TK

UNITED STATES COAST GUARD

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

MVI
(PINE RIDGE a-5 Bd)
14 JUL 1961

Commandant's Action

on

Marine Board of Investigation; structural failure of tanker PINE RIDGE on 21 December 1960, off Cape Hatteras, with loss of life

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

2. At about 1145 EST, 21 December 1960 the SS PINE RIDGE, a T-2 type tank vessel of U. S. registry, broke in two in heavy weather about 95 miles east of Cape Hatteras. The bow section subsequently foundered with the loss of seven crew members including the master. The stern section of the vessel was later recovered and the twenty-nine remaining crew members survived without any serious injuries.

3. The SS PINE RIDGE departed Tankport, New York on the morning of 20 December 1960 en route to Corpus Christi, Texas. The vessel was empty of cargo and tanks 4 and 7 across were in full ballast. During the night of 20 December ballast was gravitated into number 3 center and number 8 center tanks. At about 0400, contrary to prior forecasts, the weather started to deteriorate and the vessel while on course 180°T began encountering head winds and seas and began to pound. Orders were given by the master for butterworthing and ballasting and at 0423 speed was reduced from full ahead, about 89 RPM (15 knots) to 80 RPM (12 knots). At 0440 the master ordered 70 RPM but was advised by the first assistant engineer on watch in the engineroom that he would be unable to pump ballast on variable frequencies below 48 or 49 cycles which required approximately 73 to 76 RPM on the propeller. The master then requested that the vessel's speed be slowed as much as possible and permit pumping operations. There was no indication by the master of an emergent situation developing at that time. After the ballasting commenced the vessel began to ride easier. At about 1000 the master and chief mate were heard to mention gale warnings and expectations of worse weather ahead. At this time butterworthing and other work on deck was discontinued as the

vessel was secured for heavy weather although ballasting continued in No. 5 tanks. At 1140 the master ordered the ballasting secured and shaft RPM reduced to 60 (9 - 10 knots) as number 5 tanks had been completely filled. At this time the vessel was now rolling and pitching heavily and possibly taking green seas over the bow but none of the witnesses had the impression that she was pounding or slamming hard. At 1145, without any warning, there was a loud crack or crunch and the bow of the vessel forward of number 6 tank was observed to raise up out of the water. On a subsequent sea the vessel tore across the deck and the bow sheared around to the right, then broke completely off. At the time of the casualty the master, chief mate, second mate, third mate, radio officer, chief steward and quartermaster were in the midship house which was on the forward section. As the forward section separated the bow was observed to be high out of the water and the after end awash up to the boat deck. No lifeboats were launched from the forward section and sometime during the late afternoon or early evening of 21 December the forward section sank. There were no survivors from the forward section, nor were any bodies recovered.

4. The Norwegian motor vessel ARTEMIS on an opposite parallel course was four miles away and observed the PINE RIDGE as she broke in two. The ARTEMIS sent an SOS and remained in the area until released the following morning. In response to the SOS the SS ESSO JAMESTOWN proceeded to the scene, arriving at 1608 and joined in the search for possible survivors from the forward section.

5. Aboard the after section the chief engineer, with the assistance of members of the engine department, kept the plant in operation but no effort was made to operate the engine. On the morning of 22 December the weather moderated and the survivors were removed by Navy helicopter and taken to the USS VALLEY FORGE with the exception of the chief engineer who remained aboard the after section until it was towed into Newport News, Virginia.

6. The Board found that the failure was primarily of the ductile type which would be indicative of a high stress condition. Some brittle fractures were in evidence on deck port and starboard but were not regarded as directly causative to the failure in sagging. The vessel was fitted with 12 riveted straps, four more than required, and there was evidence that successful arrests of almost all of the brittle fractures occurred at the straps concerned.

7. The Board determined that the loading distribution of the vessel resulted in a sag numeral of almost plus 150 and a hog numeral of almost minus 20, calculated in accordance with the American Bureau of Shipping publication "Guidance Manual for Loading T-2 Tankers." The maximum sag numeral recommended in the manual is 100 and the figure of plus 150 reflects a dangerous condition of stress.

8. The investigation disclosed that the American Bureau of Shipping had audio-gauged the vessel's main hull structure in 1959. Gauge readings made after the casualty were in substantial agreement with the American Bureau of Shipping average readings and reflected a borderline condition. However, in some areas wastage was excessive.

