MARINE CASUALTY REPORT

SINKING OF THE MOTOR TOWING VESSEL JOAN ELLIS IN GALVESTON BAY JULY 22, 1970

U.S. COAST GUARD MARINE BOARD of INVESTIGATION REPORT and COMMANDANT'S ACTION

ACTION BY NATIONAL TRANSPORTATION SAFETY BOARD

DEPARTMENT OF TRANSPORTATION
WASHINGTON D.C. 20591

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M/V JOAN ELLIS
SINKING IN GALVESTON BAY
ON 22 JULY 1970

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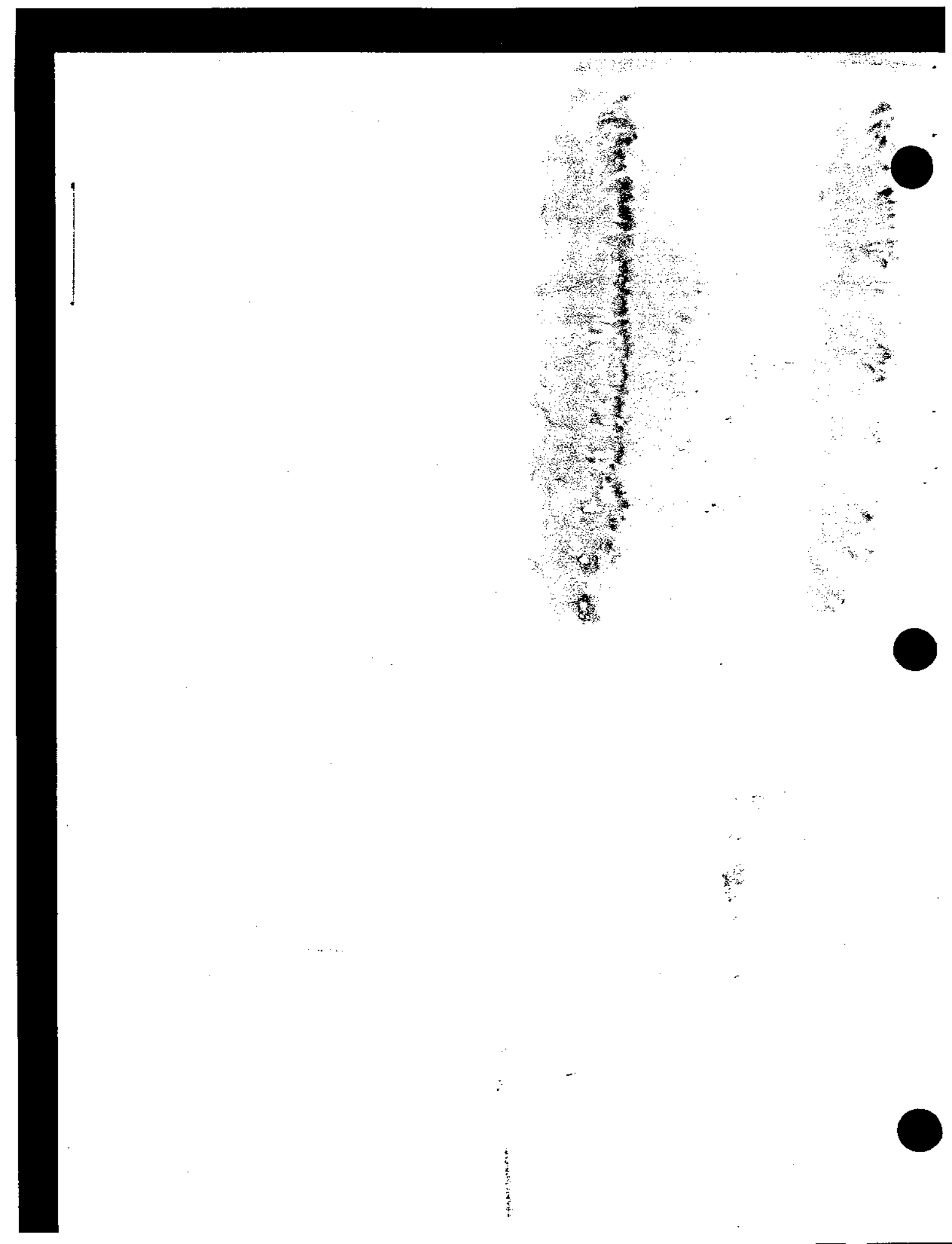

NATIONAL TRANSPORTATION SAFETY BOARD
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SINKING OF THE MOTOR TOWING VESSEL JOAN ELLIS IN GALVESTON BAY JULY 22, 1970

ACTION BY NATIONAL TRANSPORTATION SAFETY BOARD

This casualty was investigated by a U. S. Coast Guard Marine Board of Investigation convened at Galveston, Texas, on July 22, 1970. A representative of the National Transportation Safety Board attended these proceedings. The Safety Board has reviewed the investigative record and considered those facts which are pertinent to the Board's statutory responsibility to make determination of cause or probable cause and to make recommendations to prevent recurrence of such a casualty.

