

DEPARTMENT OF TRANSPORTATION



COAST GUARD

MARINE CASUALTY REPORT

**COLLISION OF THE TUG CAROLYN AND
WEEKS BARGE NO. 254 WITH THE
CHESAPEAKE BAY BRIDGE AND TUNNEL
ON OR ABOUT 21 SEPTEMBER 1972
WITHOUT LOSS OF LIFE**

**U.S. COAST GUARD
MARINE BOARD OF INVESTIGATION REPORT
AND COMMANDANT'S ACTION**

**ACTION BY
NATIONAL TRANSPORTATION SAFETY BOARD**

REPORT NO. USCG/NTSB MAR-74-2

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16. Abstract On September 20, 1972, the tug CAROLYN, towing the barge WEEKS No. 254, lost all propulsion in the Chesapeake Bay. The vessels drifted in heavy winds and collided with the Chesapeake Bay Bridge and Tunnel. Two other vessels, the Coast Guard Cutter MADRONA and the tug WARRENGAS, were standing by to assist the CAROLYN and its tow at the time of the collision. As a result of the initial collision and of subsequent impacts by the barge during the next several hours, the bridge structure was heavily damaged. This report contains the action taken by the National Transportation Safety Board in determining the probable cause of the casualty and in making recommendations to prevent its recurrence. The report also contains the Marine Board of Investigation report and the action taken by the Commandant, U.S. Coast Guard. The National Transportation Safety Board determines that the probable cause of the casualty was: (1) the failure of the master of the CAROLYN to inform the MADRONA or the WARRENGAS of the existence of a quick-release anchor on the barge and (2) the incorrect decision made by the commanding officer of the MADRONA not to take the CAROLYN in tow as a last resort. Contributing to the failure was the fatigued state of the master of the CAROLYN; contributing to the incorrect decision was a statement by the master of the CAROLYN to the commanding officer of the MADRONA that the tug was sinking.					
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NATIONAL TRANSPORTATION SAFETY BOARD
DEPARTMENT OF TRANSPORTATION
WASHINGTON, D.C. 20591

TUG CAROLYN AND BARGE WEEKS NO. 254
CHESAPEAKE BAY BRIDGE AND TUNNEL
SEPTEMBER 20-21, 1972

ACTION BY THE NATIONAL TRANSPORTATION SAFETY BOARD

This casualty was investigated by a U. S. Coast Guard Marine Board of Investigation convened at Portsmouth, Virginia, on September 25, 1972. A representative of the National Transportation Safety Board observed part of the proceedings. The National Transportation Safety Board had considered only those facts in the investigative record which are pertinent to the Safety Board's statutory responsibility to determine the cause or probable cause of the casualty and to make recommendations.

SYNOPSIS

At 0140, on September 21, 1972, the tug CAROLYN and its tow, the barge WEEKS No. 254, struck a trestle on the western side of the Chesapeake Bay Bridge and Tunnel (CBBT). After initial impact, the tug and barge drifted south and struck the CBBT in various locations. The CAROLYN then passed under the bridge and the towing hawser parted. The CAROLYN drifted south and grounded on Chesapeake Beach; the WEEKS No. 254, buffeted by heavy winds, remained on the west side of the CBBT and pounded the structure for several hours. This pounding extensively damaged bridge pilings, bridge spans, and a portion of the roadway. No deaths or injuries occurred.

The CAROLYN and the WEEKS No. 254 had been proceeding north in the Atlantic Ocean on September 20 when, because of heavy weather, they headed south to seek refuge in the Chesapeake Bay. As the weather continued to deteriorate, the Coast Guard Cutter MADRONA and a commercial tug, the WARRENGAS, stood by ready to assist the tug and barge.

After the CAROLYN and its tow passed over the CBBT, the CAROLYN began to list excessively to port. In order to facilitate the transfer of fuel from the port to the starboard tanks, the CAROLYN was headed into the wind. During this maneuver, a portion of the towing hawser coiled on deck washed overboard from the tug and fouled first the port, then the starboard propeller. The fouling of the propellers caused total loss of propulsion. After the crew of the CAROLYN was evacuated by the MADRONA and after the MADRONA made several unsuccessful attempts to take the WEEKS No. 254 in tow, the tug and barge drifted into the CBBT.

The National Transportation Safety Board determines that the probable cause of the casualty was: (1) the failure of the master of the CAROLYN to inform the MADRONA or the WARRENGAS of the existence of a quick-release anchor on the barge and (2) the incorrect decision made by the commanding officer of the MADRONA not to take the CAROLYN in tow as a last resort. Contributing to the failure was the fatigued state of the master of the CAROLYN; contributing to the incorrect decision was a statement by the master of the CAROLYN to the commanding officer of the MADRONA that the tug was sinking.

Contributing to the collision were the absence of standards or guidelines for safe procedures in towing operations and the absence of a Federal regulation to require that unmanned barges have an expeditiously controlled anchoring capability.

ANALYSIS

The tug and barge remained essentially undamaged by the forces of the storm. The tug did not sink or capsize, took on very little water, and was moved from its beached location under its own power. There is no indication that the barge suffered any damage before its collision with the Chesapeake Bay Bridge and Tunnel (CBBT). Although the tug may not have been well matched to the size of its barge, the tug design was sufficient to resist the storm forces. In case of emergency, the barge could have been anchored. The assisting vessels were capable of preventing the collision. However, the personnel involved in the sequence of events, which included the attempts to reach a safe refuge, to remove list from the tug, to relinquish the tow, and to evacuate the CAROLYN's crew, did not prevent the barge from colliding with the CBBT.

Seeking Safe Refuge

The weather forecast received by the master of the CAROLYN at about 0600 on September 20 should have alerted him that adverse weather was forthcoming. However, since fair weather prevailed at that time, the master continued on his intended course and apparently took no precautions. Not until about 5½ hours later did high winds prevent the tug and barge from making further headway. If the master had been aware of the effect which these winds would have on the CAROLYN, he could have prepared to seek refuge earlier at a nearby harbor and, as the weather deteriorated, he should have been able to arrive in the Chesapeake Bay during daylight hours in less severe weather.

The CAROLYN, however, did not head south at an appropriate time. Only when seeking refuge became absolutely necessary did the master of the CAROLYN head for the Chesapeake Bay. As the result of insufficient planning, the master, in securing the tug for rough weather, overlooked 400 feet of hawser coiled on the deck of the tug.

The problem of insufficient planning was heightened when, en route to the Chesapeake Bay, the master discovered that navigational charts needed for entering the Bay were not on board. Since the tug's already malfunctioning radar was becoming inoperative, the master was forced to rely solely upon radio communications and the visual observations of others to navigate the CAROLYN toward the entrance of the Chesapeake Bay. As a result, the CAROLYN deviated from the proper approach and nearly grounded offshore from Cape Henry Light.^{1/}

Because the master of the CAROLYN had no acceptable standards involving the limitations of various tug/barge combinations, he had to rely on his previous experience on much larger and more powerful tugs when he decided to continue northward in the face of deteriorating weather. Only when high winds halted further progress in the vicinity of Chincoteague Inlet did the master realize that his prior experience was inapplicable. Thus, the absence of standards or guidelines upon which the behavior of barges can be estimated in a variety of conditions underlies this accident. If such standards or guidelines had been available, the master of the CAROLYN would have been more likely to take earlier steps to seek refuge.