9. The PINE RIDGE was last certificated on 19 October 1959 and was laid up from November 1959 to October 1960. The owners then made plans to jumboize the vessel and desiring to place her back in service prior to that time requested a preliminary examination from the local Officer in Charge, Marine Inspection to obtain an approximate idea of the repairs required. The Officer in Charge, Marine Inspection personally conducted this examination on 6 October 1960 but as the vessel was not gas-free the requirements issued at that time were of a limited and general nature. When subsequently gas-freed the vessel was attended by a Coast Guard inspector and classification society surveyor and such repairs as in their judgment were necessary to render the vessel seaworthy were required.

REMARKS

1. Concurring with the Board, it is considered that the principal cause of this casualty was improper ballasting. Since the master had been provided with a copy of the "Guidance Manual for Loading T-2 Tankers" and had considerable experience in this type of vessel, there appears to be no satisfactory explanation for the dangerous ballast condition which existed when the vessel broke in two.

2. The Board concluded that at the time of the casualty the vessel was encountering extremely severe weather and that the most serious contributing cause was the vessel's course and speed directly into the seas. The Board's finding that the wind was Beaufort 9-10 and the seas were about 30 feet high is supported by the reports of other vessels in the area. Despite this, the consensus of the witnesses aboard the PINE RIDGE was that the weather, although rough and getting progressively worse, had not reached extreme proportions and the vessel was not laboring greatly. Without further testimony from the master or other navigation personnel the master's choice of course cannot be criticized. That the master recognized the desirability for a reduction of speed was evidenced by his request to the first assistant engineer who was on watch during the 0400 to 0800 watch in the engineroom. In this regard, although the first assistant engineer did not believe a second auxiliary generator could be put on the line to permit reduction of speed while at the same time operating three cargo pumps for pumping ballast without risk of losing all power, the chief engineer was of the opinion such arrangement could have been accomplished without difficulty. Whether or not this would have changed the ultimate outcome of this casualty is speculative.

3. The Board further concluded that the weakened structural condition of the vessel as a result of wastage was a contributing factor. As the Board suggested, the fact that the PINE RIDGE was scheduled to receive a new midbody in the course of being jumboized quite probably was in the minds of the owners, the classification surveyors and the Coast Guard inspector while the condition of the internals and the necessity of renewals was being considered. In this connection the Board stated as a fact that repairs to the internal structure did not include all of the items listed by the Officer in Charge, Marine Inspection as a result of his personal inspection. These requirements issued as a result of inspection while the vessel was not yet gas-free were necessarily general. There is nothing in the record to indicate that they were not carried out to the extent that the hull inspector later considered to be necessary after examination of the vessel in a gas-free condition.

4. Aside from the opinions by the Board, this casualty again points up the fact that the determination of the condition of an aged vessel is particularly difficult. An estimate of the strength remaining in any vessel must include many factors in addition to age, route and trade and does not lend itself readily to specific percentages of wastage or, as set forth in the Board's second recommendation, to requirements for mandatory periodic gauging. The "Notes on Inspection and Repair of Steel Vessels" distributed to the industry as Navigation and Vessel Inspection Circular No. 4-60 was an attempt to point out some of these factors and promote uniformity in the approach to hull repair requirements. Underlying the promulgation of this guide was the premise that there would be a working liaison between the Officer in Charge, Marine Inspection, the local representative of the classification society and the owners. Obviously the proper balance between economy of operation and safety can only be achieved with full cooperation, mutual assistance and a frank exchange of information between those directly concerned. With respect to the Board's recommendation 1, specifically recommending closer cooperation between the Coast Guard and the American Bureau of Shipping on structural conditions and surveys, it must be recognized that this is and always has been the policy of the Coast Guard.

5. Concerning the Board's recommendation 3 that Coast Guard inspectors be advised of the importance of closely adhering to the structure repair recommendations contained in the "Notes on Inspection and Repair of Steel Vessels," there is no substantive evidence that they were not adhered to considering the fact that those notes are guidance material. On the other hand, as a matter of policy, it is expected that Coast Guard inspectors will refer to all existing instructions, technical data and background material to insure fulfillment of the Coast Guard's statutory responsibility with respect to seaworthiness and safety of life.

6. The Board's recommendation 4 that inflatable life rafts be required on all ocean-going vessels will be referred to the Merchant Marine Council.

