counter by use of falls fitted with common hooks could have been successfully accomplished.

16. That the search and rescue operations in this casualty were thorough and well-directed. All Coast Guard units responded to the maximum of their ability under the existing weather conditions, and the major floating units were underway well within the period allowed by their standby status. The appreciation of the survivors and the representatives of the owners of the CARL D. BRADLEY for the efforts of the CGC SUNDEW is worthy of note. The decision of the responsible personnel attached to the Coast Guard Air Station to hold the available helicopters for actual rescue work in view of the weather conditions was based on sound judgment.

17. That the participation of the M/V CRISTIAN SARTORI in the search was in keeping with the finest traditions of the sea. This vessel was immediately headed toward the scene of the casualty, and made every effort to assist under extremely adverse weather conditions. The fact that the searching of the SARTORI proved unsuccessful does not detract from the valiant efforts of the Master and crew to aid the crew of the CARL D. BRADLEY. The voluntary participation by other merchant vessels, as well as private, commercial, and military aircraft, and by the individual citizens of the various islands was also commendable.

18. That communications pursuant to this SAR emergency were adequate. All stations in the area maintained radio silence when so directed, and the interference on channel 51 that did occur did not impede communications on the scene.

19. That had the life raft been equipped with rocket or parachute-type distress signals, the survivors might have been located during the night.

20. That it is the stated policy of the owners of the CARL D. BRADLEY to give the masters complete responsibility for the safety of their vessels and, therefore, complete freedom to anchor or postpone departure, if unfavorable weather or other reasons dictate such action to be in the interests of safety. In view of this, it is the opinion of the Board that the master of the CARL D. BRADLEY, in making the decision to and in proceeding across northern Lake Michigan from Cana Island toward Lansing Shoal, exercised poor judgment. This decision was probably induced by a zealous desire to hold as closely to schedule as possible, and because of this, he gave less attention to the dangers of the existing weather than what might be expected of a prudent mariner.

21. That no aids to navigation or uncharted or incorrectly charted area or objects were involved in the casualty.

22. That no personnel of the Coast Guard or any other governmental agency contributed to the casualty.

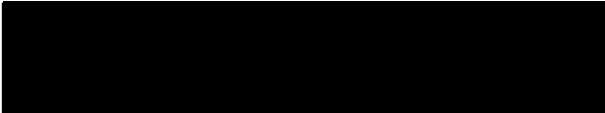
23. That there is no evidence that any licensed or certificated personnel of the CARL D. BRADLEY committed any acts of incompetence, inattention to duty, negligence, or wilful violation of any law or regulation.

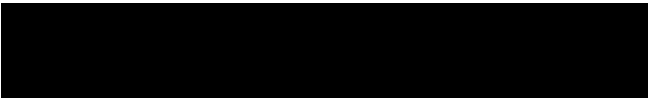
RECOMMENDATIONS

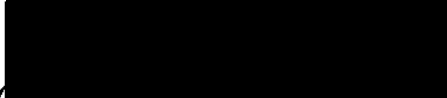
1. That all jacket-type life preservers be provided with a crotch strap to hold the jacket down on the body and with a collar to support the head out of water. In this respect, the specifications for life preservers under 46 CFR 160.002-005 (Subchapter Q, Specifications) will require modification.

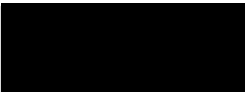
2. That a second additional life raft or other approved buoyant apparatus be mandatory for all Great Lakes cargo vessels of 300 gross tons and over, and that 46 CFR 94.10-40(a) and 46 CFR 94.15-10(c)(3) (Subchapter I, Cargo and Miscellaneous Vessels) be modified to require two life rafts and to specify that one of these rafts shall be in the forward part of the vessel and one in the after part of the vessel.
3. That each lifeboat on all Great Lakes cargo vessels of over 3000 gross tons be fitted with mechanical disengaging apparatus. To effect this recommendation, the provisions of 46 CFR 94.10-5(a)(4)(i) should be modified to include Great Lakes vessels and to require that all existing common hook installations be replaced with mechanical disengaging apparatus at the earliest possible date. Further, that the provisions of this recommendation be extended to include Great Lakes tank and passenger vessels of over 3000 gross tons, and that the applicable sections of 46 CFR, Part 33 (Subchapter D, Tank Vessels), and 46 CFR, Part 75 (Subchapter H, Passenger Vessels), be so modified.
4. That each lifeboat on all Great Lakes cargo vessels be equipped with two painters as required for ocean and coastwise vessels, and that 46 CFR 94.20-10(a) and 46 CFR 94.20-15(z) be modified accordingly. Further, that the provisions of this recommendation be extended to include all Great Lakes tank and passenger vessels, and that the applicable sections of 46 CFR, Part 33 (Subchapter D, Tank Vessels), and 46 CFR, Part 75 (Subchapter H, Passenger Vessels), be so modified.
5. That each lifeboat and life raft on all Great Lakes cargo vessels be provided with a unit of at least six red parachute-type flare distress signals and the means to project them. This recommendation will require modification of 46 CFR 94.20-10(a), 46 CFR 94.20-20(a), 46 CFR 94.20-15(hh), and 46 CFR 94.20-25(m). Further, that the provisions of this recommendation be extended to include all Great Lakes tank and passenger vessels, and that the applicable sections of 46 CFR, Part 33 (Subchapter D, Tank Vessels), and 46 CFR, Part 75 (Subchapter H, Passenger Vessels), be so modified.

6. Inasmuch as the exact location of the hull of the CARL D. BRADLEY is unknown at this time and the possibility exists that reasonable efforts to locate the hull during this coming shipping season will be successful, which may or may not alter the findings of fact, opinions, or recommendations of this board, it is recommended that the board remain in an adjourned status so that it may be reconvened should circumstances demand.


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Chairman


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Member


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