Problem of List

When the master of the CAROLYN changed course toward the Thimble Shoal Channel opening in the CBBT, the northeasterly winds were placed off the starboard beam of the CAROLYN. Winds of 30 knots, which gusted to 60 knots, forced the barge to ride at an angle off the tug's port stern. The resultant towline pull and the wind heel caused the CAROLYN to assume a 20° to 30° port list and to be trimmed by the stern. After the master realized that the winds were not moderating inside the CBBT entrance, he became concerned that fuel gravitation from the starboard to port tanks was aggravating the list and possibly could capsize the CAROLYN.

The master attempted to head the CAROLYN into the wind to transfer the fuel to the starboard tanks. At some time during that maneuver, a bight of loose hawser fell over the port side as a result of either the severe port list, or waves washing over the stern, or both. As the CAROLYN continued to maneuver to starboard, the loose bight of hawser fouled first the port screw and then the starboard screw of the tug. The master and crew feared that further fuel gravitation would capsize the powerless CAROLYN, and requested assistance to abandon ship.

Since stability data, vessel plans, and fuel tank dimensions were not introduced in evidence at the Marine Board of Investigation, the effect that the fuel gravitation could have had on the CAROLYN could not be precisely calculated. However, the master's concern about the effect of fuel gravitation is questionable, in view of his very limited experience with the CAROLYN. As the MADRONA came alongside to evacuate the crew and a lee was created, the list decreased noticeably.

^{1/} Although significant in the overall sequence of events, the absence of the charts was not a cause of the casualty.

After the evacuation, as the tug and barge were drifting toward the CBBT, the master noticed that the tug's list had decreased. That the list decreased when the effect of the wind was reduced and when the barge started "towing" the tug, indicates that any contribution to the list caused by fuel accumulation in the port tank was not significant.

Cross-connected tanks similar to those on the CAROLYN are not unusual. Because fuel transfer between tanks on the tug could have been facilitated by a pump in the piping system, fuel could have been readjusted regardless of vessel heel. Also, fuel gravitation could have been stopped by closing the tank valves. The master, however, neither closed the valves nor used the pump. Therefore, the common fuel-oil line of the CAROLYN should not be considered as contributory to the casualty. The captain's decision to change course rather than use the available alternatives might be attributed to unfamiliarity with the equipment, a sense of increasing danger or degradation of reasoning resulting from lack of rest.

Relinquishment of the Tow

Before the arrival of the tug WARRENGAS, it was agreed that, if possible, the CAROLYN would be relieved of the WEEKS No. 254. Since the CAROLYN was not in danger at that time, no mention was made regarding the CAROLYN being towed, and there was no indication that Coast Guard assistance was needed. Because of the hazards of over-exposing the crew of the WARRENGAS to the severe weather conditions, taking the CAROLYN's towline was not considered the safest method of relieving the tow. Unaware that the excessive list was a serious concern of the master of the CAROLYN, the master of the WARRENGAS circled the tug and barge to find a way to attach a line to the barge. Only after the CAROLYN had lost propulsion did the situation become a matter of distress. When, 2 minutes after the first indication of distress, a request for evacuation was made, no further attempts to transfer the tow to the WARRENGAS were considered.

Abandonment of Tug

The loss overboard of the bight of hawser was not detected by the CAROLYN's crew; the crew did not recognize that the fouling of the port propeller was the reason that the port engine stopped. While the crew attempted to restart the port engine, the starboard propeller became fouled by the loose hawser, and all propulsion was lost. At that time, the wind-induced portion of the list could no longer be removed by turning the tug into the wind. The master concluded that the tug now would capsize. The master of the CAROLYN, however, told the two assisting vessels that the tug was "sinking," not capsizing, even though there was only a small amount of water in the bilges and no appreciable water leakage into the tug. But

he also told the Coast Guard that dewatering pumps would not help because the problem was caused by the fuel. Off-center fuel, as shown above, was not the cause of the list. The danger of immediate capsizing was small and time was available to gain control of the tug and barge. However, the assisting vessels were unable to understand the situation in view of the master's statements that the tug was sinking.

Inability to Anchor Barge

After the propellers were fouled by the towline and both engines stopped, the tug's anchor was dropped. The anchor could not and should not have been expected to hold against the combined pull of the barge and tug. The obvious inadequacy of the small tug anchor should have reminded the CAROLYN's crew of the availability of the remote-release anchor on the barge. This did not happen. Since unmanned barges are not required to and seldom carry anchors, the assisting vessels would not have suspected that such an anchor was available. As a result, a most important emergency backup system for retaining control of the barge went unused.

Unmanned barges are not required to carry anchors; thus, barges, unlike self-powered vessels, cannot be expeditiously controlled in the event of propulsion failure or severe weather. On the WEEKS No. 254, an anchor with trailing trip line was provided for the voyage. However, the anchor could not be controlled from the tug, because the barge was unmanned and located at least 800 feet from the tug. If the crew had wished to anchor the barge, the tug would have had to circle to the rear of the barge with the tug's hawser still in towing position. This would have permitted a large amount of slack or would have required the small crew to take in the hawser very rapidly. When propulsion failed on the tug, the anchor could not be reached without the assistance of other vessels.

The only means by which the crew of the tug could have anchored the barge quickly would have entailed parting the hawser. An expeditiously controlled anchoring capability is needed to protect other waterway users and persons and property along shore as well as personnel who may be aboard the barge. The risk which a barge presents is no less than that presented by a self-powered vessel. Barge anchors should be intended and designed to protect more than just the barge itself.

Role of the Tug Anchor

The tug anchor, although not holding, did slow the tug and barge drift. Furthermore, it assisted in pivoting the tug so that the towline pulled more nearly over the stern and reduced the tug's list. The tug anchor thus possibly delayed the arrival of the tug and barge.

at the bridge and reduced the threat of capsizing. However, when the MADRONA came alongside, the master of the CAROLYN, through misunderstanding, had the anchor line cut.

Towing Efforts of the MADRONA

The MADRONA was capable of towing both the CAROLYN and the WEEKS No. 254. The towing efforts of the commanding officer of the MADRONA were clearly influenced by the report of the master of the CAROLYN that the tug was sinking. An assisting vessel will normally avoid securing any of its lines to a sinking vessel. In this situation, however, because the water was only about 20 feet deep, any towline secured to the CAROLYN would not have been dangerous if the CAROLYN had sunk.

No attempts were made to put a towline from the MADRONA to the CAROLYN during or after the crew evacuation. Fittings for securing such lines were readily available on the tug. Instead, the MADRONA's efforts were directed at trying to pull aboard the towline between the CAROLYN and the barge. This was a particularly difficult and dangerous operation in the darkness. When this proved unsuccessful, the MADRONA approached the barge to secure a line to it. The dark high barge was a much less certain target for a towline than the lighted tug.