7. The manner in which the chief engineer performed his duty after the vessel broke in two will be referred to the Merchant Marine Awards Committee of the Maritime Administration.

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

[redacted]

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

After a full and mature deliberation, the Board finds as follows:

-FINDINGS OF FACT-

1. At or about 1145 hours (EST), 21 December 1960, the SS PINE RIDGE, O. N. 243803, en route from Tankport, New York to Corpus Christi, Texas, in ballast, while in heavy weather suffered a structural failure and broke in two, in the approximate position of Latitude 35° 11' N - Longitude 73° 35' W, with loss of life. Of the thirty-six members of the crew, twenty-nine survived on the stern section. Seven members of the crew on the bow section including the master were lost.

2. The SS PINE RIDGE, O. N. 243803, was a T-2 tanker built at Mobile, Alabama in 1943; of 10,417 gross tons; length 504 feet; breadth 88.2 feet; depth 39.2 feet; turbo-electric propulsion of 6,000 horsepower; home port, Wilmington, Delaware; owners, Paco Tankers Incorporated, 611 Industrial Trust Building, Wilmington, Delaware. Operators, Keystone Shipping Company, 1000 Walnut Street, Philadelphia, Pennsylvania. The SS PINE RIDGE was fitted with the following strength/crack arrestor straps: 58" X 1" deck strap 12.5 feet off the center line port and starboard; 67" X 1" bottom strap 10 feet off the center line port and starboard; approximately a 15" X 1" deck strap 26.5 feet off the center line port and starboard; approximately 15" X 1" bottom strap 24 feet off the center line port and starboard; approximately 20" X 1" upper side strap 32.25 feet above the base line port and starboard; approximately a 20" X 1" lower side strap 9.75 feet from the base line port and starboard. The 58" and 67" strength straps were installed by the Bethlehem Steel Company, Baltimore, Maryland in November 1952. These straps extended from 2 feet forward of Frame 50 to 2 feet aft of Frame 68. Riveted bilge keel alterations were also made at that time.

3. As a result of this casualty the following personnel were lost:

Name	License or Certificate No.	Home address	Position Serving
Clark Snyder	[redacted], Master Steam & Motor, issue 4-7 [redacted]	[redacted]	Master
Eugene William Lary	[redacted], Chief Mate, Steam and Motor, issue 1-5, [redacted]	[redacted]	Chief Mate
Edward Gulben	[redacted], Master & First Class Pilot, Steam & Motor Vessel, issue 3-7 [redacted]	[redacted]	Second Mate

Name	License or Certificate No.	Home Address	Position Serving
Harry Davis	[redacted], Third Mate, Steam & Motor, issue 5-5, [redacted]	[redacted]	Third Mate
Raymond Francis Brazner	[redacted] issue 3, Radio Officer, [redacted]	[redacted]	Radio Officer
Joseph Daniel Courson	Able Seaman, Any waters, Unlimited, [redacted]	[redacted]	Quartermaster
Joseph Marine	Steward, Butcher, Cook & Baker (Food Handler) [redacted]	[redacted]	Steward

Other than the persons who were lost there were no serious injuries as a direct result of this casualty.

4. The weather at the time of the casualty was as follows: Wind, force 9 to 10, strong gale, south-southwest; seas code 8, very rough seas; height of waves approximately 30 feet; air temperature 70° F.; water temperature 74° F.; distance between waves approximately 4 to 5 hundred feet; rain and haze with visibility ranging from 1 to 7 miles.

5. The PINE RIDGE departed the dock at Tankport, New York at 0810 hours (EST) on 20 December 1960, and took departure from Scotland Light Vessel at 0948 hours (EST), 20 December 1960. Prior to leaving the dock all cargo tanks were empty with the exception of number 4 and 7 across which were full (in ballast). During the 20th of December 1960, the voyage was uneventful and no heavy weather was encountered. Sometime during the night of 20 December or the early morning hours of the 21st, the chief mate gravitated ballast into number 3 center and 8 center cargo tanks. Shortly after 0400 hours (EST), 21 December the vessel encountered heavy weather and began to pound. The wind and the seas were from the south directly opposite the course of the vessel of 180° True. After a discussion between the chief mate and the master, it was decided that the vessel definitely needed more ballast. The weather was deteriorating, contrary to the forecasts which had been received. Shortly after 0400 hours (EST) the pumpman was called out and ordered to fill number 6 across, wash out lines to number 1 port and starboard, Butterworth number 5 across and when clean fill 5 across, strip number 1 and 2 across and Butterworth number 9 across. The pumpman was already awake at the time, the vessel's pounding having awakened him. Up until 0423 hours (EST) the shaft rpm's were normal full speed ahead for good weather, but at this time were reduced to 80 rpm. At 0440 hours (EST), the chief mate, who was on watch, called the engineroom and advised the first

assistant engineer, who was also on watch, that the master wanted the shaft revolutions reduced to 70 rpm.