SYNOPSIS

The towing vessel M/V JOAN ELLIS, owned and operated by Inland Towing Company, Galveston, Texas, sank in Galveston Bay at about 0315 c.d.t. on July 22, 1970. At the time of the casualty, she was towing four empty barges and was en route from Houston to Brownsville. Two of the five crewmembers drowned; the other three were rescued by the towing vessel M/V GRAMPUS. The JOAN ELLIS was salvaged and the barges were not damaged.

The National Transportation Safety Board determines that the probable cause of this sinking was flooding of the two aftermost compartments through deck manholes, resulting in settling of the stern and the ultimate massive flooding of the engineroom through open deck doors. Contributing to the casualty were: the strain imposed by the towing hawser when the vessel turned to starboard and increased speed; the splashing of waves from the barge over the stern; the inadequate freeboard; the inadequate bilge system; the non-watertight manhole covers; the low sills under weather deck doors; the galley deck level which is a

foot lower than the main deck; and the absence of stop valves in the drains from the fresh water compartment and galley into the engine-room bilges. Loss of life might have been prevented if the vessel had been equipped with a general alarm system.

SUMMARY OF FACTS

The M/V JOAN ELLIS was towing four unloaded barges from Houston on a short scope of her towing hawser. The lead barge was being towed stern end towards the towing vessel, with only about 10 feet of clearance between the barge and the vessel. For several hours prior to the time of the casualty, choppy 3-foot waves striking the blunt lead area of this barge sprayed water over the stern of the JOAN ELLIS. When the tow approached buoy 25A, the speed was reduced preparatory to changing course to the right to enter the Galveston to Freeport cutoff of the Intracoastal Waterway. At about 0300, the pilot decided that the vessel felt sluggish and he sent the deckhand below to check for water in the engineroom bilges. He reported back that there was none. At 0310, the pilot sensed that the vessel was more sluggish in responding to the rudders and sent the deckhand below again to check the bilges. At this time, the pilot glanced astern and noted that the water was almost covering the 18-inch-high bulwarks at the stern. The vessel quickly settled by the stern, listed to starboard, and sank at 0315. The pilot did not have time to broadcast a voice radio distress message before power was lost.

Just prior to the sinking, the master ran to the bridge and told the pilot that they were sinking, then he went aft, presumably to cut the barges loose. The deckhand on watch shouted through the port crew's quarters door to warn the other deckhand and the cook. There was no alarm system. The off-duty deckhand survived, but the deckhand on watch and the cook were trapped inside the crew's quarters. The master, pilot, and off-duty deckhand escaped over the port side and clung to debris. They did not have time to don available lifepreservers. The barges overran the sinking vessel and struck the top of the wheelhouse. A portable battery light from the bridge drifted by and the master used it to signal the passing towing vessel GRAMPUS, which rescued the three survivors.

The JOAN ELLIS is an uninspected towing vessel, 52 feet long, of 55 gross tons, and powered with twin diesel engines producing a total of 800 horsepower. This vessel is not subject to the loadline regulations, nor maintained in class by the American Bureau of Shipping. Its

subdivision is such that the engineroom space comprised about three-quarters of its internal volume below the main deck. The vessel has not been inclined, and no stability data are available for this hull type.

A bulwark, 18 inches high, is installed around the stern, fitted with freeing ports. There are two deck access openings on the after-deck. One rectangular manhole provides access to the aftermost rudder housing compartment. This manhole is about 24 by 36 inches and is designed to be secured with 30 bolts and a gasket. At the time of the casualty, only about eight of the bolts were in place. No drain is provided for this compartment.

The second opening aft is to the fresh water compartment, consisting of a circular manhole about 15 inches in diameter, with a center bolt securing arrangement. The manhole cover had rusted through and was difficult to dog down tightly. This compartment drains into the engine-room through a 1-inch drain line which was not fitted with a stop valve.

The deck doors to the galley, engineroom, crew's quarters, and toilet are about 30 inches wide, and 60 inches high, and are constructed of wood. They were hooked open at the time of the sinking. Sills for these doors are 9 inches high. The aftermost compartment is the galley, next forward is the engineroom, and the crew's quarters are located forward. One-and-one-fourth-inch drain lines located in the after corners of the galley deck discharge unchecked into the engineroom. The galley deck is 1 foot lower than the main deck.