If the MADRONA had put its towline on the CAROLYN, both the tug and the barge could have been prevented from striking the bridge. However, the MADRONA's crew continued to try to attach a line to the WEEKS No. 254 until it was too late to put a line on the CAROLYN before the collision. The WARRENGAS was also capable of putting a line on the CAROLYN, but was not asked to do so. Even though the WARRENGAS might not have held both the tug and barge stationary, at least valuable time would have been gained, and the barge and tug might have gone ashore somewhere west of the bridge.

Human Factors

The master of the CAROLYN was an experienced operator. Nevertheless, in preparing for this 2,000-mile voyage, he obviously did not plan in sufficient detail for contingencies that might occur en route. This oversight could have resulted from the master's lack of awareness of the limitations of the CAROLYN in towing in heavy weather. The high winds and rough seas that developed caused the master to seek shelter, a most appropriate decision. Unfortunately, the effect of the following events placed unexpected stresses on the master, which may have reduced his ability to respond adequately to the changing situation:

1. The Chincoteague Inlet, the first refuge sought, was unavailable because of insufficient depth of water.

2. Charts of the Chesapeake Bay, the next likely refuge 50 miles south, were not on board.
3. Entry into the bay had to be made in the dark without the use of charts and the radar which had failed.
4. The tug and barge nearly ran aground off Cape Henry.
5. The tug and its tow took nearly 2 hours to travel the 3 miles from Cape Henry to the entrance to Thimble Shoal Channel.
6. Winds did not abate after the CAROLYN passed over the CBBT.
7. The Coast Guard warned the master that he was heading for shoal waters off Old Point Comfort.
8. An extreme list to the port developed.
9. The master believed that the tug WARRENGAS, which had been requested by radio, would not provide the assistance as requested.
10. All propulsion on the CAROLYN was lost when a hawser went overboard and fouled the propellers.

The effect of these stresses, i.e., the master's inability to respond adequately to the changing situation, was heightened by the fact that the master had had no rest since before 0600 on September 20. These conditions may have led the master to take certain actions not compatible with those which he might have reasonably been expected to take. The master's three major inappropriate actions were:

1. Not securing the hawser when he prepared for bad weather,
2. Incorrectly assessing the degree of hazard associated with the additional list caused by excessive fuel in the port tanks, and
3. Forgetting to deploy the barge anchor or to alert the Coast Guard of its existence.

These oversights are not unusual when tug operators are overloaded with decisions.

Economic Impact of Casualty

The Chesapeake Bay Bridge and Tunnel is a major thoroughfare which connects the tidewater Virginia area with the Delmarva Peninsula.

The CBBT, along with its approach roads, forms a 20-mile section of US Highway 13. When the CBBT is closed, the 20-mile trip from Norfolk, Va., to the southern portion of Delmarva is increased to more than 400 miles.

Delmarva has a primarily agricultural economy, a large portion of which involves the poultry industry. In addition to the value of raw farm commodities, produce-processing firms contribute to the area's economic well-being. Rapid movement of agricultural goods is essential to prevent an economic calamity.

Delmarva is not the only area which suffers when the CBBT is closed. The seafood industry, travel industry, various service facilities along US Highway 13, and the vacation areas of northern Virginia also suffer. During the 14 days in September and October in which the CBBT was closed as a result of this casualty, the total economic loss was conservatively estimated to be \$3,397,000. If the closure had occurred during a similar period in July and August, the loss would have increased to more than \$8,000,000. These estimates do not include the cost of repairing the CBBT or the assistance given by the U.S. Navy during that time.

Since the CBBT began operation, it has been closed five times as a result of ship/bridge collisions. Facility repairs and related costs resulting from these casualties have amounted to more than \$6,250,000.

Protection of Bridges

On July 10, 1972, the Ports and Waterways Safety Act (Public Law 92-340) became law. Title I of this Act authorized the Coast Guard to control vessel traffic during adverse weather conditions or under other hazardous circumstances by establishing speed limitations and vessel operating conditions. One purpose of this act is to prevent damage, destruction, or loss of bridges.

All five casualties which required closing the CBBT occurred in winds of more than 20 knots. Until such time as the recently proposed regulations are adopted by the Coast Guard, the risks for another collision with the CBBT remain substantial.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the casualty was: (1) the failure of the master of the CAROLYN to inform the MADRONA or the WARRENGAS of the existence of a quick-release anchor on the barge and (2) the incorrect decision made by the commanding officer of the MADRONA not to take the CAROLYN in tow as a last resort. Contributing to the failure was the fatigued state of the master of the CAROLYN; contributing to the incorrect decision was a statement by the master of the CAROLYN to the commanding officer of the MADRONA that the tug was sinking.

Contributing to the collision were the absence of standards or guidelines for safe procedures in towing operations and the absence of a Federal regulation to require that unmanned barges have an expeditiously controlled anchoring capability.

RECOMMENDATIONS

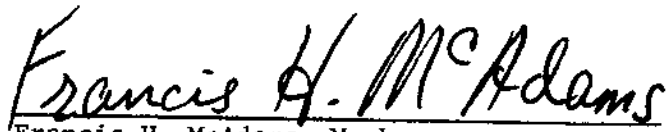
The National Transportation Safety Board recommends that the U.S. Coast Guard:

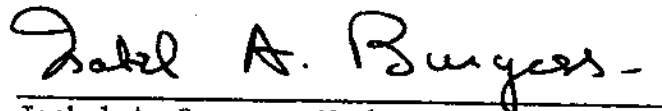
1. Expedite the promulgation of regulations regarding vessel control in the vicinity of the Chesapeake Bay Bridge and Tunnel. (Recommendation No. M-74-1)
2. Determine the effects of fatigue on personnel error as a cause of marine casualties, with particular reference to the sizes of crews carried on towing vessels. (Recommendation No. M-74-2)
3. Publish and make available to towboat operators guidelines for safe operating procedures for towing operations. These guidelines should include methods of preplanning a voyage, the proper use of towing hawsers, and actions to be taken in various emergency situations. (Recommendation No. M-74-3)
4. Determine the need for anchors on unmanned barges and practical methods of controlling such anchors in order to prevent damage to any vessel, bridge, or other structure, or other loss to bystanders on the navigable waters of the United States. (Recommendation No. M-74-4)
5. Place additional emphasis in its search and rescue procedures on protecting bridges from vessel impacts. (Recommendation No. M-74-5)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

Adopted this 4th day of January 1974:


John H. Reed, Chairman


Francis H. McAdams, Member


Isabel A. Burgess, Member


William R. Haley, Member

Louis M. Thayer, Member, was absent and did not participate in the adoption of this report.



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

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5943/CAROLYN
C-5 Bd

18 SEP 1973

Commandant's Action

on

The Marine Board of Investigation convened to investigate circumstances surrounding the collision of the Tug CAROLYN and WEEKS Barge No. 254 with the Chesapeake Bay Bridge and Tunnel on or about 21 September 1972, with no loss of life

1. The record of the Marine Board of Investigation convened to investigate subject casualty has been reviewed; and the record, including the Findings of Fact, Conclusions and Recommendations, is approved subject to the following comments and the final determination of the cause by the National Transportation Safety Board.