The first assistant advised the bridge that he could not pump ballast at such a low propeller rpm since the cargo pumps, which were being used to pump ballast, could not be operated on variable frequencies below 48 or 49 cycles, which is approximately 74 rpm's. The master then spoke to the first assistant and ordered him to run the vessel as slowly as he could and still keep the cargo pumps operating. At about 0430 hours (EST), the pumpman called the engineroom and requested steam to the cargo pumps and commenced filling number 6 across. When number 6 was approximately half filled the chief mate ordered the pumpman to bring up number 3 center. Number 3 center was filled at the same time number 6 across was filled. All members of the deck department off watch were called at about 0545 hours, and turned to preparing to Butterworth in accordance with the chief mate's orders. Number 5 was Butterworthed first, commencing at about 0600 hours. Prior to the completion of Butterworthing number 5 center, number 6 across and 3 center were completely ballasted. Number 5 wing tanks were then Butterworthed.

6. At approximately 1000 hours (EST), while the vessel's course was approximately 212° True, the chief mate and master expressed their anxiety about the weather, which was deteriorating rapidly. The master personally ordered that number 5 be ballasted as soon as possible. Because of the weather all Butterworthing and other work on deck was ordered discontinued and the vessel secured for heavy weather. At approximately 1140 hours (EST), the master called the chief engineer and ordered the shaft rpm's reduced to 60 as number 5 had been completely ballasted. At this time number 3 center, 4, 5, 6 and 7 across were in full ballast and number 8 center tank was approximately half filled. At the time the master called the chief engineer, the first assistant, who was in the chief engineer's office, proceeded to the engineroom to assist the third assistant, who was on watch, to further reduce the shaft revolutions. At this time the vessel was taking heavy seas over the bow and pitching heavily with the wheel coming out of the water and taking a heavy spray across the catwalk.

7. The vessel had slammed several times, quite hard, and was occasionally pounding up until the time of the casualty. At approximately 1145 hours (EST) a loud racking noise was heard forward and the bow suddenly rose out of the water and sheared off to the right. The after end of the bow section dropped into the water rising again on a subsequent sea. The bow section then tore loose and the vessel was in two sections. At the time of the breaking in two the master, chief mate, second mate, third mate, radio officer, steward and quartermaster were the only persons in what then became the bow section and were subsequently lost.

8. As the two sections separated the bow was observed to be high out of the water and the after end was awash up to the boat deck. No lifeboats were launched from the bow section and sometime during the late afternoon or early evening of 21 December the bow section sank.

9. Shortly after the vessel broke in two the chief engineer proceeded to the engineroom and with the help of the members of the engine department was able to keep the plant in operation and all hands remained aboard the stern section until the morning of 22 December, when all members were evacuated from the stern section by helicopter and taken aboard the USS VALLEY FORGE with the exception of the chief engineer, who remained aboard the stern section while it was towed into Newport News, Virginia on 27 December 1960.

10. The vessel's breaking in two was observed by the Norwegian Motor Vessel ARTEMIS, who reported substantially as follows: At about 1115 hours (EST), 21 December, while in heavy weather, a target was observed on the radar 7 or 8 degrees on the starboard bow, about thirteen miles distant. This target subsequently proved to be the PINE RIDGE. The ARTEMIS was at this time on a course of 342° True. At about 1125 hours, the ARTEMIS, when 8 or 9 miles from the PINE RIDGE altered course to the right to 040° True. The ARTEMIS, at the time was making approximately 11 knots. When approximately 6 miles off the PINE RIDGE was sighted visually on an approximate parallel but opposite course to the ARTEMIS, about 4 points on the ARTEMIS' port bow. The PINE RIDGE was headed into the seas, pitching heavily and taking seas over the forecastle.