The JOAN ELLIS previously had sunk in 1965 and again in 1967. The first sinking was due to a leaking stern tube packing gland, and the second was caused by the vessel's being overrun by barges. However, she has operated in such exposed waters as Matagorda Bay without experiencing any problems involving her seaworthiness.

The pilot on watch had served on the JOAN ELLIS for only 9 days and the deckhand was inexperienced. No members of the crew held any type of license. The pilot held a Merchant Mariners Document endorsed for tankerman.

ANALYSIS

The Safety Board concurs in the conclusions of the Marine Board of Investigation. The lack of design plans and building specifications

precludes calculation of the exact effect that flooding of the after two compartments would have on the vessel's trim. It is possible that these compartments contained water prior to the towing vessel's departure from Houston. The full load of fuel oil and fresh water at departure resulted in drafts of 5 1/2 feet forward and 7 1/2 feet aft. Based on the only available inboard profile plan of the vessel, this would give her a maximum of 5 to 6 inches of freeboard on the afterdeck. The added weight of the new engines (installed in 1966) and the pilothouse, which was raised in 1963, would have reduced this freeboard slightly from her original design loaded draft.

Three-foot waves splashing against the blunt leading end of the barge caused about 1 foot of water to be maintained on the stern of the JOAN ELLIS for several hours. This head of water resulted in progressive flooding through the after two manholes on deck. The rudder stock compartment flooded and water entering the fresh water compartment flowed through the two drains and partially flooded the engineroom bilges. This increased the vessel's trim by the stern. Progressive flooding of the engineroom made it possible for water to enter through the galley doors. Water was entrapped on the galley floor and drained into the engineroom.

The sudden sinking by the stern, with a starboard list, was due to large quantities of water entering through the open engineroom doors and to the strain of the towing hawser to starboard. This strain was aggravated by the change in course and increase in speed. These emergency maneuvers are attributed to the inexperience of the pilot. His lack of familiarity with the operating characteristics of the vessel also account for his failure to detect earlier that the towing vessel had taken on water aft.

This vessel has sunk three times which raises a serious question as to its seaworthiness and emphasizes the need for minimum safety standards and inspection. A freeboard of only 5 inches is not adequate even for inland waters. The inadequate bilge system, and the lack of a general alarm and watertight closures on deck, all contributed to this sinking. The bilge alarm system was connected to the electrical circuit for the galley range. When the stove was not turned on, the alarm was not energized. Vessels subject to Coast Guard inspection and certification are required to have separate emergency electrical circuits for the alarm, an emergency power source in event of failure of the main electrical system, inclining tests and stability data, and minimum manning requirements for licensed personnel are prescribed.

The Safety Board noted the need for inspection laws and regulations in its action on the report of the Marine Board of Investigation of the loss of

the towing vessel M/V MARJORIE McALLISTER, released June 29, 1971. The sinking of the JOAN ELLIS is the ninth such uninspected vessel casualty noted by the Safety Board.

The loss of the two crewmembers trapped in their quarters might have been avoided if the vessel had been equipped with a general alarm. The rescue of the master, pilot, and deckhand was made possible primarily by a waterproof light which floated within reach of the master and enabled him to signal the passing towing vessel GRAMPUS. It is probable that one or more of the survivors might have drowned before they could have been seen in daylight.

In this case, all three of the crewmembers who managed to get off the vessel before it sank were seen and picked up by the passing M/V GRAMPUS. However, under similar circumstances, the availability of an inflatable liferaft would greatly increase the chances of survival for persons in the water.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this sinking was flooding of the two aftermost compartments through deck manholes, resulting in settling of the stern and the ultimate massive flooding of the engineroom through open deck doors. Contributing to the casualty were: the strain imposed by the towing hawser when the vessel turned to starboard and increased speed; the splashing of waves from the barge over the stern; the inadequate freeboard; the inadequate bilge system; the non-watertight manhole covers; the low sills under weather deck doors; the galley deck level which is a foot lower than the main deck; and the absence of stop valves in the drains from the fresh water compartment and galley into the engineroom bilges. Loss of life might have been prevented if the vessel had been equipped with a general alarm system.