REMARKS

1. The casualty resulted from the loss of power on the Tug CAROLYN after the towing hawser fouled her screws. The failure of the crew of the CAROLYN to properly secure the vessel for sea allowed the improperly stowed hawser to wash overboard and into the screws. Good seamanship will help reduce the hazards of incidents of this kind. Publicity of this casualty may serve to cause others to be watchful to prevent recurrences of similar incidents.
2. A principal contributing cause of the casualty was the beam wind and sea buffeting the M/V CAROLYN while on a westerly heading, which resulted in a port list of the tug and provided for a gravitational flow of fuel through the vessel's cross connected fuel tanks, which aggravated that list.
3. The state of mind of the master of the Tug CAROLYN and his decisions throughout the chain of events leading up to the casualty were of extreme importance. While navigating on the planned coastwise route, the wind and sea conditions were such that he felt it necessary to seek a harbor of safe refuge. Although navigational assistance was being provided, he was attempting to transit an unknown channel without the use of the appropriate charts, at night and under severe weather conditions. Further the tug was

experiencing a list sufficient for the port main deck to be awash. The above factors certainly affected the master's state of mind in which he feared for the safety of his own life and that of his crew. The decisions he made to seek a harbor of safe refuge; to request pilotage assistance; to request the tug WARRENGAS to relieve him of his tow; to turn his vessel upwind; and, to attempt to anchor the vessels when the tug lost both her engines are considered to be the decisions of a reasonably prudent man.

4. The personnel of the tug CAROLYN misunderstood an attempt by the CGC MADRONA to put a towline aboard. This resulted in the anchor line being cut, and ultimately in the loss of control over the situation. If the MADRONA had been told about the anchor tripping line on the barge the vessels may have been successfully brought under control.


5. The Chesapeake Bay Bridge and Tunnel complex is a vital link between two major portions of the East Coast of the United States. In addition to repair costs to the bridge and to the vessel, disruption of service on this complex has a rather significant economic impact on the affected areas. The Coast Guard has under consideration a number of measures, particularly dealing with vessel operation and anchorage requirements, which are designed to protect the bridge. Regulations have been implemented which will require towing vessels to be under the direction and control of persons licensed by the Coast Guard. Also, the Coast Guard will continue to cooperate with state and local officials and other interested parties in the development of other safety measures which are within their authority to implement.

6. The Towing Industry Advisory Committee will be requested to provide recommendations and advice relative to proper towing hawser stowage, methods of obtaining control and/or towing a drifting barge, and cross connected fuel tanks. In order to provide further public dissemination of the above hazards this casualty report will be published in the "Proceedings of the Marine Safety Council."

ACTION CONCERNING THE RECOMMENDATIONS

1. The recommendation that this report be considered by the United States Coast Guard in its development of regulations implementing Public Law 92-340 (Ports and Waterways Safety Act of 1972) is concurred with. Regulations implementing Public Law 92-339 (Towing Vessel Licensing Act) have been published and are effective on 1 September 1973. These regulations require licensed operators for uninspected towing vessels and set forth the knowledge and eligibility requirements for the issuance of such licenses.

2. This report will be forwarded to the Commander, Fifth Coast Guard District for his use in implementing plans for the safety of the Chesapeake Bay Bridge and Tunnel. Several proposals to preclude a recurrence are presently being considered for possible adoption.


C. R. BENDER
Admiral, U. S. Coast Guard
Commandant



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:

5943/Marine Board
8 June 1973

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

Subj: Tug CAROLYN, O.N. 512707 and Barge WEEKS No. 254, O.N. 541825
Collision with Chesapeake Bay Bridge and Tunnel on or about
21 September 1972

FINDINGS OF FACT

1. At approximately 0140 EDT on 21 September 1972 the disabled M/V CAROLYN (O.N. 512707) and Barge WEEKS No. 254 (O.N. 541825) struck and damaged the west side of Trestle A of the Chesapeake Bay Bridge and Tunnel in the vicinity of Chesapeake Beach, Virginia. Approximately one hour prior to its disablement the CAROLYN with the WEEKS No. 254 in tow astern successfully transitted the Thimble Shoal Channel opening in the Chesapeake Bay Bridge and Tunnel (hereinafter referred to as CBBT) in an east to west direction. The five man crew of the CAROLYN was evacuated at 0110 EDT the same date, at the request of her master, by the U. S. Coast Guard Cutter MADRONA (WLB 302). The CAROLYN and WEEKS No. 254 combination struck Trestle A at a point approximately three miles from its southern extremity. This combination drifted southerly until the CAROLYN passed under the trestle and separated itself from the WEEKS No. 254 by parting the connecting towline. Drifting southeasterly the CAROLYN beached itself about one mile to the east of the trestle in question. WEEKS barge No. 254 continued its wind driven course down the west side of the trestle repeatedly striking the structure until the barge fetched up under the trestle at its juncture with the Virginia shore. The resultant damage to Trestle A was sufficient to close the CBBT to vehicular traffic for fourteen days. Estimated pecuniary bridge damages are reported to be in excess of two million dollars. Damages to the CAROLYN and WEEKS No. 254 were reported to be in excess of fifty thousand dollars. There were no reported deaths or injuries resulting from the collision.

2. Vessel Data

NAME:	CAROLYN	WEEKS NO. 254
O.N.	512707	541825
SERVICE:	Towing	Seagoing Barge
GROSS TONS:	93	2410
NET TONS:	63	2410
LENGTH:	59.2'	234'
BREADTH:	22.1'	53'
FREEBOARD:	Unknown	20'

PROPULSION:	Oil Screw (DIESEL)	None
HORSEPOWER:	1040	N/A
HOME PORT:	New York, New York	New York, N.Y.
OWNER/OPERATOR:	Weeks Dredging and Contracting Inc.	Same
	Elizabeth, N.J. 02208	
MASTER:	Al Antoine Le Boeuf	Same
	Box 258-W, Route 1	
	Galliano, Louisiana	
LICENSE:	None	
IND:	Z437-60-0791	
LAST INSPECTION FOR CERTIFICATION:	Uninspected	31 August 1972
TYPE OF INSPECTION PORT:	N/A	Original (Biennial)
	N/A	Port Arthur, Tex.

At the time of the casualty the vessel was being piloted by visual observation of the available aids to navigation. Prior to entrance into Thimble Shoals Channel navigation was being effected with the vessel's installed Loran set and magnetic compass. An installed radar was not being utilized because of reported operational difficulties.

The Barge WEEKS No. 254 is a hinged single hold dump barge. The hinge effect is accomplished by giant hydraulic rams located in the forward and after rakes of the barge which open the barge longitudinally to dump its cargo. The rakes are connected by wing wall tanks approximately five (5) feet in width.

The CAROLYN is of conventional tug design with all crew spaces on the main deck or above. The below deck space was devoted almost solely to the engine room and four (4) fuel tanks. Two tanks were located forward of the engine room and two aft of the engine room. A detailed description of the tanks is contained elsewhere in the report.