11. At the time the PINE RIDGE broke in two she was approximately 4 miles off the ARTEMIS and 6 points off the port bow. The bow section was observed to rise more and more out of the sea and the fore part of the section, the bow, all the way out of the water. The pilot area was clear of the water, but the seas were breaking over it. Immediately the ARTEMIS sent out the SOS. At 1200 hours (EST), the weather was blowing a full gale and the seas were confused. The wind was estimated to be force 10 and the seas were running to a mountainous height. The seas were too large for the master of the ARTEMIS to launch lifeboats to pick up any possible survivors.

12. The loading condition of the vessel at the time of casualty was as follows:

TANK	CONTENTS	WEIGHT IN TONS
Fore Peak	- - -	0
Forward Fuel Oil Deeps	- - -	0
Midships Fresh Water	F. W.	35
Aft Fuel Oil	F. O.	300
Forward Double Bottoms	F. W.	25

TANK	CONTENTS	WEIGHT IN TONS
Aft double bottoms	F. W.	5
Distilled water	F. W.	20
Aft fresh water	F. W.	25
Aft Peak	F. W.	75
Cargo No. 1 - P., S.	- - -	0
Cargo No. 2 - P, S, C.	- - -	0
Cargo No. 3 - P, S.	- - -	0
Cargo No. 3 - center (full)	S. W. ballast	1500
Cargo No. 4 - P, S, C (full)	S. W. ballast	2790
Cargo No. 5 - P, S, C. (full)	S. W. ballast	2790
Cargo No. 6 - P, S, C. (full)	S. W. ballast	2790
Cargo No. 7 - P, S, C. (full)	S. W. ballast	2790
Cargo No. 8 - C (½ full)	S. W. ballast	800
Cargo No. 8 - P, S.	- - -	0
Cargo No. 9 - P, S, C.	- - -	0

The above loading distribution of the vessel resulted in a sag numeral of almost + 150 and a hog numeral of almost - 20. calculated in accordance with the procedure outlined in the American Bureau of Shipping "Guidance Manual for Loading T-2 Tankers". This manual indicates that when a hog or sag numeral exceeds 100, the vessel's structure is subject to conditions which are more severe than the standard conditions and recommends for safe operation that the load distribution be arranged to obtain the lowest possible numeral. A copy of the American Bureau of Shipping Guidance Manual was aboard the PINE RIDGE at the time of the casualty.

13. The master, Clark Snyder, had been employed by the Keystone Shipping Company for about 18 years and had bean employed as master of tankers for over 16 years. Captain Snyder had considerable experience aboard T-2 tankers.

14. A description of the break is as follows:

On the port side the fracture of the side plating and longitudinals occurred at or slightly forward of transverse bulkhead frame 56 in the No. 6 cargo tank following almost a straight line from the deck level to almost 10 feet above the bottom thence it angled forward at about 45° to the turn of the bilge. At this point it reversed direction and angled aft and inboard along the round of bilge to the bulkhead, frame 56.

The starboard side fracture occurred at the deck level at the same location as the port side except that the tear was more ragged and extended both forward and aft to the transverse bulkhead, Frame 56.

The tear across the bottom extended from the peaks at both bilge turns following a jagged line inboard and aft past the transverse bulkhead, Frame 56. The bottom shell straps, flat plate keel and A and B strakes were torn across irregularly in the bottom of No. 7 cargo tank almost one or two frame spaces aft of bulkhead, Frame 56, sheering away from the bottom longitudinals and other internal structure. Most of the bottom longitudinals fractured just forward of bulkhead, Frame 56.

The deck plating sheered away from the side plating port and starboard from Frame 56, and forward about 35 feet on the starboard side and 20 feet on the port side before tearing in an irregular manner across the deck near the forward end of No. 6 cargo tank. Partial transverse fractures of the deck stringer plates occurred at the aft end of No. 6 cargo tank.

Examination revealed that the structural failure was primarily of the ductile type. Some evidence indicated a small amount of brittle fractures occurred in the plating port and starboard at the gunwales. Observations indicate that the fracture of the bottom longitudinals began at the flanges.

Compression failure of the deck structure at some stage of the breakup was evident from the distortion of the cargo deck piping on the stern section.