3. At 0600 EDT on 20 September 1972, (all dates referred to hereinafter will assume the year 1972), the National Weather Service forecast indicated Small Craft Warnings were in effect for both the Hampton Roads area and the intended track line of the CAROLYN and its tow. Specifically, fifteen to thirty mile per hour northeast winds were forecasted for the Hampton Roads area and twenty to thirty knot northeast winds forecasted from Cape May, New Jersey to Virginia Beach, Virginia. The forecast also warned of rough seas and surf with accompanying tides of two to three feet above normal. These Small Craft Warnings remained in effect until 2400 EDT the same date when they were changed to Gale Warnings. Both warnings were promulgated with Safety Voice Broadcasts by six Coast Guard units along the CAROLYN's Track line from Fort Macon, North Carolina to Baltimore, Maryland and the Marine Operator at Norfolk, Virginia. The actual weather conditions encountered by the CAROLYN during the afternoon of 20 September were those forecasted. The weather continued to deteriorate with northerly, northeasterly winds of twenty five to thirty five and gusting to fifty five knots, reported at the time of the casualty. These winds were accompanied by overcast skies with rain, and rough seas with eight foot

northeasterly swells, at the eastern extremity of Thimble Shoals Channel. The tide was recorded as ebbing at the CBBT during the time of the CAROLYN's transit and its subsequent collision.

4. The M/V CAROLYN departed Port Arthur, Texas at approximately 1430 CDT on 30 August with the WEEKS No. 254 barge in tow. This barge had been recently constructed and its owners purchased the CAROLYN at about the same time to deliver the barge to New York, N.Y. where they subsequently would both be placed into regular service. Minor alterations to the CAROLYN were accomplished prior to its departure from Port Arthur. These alterations, in the main, consisted of welding plates in the vessel's main deck doorways to raise the effective height of their coamings. In addition to the alterations it was also necessary to effect unspecified repairs to the vessel's steering gear which had presented problems during the transit from Houma, Louisiana to Port Arthur. An anchor and cable were provided on the barge with a tripping line reportedly trailed over the stern of the barge. An inspection of the tow arrangement was reported by the vessel's master to have been accomplished by a representative of the United States Salvage Association. The cited alterations were similarly reported to be a requirement of the same representative.

5. At the time of departure from Port Arthur and at the time of the casualty the barge was made fast to the CAROLYN with 1200 feet of 2" diameter nylon towing haswer. The bitter end of this hawser was attached to the tug's towing bitts by use of shackles. Approximately 400 feet of the towing hawser was then coiled down the stern of the tug and the line again secured to the bitts, this time by a simple coiling arrangement. This arrangement provided an effective tow line of approximately 800 feet connecting the tug and barge. The CAROLYN crew, departing Port Arthur consisted of an unlicensed master, an unlicensed mate, two deckhands and a cook. The master, one deckhand, and the cook's experience was largely restricted to the Gulf of Mexico, Louisiana oil fields or inland waters. A notable exception was a reported single trip of the master to New York over the projected track line of the CAROLYN. The experience level of the mate or the deckhand is unknown.

6. The CAROLYN and tow successfully transitted the Gulf of Mexico with no reported difficulties and continued up the Atlantic Sea Coast of Florida. On 6 September the vessels put into Port Everglades, Florida for fuel and supplies. Shortly after departing this port on 7 September the CAROLYN developed engine (port) trouble and consequently put into West Palm Beach, Florida, aided by another tug, at approximately 2130 EDT the following day. The CAROLYN remained in West Palm Beach for seven days undergoing repairs to the port engine. During this interval the CAROLYN mate and one deckhand were replaced. Both replacements were unlicensed although the mate formerly held a Motor Boat Operator's License which expired approximately two years before his instant employment. The new mate professed extensive experience off of the east coast of the United States and nearby islands while the new deckhand was completely inexperienced. At approximately 0930 EDT on 15 September

the tug and barge cleared West Palm Beach Inlet bound for its New York destination. Continuing northward the two vessels encountered no difficulties until the morning of 20 September at which time they were abeam of Chincoteague, Virginia.

7. The master of the CAROLYN described the early morning weather forecast on 20 September as nothing to be alarmed at. He similarly described relatively calm seas and low wind velocity. As the morning progressed he experienced worsening weather with the seas building and wind velocity increasing to thirty five knots from the northeast. The master and mate both became apprehensive about the influence that the light (2 1/2 foot draft) barge could exert on the CAROLYN and consideration was given to entering Chincoteague Inlet. The CAROLYN and tow were safely brought about at approximately 1130 EDT 20 September and began a southwesterly heading toward Chincoteague Inlet. Radio communications with Coast Guard Station Chincoteague, established shortly after the vessels had come about, influenced the two men to conclude it would be hazardous to enter the inlet. Again, the tug and its tow came about and headed up into the northeast winds. The two vessels were unable to make any headway against the wind and seas and thus came about yet another time to head southward toward the entrance of Chesapeake Bay. This southerly transit progressed without any reported difficulties until approximately 1830 EDT the same date when the tug requested assistance in mooring in the Hampton Roads area because they had no Chesapeake Bay charts and no one on board was familiar with the area. This assistance request was transmitted to the Coast Guard Station Little Creek via 2182 kilohertz.

8. The CAROLYN request was relayed initially to the Curtis Bay Towing Company who indicated that they did not have any equipment available. Subsequent calls to the McAllister Towing Company and the Allied Towing Company, also located in the Norfolk, Virginia area, elicited the same report of unavailable tugs to proceed out to the Thimble Shoals Channel entrance. Both firms, however, indicated that they could provide assistance after the tug and barge arrived at the Hampton Roads Bridge Tunnel. At approximately 1900 EDT 20 September, the CAROLYN was advised by the Coast Guard Station Little Creek, based on her description of lights observed, that the tug was apparently off of the Chesapeake Channel opening in the CBBT. Accepting this evaluation the tug then continued southward toward the Thimble Shoals Channel opening. Captain R. H. Dozier of the pilot boat HAMPTON ROADS partially monitored this radio exchange and contacted the Coast Guard Station Little Creek as a result thereof. After being apprised of the CAROLYN's plight Captain Dozier positioned the pilot boat just off of the entrance to Thimble Shoals Channel between Buoys "1" (LL 2903) and "2" (LL 2904).

9. At some time between 2100 EDT and 2130 EDT 20 September, Captain Dozier observed a light displaying a vessel searchlight characteristic, approximately one mile to the east of Cape Henry Light (LL 152). After establishing radio communication with the CAROLYN he brought his own searchlight into play and thus was able to identify the CAROLYN as the source of light in question. Captain Dozier questioned the CAROLYN personnel as to their awareness of their position and was advised by the tug's mate that the boat was seeking the opening in the Bridge Tunnel

with its light. The mate subsequently questioned the possibility of the tug and tow proceeding directly from its position to the pilot boat's position. After a discussion of some unspecified duration between the captain of the pilot boat and the tug's mate it was ascertained that the tug could safely steer a course of 040°T.

10. As the CAROLYN and tow proceeded toward Thimble Shoals Channel, an Allied Towing Corporation tug, the M/V WARRENGAS (O.N. 266657), became available. This availability was reported to the Coast Guard at 2150 EDT on 20 September and an estimated transit time of two hours to the CBBT was provided. In the meantime the CAROLYN call for commercial assistance prompted the Fifth Coast Guard District Rescue Control Center to order the Coast Guard Cutter POINT MARTIN (WPB 82379) to escort the tug and barge to the Hampton Roads Bridge and Tunnel. Subsequent reconsideration of weather conditions prompted the Rescue Center to substitute the MADRONA for the POINT MARTIN. This substitution was effected prior to any POINT MARTIN departure from its Little Creek Virginia mooring. At approximately 2200 EDT this same date, the WARRENGAS was dispatched to proceed out Thimble Shoals Channel to rendezvous with the CAROLYN and render whatever assistance the WARRENGAS could and escort the troubled tug and tow into Hampton Roads. At approximately the same time the MADRONA, which was underway in the Hampton Roads area was diverted to the Chesapeake Bay entrance with orders to locate the CAROLYN and escort her through Thimble Shoals Channel until relieved by commercial assistance.

11. The MADRONA, WARRENGAS, CAROLYN, and WEEKS No. 254 were now all proceeding toward the Thimble Shoals Channel opening in the CBBT. At approximately 2215 EDT on 20 September, the CAROLYN and tow were in the vicinity of the Chesapeake Bay Entrance Junction Buoy (LL 155.05). While the vessel was in this area her master first voiced his apprehension on maintaining a westerly heading. Continuing this westerly reach the two vessels were abeam to the wind and seas thus subjecting the tug to an appreciable wind heel effect and exposing a tremendous sail area for the light barge. These conditions resulted in a port list of the tug and a southerly setting of the barge. Both conditions aggravated the already undesirable gravitation capability, with the potential moment influence, of the vessel's cross-connected fuel tanks. These tanks, four in number, consisted of a pair of tanks forward of the vessel's engine room and a pair aft of the engine room. The forward pair was bounded by the vessel's hull, the main deck and forward and aft bulkheads. A longitudinal bulkhead separates the pair thus providing two independent tanks. The two after tanks were similarly constructed except for a relatively small volume space obtained by the installation of internal bulkheads. This space was utilized for lubricating oil stowage and is so arranged that it partially separates the much larger fuel tanks. All four tanks were connected by a one and a half inch (1 1/2") I.P.S. pipe containing a shutoff valve for each tank. The four valves were known to be open and therefore all four tanks were cross connected.

12. By 2300 EDT 20 September, the CAROLYN was at the approximate position of the Cape Henry Wreck Lighted Buoy (LL 2674). This position prompted Captain Dozier to advise the tug to come around further to the west. As the tug shaped up on the approximate heading of 315° its master was advised that this course looked good to enter the channel but required a little northerly compensation to bring him above the Thimble Shoals Channel into an established "Auxiliary Channel". This channel, he was informed, was for use by light vessels with less than twenty foot draft. The CAROLYN master expressed much displeasure at leaving all the buoys on his port hand or in effect passing them on the "wrong side". Captain Dozier reassured him that there was sufficient water to the north of the lighted channel and that the MADRONA would be on the scene prior to the tug's entrance at the opening in the CBBT. By this time a combination of forces, represented by the barge's southerly leeway, wind heel effect, and gravitating fuel, was exerting sufficient pressure on the tug to cause a noticeable port list. However, the tug's master continued his western transit on the presumption that he would encounter better weather inside and was subsequently contacted by the MADRONA at approximately 2315 EDT on 20 September.

13. The initial contact between the MADRONA and CAROLYN was a radio transmission which took place when the MADRONA was approximately midway between Thimble Shoals Light (LL 2927) and the opening in the CBBT. At this time the CAROLYN was lined up to enter the channel and did not indicate that she was in distress or required any special assistance. The tug was advised by the MADRONA that the two vessels would rendezvous between Thimble Shoal Channel Buoys "4" (LL 2906) and "6" (LL 2908) at 2335 EDT on that date. This rendezvous was effected and the actual escort of the CAROLYN and WEEKS No. 254 commenced when the latter two vessels were in the vicinity of Thimble Shoals Channel Buoy "4". Lieutenant Commander Ralph E. Knorr, Commanding Officer of the MADRONA, expressed concern to the CAROLYN of the riding angle between the tug and tow. This angle, caused by the barge riding appreciably to the south of the tug, posed the possibility that the tow would become fouled in the line of buoys. The MADRONA Commanding Officer succeeded in getting the CAROLYN to come up further to the north only after an expression of the tug master's reluctance to move further outside of the buoy line. As the MADRONA passed through the opening of the CBBT ahead of the CAROLYN the buoy tender illuminated the unlighted day mark on the northern extremity of the auxiliary channel until the CAROLYN was able to similarly play her own searchlight on the aid to navigation.

14. The tug and tow continued on through the CBBT Thimble Shoals Channel opening thus passing the aid in question at a distance of several hundred feet without any difficulty. As this transit took place, at approximately 2345 EDT 20 September, the tug WARRENGAS established radio contact with the MADRONA. The purpose of this transmission was a request by the tug to remain near Old Point Comfort, Virginia until the MADRONA, the CAROLYN and the WEEKS No. 254 progressed further up the Thimble Shoals Channel. This request cited bad weather, which

by now included fifty five knot northerly/northeasterly gusts and seas in excess of 4' to the west of the Bridge/Tunnel complex, as the reason for remaining Inside. This information was relayed to the CAROLYN who registered displeasure with this arrangement, and reported that she was experiencing difficulty with her tow and was listing to port. The WARRENGAS reported to the MADRONA that she (tug) had monitored the CAROLYN description of her (tug and tow) plight and the WARRENGAS was continuing outbound in the Channel. This radio exchange closely coincided with the approximate 2400 EDT 20 September position of the CAROLYN and WEEKS No. 254.

15. At some time after 0000 EDT and before 0015 EDT on 21 September the CAROLYN and tow reached a position just north of Thimble Shoal Channel Buoy "10" (LL 2914) which also represented her westernmost transit. At this time the CAROLYN master decided that he could no longer maintain a westerly course in light of the tug's ever increasing port list and trim by the stern. The port side of the tug's main deck and stern was awash and was reported by both CAROLYN and MADRONA personnel to be listing twenty to thirty degrees. Concern for this list caused the tug's master to attempt to head up into the wind in order that fuel could be transferred. It was concluded by Mr. LeBoeuf that the described fuel transfer would correct the vessel's dangerous list and trim. At approximately the same time the CAROLYN master requested the WARRENGAS to take the WEEKS No. 254 into tow. This request prompted a prolonged discussion between the master of the CAROLYN and Mr. Bonnie Ray Skinner, the unlicensed master of the WARRENGAS. This discourse turned on the size of the CAROLYN towing hawser and the merits of the CAROLYN cutting the hawser in question. A significant misunderstanding developed over the size of the hawser as the CAROLYN expressed its (nylon line) size in inches diameter and the WARRENGAS assumed this dimension to be in inches circumference.

16. At approximately 0015 EDT 21 September, the CAROLYN attempted to come around to the starboard and thus head up into the winds and seas. As the vessel neared or reached a northerly heading the port engine became inoperative and the tug's master sent a deckhand, Mr. Dennis West, down to the engine room to restart the stopped engine. As the deckhand returned to the wheelhouse the engine stopped again. Again he was sent to the engine room where the same situation was repeated. During these efforts to start the engine he started the electric bilge pump which was also located in the engine room. Efforts to pump the engine room were unsuccessful because of the bilge suction location and the vessel's list. This suction was located on the centerline and there was insufficient water in the bilges, combined with the port list, to provide a suction for the pump. The CAROLYN master then ordered the deckhand to take the wheel while he (Le Boeuf) restarted the engine. During the master's absence the deckhand noted difficulties with the steering and discovered that he was unable to hold the vessel around to the starboard with only the starboard engine. On the contrary the vessel began to fall off to the port and drifting slowly to the southeast.