15. Examination of the stern section in dry dock in Newport News after the casualty together with the American Bureau of Shipping audio-gauge readings taken in 1959 showed the general condition of the main hull structure to have been as follows:

Item of structure	Approximate average percent reduction in thickness from original scantlings
Deck plating	23%
Side shell plating	17%
Bottom plating	17%
Longitudinal bulkheads	37%
Deck longitudinals	65%
Side longitudinals	From 60% near deck to 25% near bottom
Bottom Longitudinals	28%
Deck, side and bottom straps	5%

The 1959 American Bureau of Shipping audio-gauge readings and dry dock gauge readings made after the casualty were substantially consistent.

16. The following is a brief history of repairs made to the internals since 1955:

Structure	Renewals
Flat plate keel	FK 8 thru FK 16 except for FK 10
Shell plating, port	F 4, F 6, G 6, G 7, H 6, J 6.
Shell plating, starboard	A 7, F 4, F 5, G 5, G 10, M 9, N 9, N 1.
Deck longitudinals	In cargo tank No. 1, P & S, Cargo Tank No. 2, center starboard side, Cargo Tank No. 5, P. S. C., Cargo Tank No. 9, port and starboard.
Side longitudinals	Upper No. 5, port and starboard in No. 9 cargo tank wings.
Vertical bulkhead webs	Upper part Frame 68, center and 10 feet off center port and starboard. All webs Frame 62. Frame 56, center and 10 feet off center port and starboard.
Longitudinal bulkhead connections to transverse bulkheads	Frame 68, 62, 56, 50.
Transverse bulkheads	Frame 73 (3 plates) Frame 68 center tank upper 6 strakes Frame 62 complete Frame 56 center tank upper 6 strakes
Longitudinal bulkhead	2 plates port and starboard in No. 9 cargo tank.
Miscelleanous studs, headers, etc.	Scattered.

The above covers the main hull renewals during this period on which the record is clear. Other renewals may have been made in conjunction with other repairs.

17. The PINE RIDGE was last certificated on 19 October 1959 at Galveston, Texas. At the time the certificate was issued certain requirements were issued among which was the following: "At next drydock period and not later than sixty (60) days from the above date, renew wasted internal structures to all cargo spaces as required." This requirement was issued on 19 October 1959, to the owners and a photostatic copy given to the master of the vessel on Form NAVCG-835. On 17 November 1959, the vessel arrived at Port Everglades, Florida and a leak was discovered in the hull of the vessel, which contaminated the harbor. Examination revealed a possible leak in the hull in way of number 7 port cargo tank. When the cargo in number 7 tank was discharged no further leakage was noted. The Certificate of Inspection was removed from

the vessel and forwarded by the OCMI, Miami to OCMI, Savannah. The vessel was issued a permit to proceed to Savannah for repairs. On 20 November 1959, the vessel entered drydock at Savannah and preparations were made for repairs. An external examination of the vessel's hull was made but no repairs were carried out. The vessel was laid up in November 1959, and remained in a lay-up status until approximately 6 October 1960 at which time the OCMI, Savannah was requested to conduct a brief examination of the vessel in order that the owners could obtain an approximate idea of the extent of the repairs required to place the vessel back in operation. The vessel's owners and/or operators were considering placing the vessel back in service prior to an anticipated "jumboizing" which was planned for several of their vessels. On this date a partial inspection was made by the OCMI, Savannah accompanied by the Marine Superintendent of the Keystone Shipping Company. A thorough internal and external hull examination could not be made at this time since the vessel was not drydocked and a number of the tanks contained ballast and the majority of the tanks contained unsafe ladders. From this preliminary examination, the OCMI issued a list of requirements of known needed repairs to internals dated 7 October 1960.

The vessel was redrydocked on 21 October 1960 and remained in drydock until 28 October 1960. During this time and up until 8 November 1960, when the Certificate of Inspection was restored by the OCMI, Savannah, repairs were carried out on the vessel under the supervision of the Coast Guard Inspector and the American Bureau of Shipping surveyor. A mid-period inspection was also made at this time. Repairs to the internal structure were not extensive and did not include all the items listed by the OCMI as a result of his preliminary examination of the vessel.

The vessel sailed from Savannah on 8 November 1960 and made two cargo carrying voyages between New York and Gulf ports prior to the casualty.

18. Audio-gauge readings of the vessel's main hull structure and internals were made for the American Bureau of Shipping in 1959 while the vessel was laid up in Savannah but the OCMI, Savannah was not made aware of these data.

-CONCLUSIONS-

1. It is concluded that the casualty was caused by a combination of:

   (a) Improper ballasting,
   (b) The vessel proceeding directly into heavy seas at a too great a speed,
   (c) Severe weather conditions and
   (d) Weakened structural condition of the vessel as a result of wastage.