17. The master was likewise unsuccessful in starting the port engine and discovered a bight of his towing hawser, streaming out through a freeing port on the port hand side of the stern, which was apparently fouled in the port screw. In the meantime the discussion sporadically continued between the master of the CAROLYN and the master of the WARRENGAS over the relinquishment of the tow. No request was made nor consideration given to the passing of a line between the two tugs, notwithstanding the relatively long discussion regarding WARRENGAS assistance. During the course of this discussion the WARRENGAS made a pass down both sides and the stern of the WEEKS No. 254 at a distance estimated to be fifty feet. The tripping line described by the CAROLYN master was not discovered by the WARRENGAS. This failure was understandable in consideration of the fact that the WARRENGAS did not utilize her searchlight at the barge's stern nor was the presence of a tripping line made known to her personnel. As a result of this observation Mr. Skinner determined that it was impossible to get a line on the barge or take control of the existing tow line.

18. The CAROLYN's already near impossible situation continued to deteriorate as the vessel's starboard engine failed shortly before 0045 EDT on 21 September. This failure now placed the disabled tug and its tow solely in control of the north, northeasterly winds and an ebbing tide. The CAROLYN master immediately caused a seventy five pound Danforth anchor, attached to the vessel by an estimated one hundred and fifty feet of 1 1/4" diameter polypropylene line, to be thrown over the side. The anchor offered little resistance, however, and the two vessels continued to drift helplessly in an east, southeasterly direction. At approximately 0045 EDT 21 September, the CAROLYN advised the MADRONA by radio that her (tug) screws were fouled by the towline. The tug and tow were approximately fifteen-hundred yards distant from the CBBT at this time. The MADRONA Commanding Officer ordered his crew to General Quarters and portable pumps broke out on the premise that he could assist the CAROLYN. The CAROLYN came up on the radio again, at approximately 0100 EDT the same date to state "Coast Guard get over here right away" or words to that effect. When queried as to her problem the CAROLYN responded with the observation that she was sinking and requested that her crew be evacuated. The WARRENGAS had also received the radio request for help by the CAROLYN. Their (WARRENGAS) response, in consideration of their size vice the MADRONA and the latter's presence in the proximity of the CAROLYN, was to advise the stricken vessel's crew that they should "keep cool, assistance is on the way" or words to that effect. As the MADRONA headed for the stricken tug she questioned the WARRENGAS as to the status of the WEEKS No. 254. After discovering that the barge was still attached to the CAROLYN the MADRONA requested the WARRENGAS to stand clear while the cutter removed the CAROLYN crew. The CAROLYN crew was advised of the MADRONA's intent to evacuate them and they began their preparations to abandon ship by collecting their personal gear. In light of the new potential danger to the tug and tow combination and the tug's crew the POINT MARTIN was dispatched to the scene at approximately 0100 EDT that date.

19. The MADRONA made her approach on the CAROLYN from the windward side. As the cutter continued down in a general southeasterly direction the

starboard side of the tug was presented making conditions right for a direct approach of the MADRONA starboard bow to the starboard quarter of the CAROLYN. Approaching the tug in this manner permitted MADRONA crew members to pass a heaving line from the forecastle of their vessel to the stern of the tug. The CAROLYN crew were apparently unaware that a heaving line had been passed over to them, thus prompting personnel on the MADRONA to shout "grab the line" or "get the line" or words to that effect. In the meantime crew members on board the CAROLYN reported to their master that someone on the MADRONA had requested them to "cut the line". Assuming this request to be directed to the anchor line, because of possible interference with the MADRONA approach, Mr. Le Boeuf ordered deckhand West to cut the anchor line. The deckhand obtained a knife from the galley and carried out his orders to cut the anchor line thus exposing the tug and barge to the undampened effects of the wind and tide. The starboard bow of the MADRONA was placed at or near the starboard stern of the CAROLYN thereby enabling the tug's crew to step over from the CAROLYN's quarter to the waist, or better known as buoy deck, of the Coast Guard vessel.

20. The Commanding Officer of the MADRONA immediately summoned the CAROLYN master to the tender bridge in order that he (LCDR Knorr) might obtain an accurate assessment of the tug's condition. In response to the question of utilizing pumps on the tug, the master advised the MADRONA Commanding Officer that it was useless because the tug was sinking and the problem was fuel more than water. A scant five minutes later the MADRONA then backed away from the stricken tug where she (MADRONA) had maintained station pending the evaluation by the tug's master. By this time the distance between the stricken tug, with its tow and the CBBT had closed to approximately one thousand yards. It was now 0115 EDT 21 September and the MADRONA commenced her efforts to gain control of the drifting tug and barge. As the cutter maneuvered to the WEEKS No. 254 the Coast Guard Group Norfolk was advised of the potential danger to the CBBT. Upon receipt of this information at shortly after 0120 EDT 21 September, the Group advised Sergeant J. H. Moore, CBBT Security and Tolls Division, that an unmanned tug and barge was adrift eight hundred yards west of number one bridge island and was in immediate danger of striking the bridge. Based on this information the Sergeant stopped traffic on the north end of the tunnel and dispatched Patrolman R. D. Fulcher to do likewise on the southern side of the tunnel.

21. Initial attempts by the MADRONA to secure the stricken vessel's towline were by the use of a grapnel. Failing in this attempt the cutter placed her bow against the towline and endeavored to work the line up on to the forecastle. This effort was also unsuccessful as were lassoing type throws at the barge's bitts by the MADRONA Boatswain from that vessel's raised forecastle. The MADRONA then came alongside the barge and attempted to retrieve lines lying visible on the starboard side of the barge's deck. Unsuccessful again the MADRONA backed away as the barge was now an estimated one hundred twenty five feet from the bridge. A brief observation of the WEEKS No. 254 stern did

not reveal to the MADRONA crew the existence of any line extending down into the water nor was the presence of any described tripping line made known to the Coast Guard vessel. Shortly after the MADRONA backed away from the barge in question the CAROLYN struck Trestle A of the CBBT with the WEEKS No. 254 striking the same structure immediately thereafter. Patrolman Fulcher indicated the time and point of initial impact of the tug to be 0140 on 21 September in the vicinity of 3 mile post. This position represents a distance of approximately 2 1/2 miles from the shore line. The barge was streamed out to the south of the tug still attached by the towline. Arriving on the scene at this time was the POINT MARTIN which was directed by the MADRONA to make a pass at the barge in an effort to get a line on the WEEKS No. 254. The POINT MARTIN responded a short time later that she was unable to get a line on the barge and was experiencing appreciable difficulties from the seas. The Commanding Officer of the MADRONA recalled the POINT MARTIN and the smaller craft was dispatched back to Little Creek. Drifting southward along the west side of the trestle the tug and barge repeatedly struck the structure until the tug went under the bridge in the vicinity of 2 mile post. As the still lighted CAROLYN passed on to the southeast the towing hawser fetched up on a pile bent thus constraining the tug at some short distance to the east with the barge remaining against the west side of Trestle A. The tug and barge remained in this position at least until approximately 0200 EDT 21 September, at which time Patrolman Fulcher departed the scene.