2. The proximate cause of the casualty was the ballasting of the vessel. The filling of number 5 tanks produced a sagging numeral of approximately 150 computed in accordance with the procedure outlined in the American Bureau of Shipping "Guidance Manual for loading T-2 Tankers." This sagging numeral placed the vessel's structure under as severe a loading stress as possible. The master recognized the need for more ballast in his vessel and his failure to use the accepted method in placing ballast in alternate tanks appears to have been motivated by a desire to fill clean tanks only. It is believed that ballast would have been placed in the forward tanks had the weather permitted the cleaning of these tanks. Since the master had considerable experience in the operation of T-2 tankers and therefore should have been aware of the proper ballasting procedures, it is the opinion of the Board that the bal - lasting of the vessel in this manner consituted negligence.

3. It is the opinion of the Board that the most serious contributing cause of the casualty was the vessel's course and speed. Had the vessel's course been other than directly into the seas, the stresses would have been considerably less. The vessel's speed at the time of the casualty was greater than that desired by the master, however, he was faced with the dilemma where he found himself unable to reduce speed until the ballasting had been completed.

4. At the time of the casualty, the vessel was encountering extremely severe weather. This conclusion is supported by the fact that the crew's orders to clean the forward tanks were cancelled and all men were ordered off the deck during the mid-morning.

5. The wastage, as indicated in paragraph 15 of the Findings of Facts, is believed to have been a contributing factor. This wastage was in excess of that recommended in the Navigation and Vessel Inspection Circular No. 4-60. The over-stressing which was present at the time of the casualty was excessive for the existing structural strength. As a result of the 1959 American Bureau of Shipping audiogauge readings, the vessel's scantlings were known to the vessel's owners and/or operators as being borderline. However, work which might normally have been undertaken was not carried out in anticipation of the vessel receiving a new mid-body in the near future. The Coast Guard Inspectors were not aware of the audiogauge readings of 1959 and thereby

did not know the true condition of the internals of the vessel. Visual inspection cannot replace gauging measurements. While the wastage was widespread, much was located in places not readily accessible without staging and furthermore would have required gauging to have revealed its true extent.

6. It is the opinion of the Board that had the PINE RIDGE been equipped with inflatable life rafts containing canopies and beacons, that the loss of life would have been less. No lifeboat could have been launched from either the bow section or the stern section but launching of inflatable life rafts by personnel in the bow section could have been accomplished and the possibility of survival would have been much greater.

7. Other than stated above, there was no willful violation of law or negligence on the part of any licensed or unlicensed personnel, owners, operators or Coast Guard personnel.

-RECOMMENDATIONS-

1. It is recommended that closer cooperation be excerised between the Coast Guard and the American Bureau of Shipping on structural conditions and surveys of inspected vessels thus providing a greater exchange of structural strength data.

2. It is recommended that the Commandant consider amending existing regulations so as to require gauging of the structures of tankers or other bulk cargo vessels in the corrosive trade at periodic intervals.

3. It is recommended that Coast Guard Inspectors be advised of the importance of closely adhering to the structure repair recommendations contained in Navigation and Vessel Inspection Circular No. 4-60.

4. It is recommended that inflatable life rafts be required on all ocean-going vessels in addition to the required lifeboats.

5. It is recommended that [redacted] Chief Engineer, be commended by the Commandant for his outstanding devotion to duty for the manner in which he took charge of the situation when the vessel broke in two and kept the plant in operation until the other survivors had been safely evacuated and for his outstanding devotion to duty in remaining aboard the stern section by himself until the vessel was safely in tow.

6. Other than as stated above, it is recommended that no further action be taken and that this case be closed.

[redacted]

P. V. COLMAR
Rear Admiral, U. S. Coast Guard, Chairman

[redacted]

J. B. McCARTY, JR.
Captain, U. S. Coast Guard, Member

[redacted]

H. J. GARDNER
Lieutenant Commander, U. S. Coast Guard
Member and Recorder

The Board then, at 1100, 15 May 1961 adjourned to await the action of the convening authority.

[redacted]

P. V. COLMAR
Rear Admiral, U. S. Coast Guard, Chairman

[redacted]

H. J. GARDNER
Lieutenant Commander, U. S. Coast Guard
Recorder