22. Unable to offer any further assistance the POINT MARTIN departed the scene at approximately 0300 EDT on 21 September. At approximately 0315 EDT on 21 September the Norfolk Coast Guard Rescue Coordination Center was advised that the CAROLYN was on the beach east of the CBBT and the WEEKS No. 254 was aground at or near the juncture of Trestle A with the Virginia shore line. The barge continued to strike the bridge as it surged with the now flooding tide. Structural sections of the bridge tumbled on to the barge as it ultimately fetched up approximately halfway through the roadway as the tide began to recede and water being pumped into the barge exerted a dampening effect. The ebbing tide left the barge high and dry well above the usual high water mark because of a high tide of at least 3.6 feet above normal.

23. The CAROLYN was first boarded by Coast Guard personnel at approximately 1200 EDT 21 September while it was at rest on the beach. The vessel was sitting upright with its lights burning normally as one of the generators was still running and on the line. The vessel's towing hawser was fouled in both screws and a line of approximately 1 1/2 inch diameter, which originated on the tug, was observed extending out through a freeing port on the vessel's port stern. This line continued down into the water and ultimately wrapped itself around the vessel's rudder. Members of the boarding party observed the top of the wheelhouse sheared off and the remainder of the tug largely intact. They reported little water inside of the deckhouse or in the engine room bilges. Their limited visibility within the semi darkened engine room narrowed their observations to a point approximately one foot below the deckplates.

A subsequent boarding by Coast Guard personnel revealed what appeared to be a high water mark on the engine room bulkheads about two inches above the deckplates. Ullages taken at this time were approximately equal in all fuel tanks and indicated that these tanks were slightly more than half full at the time of the casualty.

24. The Board conferred with members of the Commander, Fifth Coast Guard District Staff regarding similar casualties to the CBBT which resulted in a disruption of service. The Board similarly attempted to identify previous casualties by discussion with officials of the CBBT. The Board was unable to identify any vessel precipitated casualties, whereby the affected vessels struck the bridge under their own power. On the other hand the relevant similarity, of all identified casualties, was that the vessels drifted into the bridge in an uncontrolled and unpowered condition.

25. One of the casualties described above involved the USS YANCEY (LKA-93) which drifted into the CBBT on 21 January 1970. Subsequent to this casualty the Commander, Fifth Coast Guard District, initiated a meeting between Hampton Roads parties who shared a common concern for vessel casualties which might affect the CBBT. These parties included local governmental agencies, CBBT officials and other marine interests. The conferees at this meeting recognized that a principal contribution to any efforts directed toward precluding casualties similar to the YANCEY collision with the CBBT, was improved communication. The success of this consideration was evidenced by the continuous communication maintained by the concerned parties with the CAROLYN during the incident under consideration and the timely evacuation of the bridge trestles. Periodic meetings have continued since this described conference to further explore the ways and means of protecting the Bridge in question.

26. Satisfactory repairs to the Barge WEEKS No. 254 were completed on 6 December 1972 under the cognizance of the Officer in Charge, Marine Inspection, Baltimore, Maryland. The vessel proceeded to that port under the authority of a Permit to Proceed to Another Port for Repairs issued by the Officer in Charge, Marine Inspection, Portsmouth, Virginia on 11 October 1972.

CONCLUSIONS


1. That, the proximate cause of the casualty was the fault of the CAROLYN master for an act of poor seamanship which provided a source of disablement for his vessel. Such action manifested itself in his failure to effectively secure the vessel's towing hawser notwithstanding his knowledge of an impending deterioration of the weather.
2. That, a principal contributing cause of the casualty was the CAROLYN common fuel oil line arrangement which provided a gravitation capability between all four tanks.
3. That, an additional contributing cause of the casualty was the failure of the CAROLYN to have charts of the Chesapeake Bay area on board thereby exposing the vessel to the elements for a much longer period of time than necessary. Specifically, such charts would have permitted the vessel to effect a more direct approach to the bridge opening thus reducing the period that fuel would be gravitating from the starboard fuel tanks to the vessel's port fuel tanks.
4. That, a principal contributing factor to the casualty was the CAROLYN master's failure to advise the Coast Guard Cutter MADRONA or M/V WARRENGAS of the presence of an anchor "tripping Line" extending down from the WEEKS No. 254.
5. That, the misunderstanding between CAROLYN and WARRENGAS regarding the size of the towing hawser did not contribute to the cause of the casualty nor materially effect the scope of the casualty. Subsequent events to the discourse over line sizes indicate that other factors, such as weather and actual towline retrieval options available, exerted the major influence on any WARRENGAS attempt to relieve the CAROLYN of its tow.
6. That, the order to cut the anchor line presumed to have originated on the MADRONA was in fact a misinterpretation of the pleas from the MADRONA crew to secure a heaving line.
7. That, the CAROLYN master's concern about his vessel turning over and his action in coming around to head his vessel into the wind was a rational response. His subsequent evaluation of the tug's condition as "sinking", however, reflected his lack of knowledge regarding vessel stability. Such lack of knowledge precluded salvage attempts by the MADRONA, which can only be concluded as likely to be successful, and thus contributed to the casualty.
8. That the reported equal fuel tank ullages and absence of water in the engine room bilges of the grounded CAROLYN was a function of the leveling effect of the grounding. This effect provided the running bilge pump with a suction and permitted the fuel to gravitate to an equal level.

9. That, the casualty may have been prevented if the MADRONA or WARRENGAS had placed a towline on the CAROLYN with or without an attendant sinking of the tug.
10. That, the evacuation of the CAROLYN crew was executed in a timely and professional manner which reflects favorably upon the MADRONA Commanding Officer and her officers and crew.
11. That, there is no evidence of violation of any laws administered by the Coast Guard.
12. That, there is no evidence that any personnel of the Coast Guard or any other governmental agencies caused or contributed to the cause of the casualty.
13. That, a continuing dialogue between all of the parties concerned with vessel casualty influence on the CBBT should be useful and might result in a practical contingency plan.

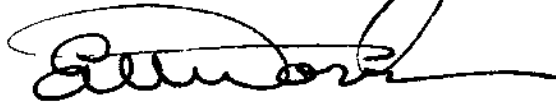
RECOMMENDATIONS

The Recommendations of the Board are:

1. That, this Report be considered by the United States Coast Guard in its development of regulations implementing Public Law 92-340 (Ports and Waterways Safety Act of 1972) and Public Law 92-339 (Towing Vessel Licensing Act).
2. That, this report be forwarded to the Commander, Fifth Coast Guard District for his consideration and/or utilization in any Study or implementation of Contingency Plan(s) concerning the safety of the Chesapeake Bay Bridge and Tunnel.



R. W. GOEHRING, RADM, USCG
Chairman



E. W. DORR, CAPT, USCG
Member



D. F. SMITH, CDR, USCG
Member



W. E. HEATH, CDR, USCG
Member and Recorder