RECOMMENDATIONS

The National Transportation Safety Board concurs in the recommendations of the Coast Guard Marine Board of Investigation and the Commandant's action thereon. We strongly support the legislation which is being considered by the Congress which would require the licensing of persons in charge of the navigation of towing vessels. In addition, the Safety Board reaffirms its previous recommendations concerning offshore towing vessels and the need for an analysis of towing vessel casualties in inland waters to determine the need for legislation requiring inspection of all towing vessels.

The Safety Board further recommends that the Coast Guard analyze casualty reports of towing vessels to evaluate the need for regulations requiring inflatable liferafts of sufficient capacity to accommodate all persons on board.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

Adopted this 23rd day of September 1971:

John H. Reed, Chairman

Oscar M. Laurel, Member

Francis H. McAdams, Member

Louis M. Thayer, Member

Isabel A. Burgess, Member

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

Address reply to:
COMMANDANT (MVI-3)
U.S. COAST GUARD
WASHINGTON, D.C. 20591

5943/JOAN ELLIS
A-8 Bd

Commandant's Action

on

The Marine Board of Investigation convened to inquire into the circumstances surrounding the capsizing and sinking of the M/V JOAN ELLIS in Galveston Bay on 22 July 1970 with personnel casualties

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 of the casualty by the National Transportation Safety Board.

SYNOPSIS OF FINDINGS OF MARINE BOARD OF INVESTIGATION

1. At about 0315 CDT on the morning of 22 July 1970 the uninspected towing vessel JOAN ELLIS capsized and sank in Galveston Bay. Two persons lost their lives. The vessel was later raised and salvaged. A survey determined that the vessel sustained considerable damage.

2. The 52 foot steel hull towing vessel JOAN ELLIS was enroute to Brownsville, Texas by way of the intracoastal waterway. The vessel was towing four empty freight barges about 10 feet astern on a short hawser with bridle. There was a 2 to 3 foot choppy sea in the Bay. The bow wave of the barge, coupled with the seas slapping against the barge caused water to splash on the after deck of the JOAN ELLIS.

3. At about 0300 when speed was reduced the vessel began to feel sluggish in her movements and steering became more difficult. The deckhand was directed to go to the engine room to check the bilges, and upon his return indicated that everything was normal. Speed was resumed, and at about 0310 the vessel again felt sluggish to the pilot. The deckhand was sent to the engine room to check the bilges

once more. The pilot looked aft and saw water coming over the bulwark and on to the after deck. The Master awakened about this time and looking out saw that the deck was covered with a foot and half of water with the after bulwark barely visible. The vessel listed sharply to starboard and the vessel started to sink by the stern. As the stern sank power failed, the lights went out, and the vessel heeled severely to starboard sinking rapidly by the stern.

4. About an hour later, the towing vessel M/V GRAMPUS came upon the scene and rescued three of the crew.

5. The vessel was raised and later examined as she lay on a marine railway in Galveston, Texas. It was determined that the major alterations made by raising the wheelhouse one deck level adversely affected its stability. There was no evidence that any stability tests had ever been made to the vessel. Further examination of the vessel revealed that the aftermost watertight compartment was flooded, apparently through the deck manhole cover that was in place and bolted. There were no provisions for draining or pumping out the aftermost compartment. The space forward of the aftermost compartment is also watertight; however the deck manhole cover was found wasted and holed at the boss of the center bolt hole. This space drained into the engine room bilges.

6. A pump installed in the engine room was equipped to pump the engine room bilges when required. A high level bilge alarm was fitted; however it was not heard at any time before the casualty.

REMARKS

1. Concurring with conclusions of the Board, the capsizing and sinking of the vessel was caused by the loss of stability and freeboard, which was brought about by gradual filling of the after spaces with sea water through defective manhole covers on the main deck.

ACTION CONCERNING THE RECOMMENDATIONS

1. The Coast Guard has statistically analyzed towing vessel casualties and determined that inspection of all towing vessels and licensing of their personnel is essential in the interest of saving lives and

property. Although the licensing of towing vessel operators would initiate a reversal of one of the most significant cause of uninspected towing vessel casualties, this casualty confirms that compulsory inspection by legislation is required to determine standards of construction, design and machinery. Legislation for licensing of towing vessel operators and inspection of towing vessels is now pending in Congress.

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

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

Address reply to:
Commanding Officer
USCG Marine Insp. Office
Room 201
Customhouse
Galveston, Texas

29 DEC 1970

From: Marine Board of Investigation
To: Commandant

Subj: M/V JOAN ELLIS, O.N. 269219 sinking, Galveston Bay, 22 July 1970, with loss of life

FINDING OF FACT

1. The uninspected M/V JOAN ELLIS while enroute Houston, Texas to Brownsville, Texas towing four light freight barges capsized and sank in Galveston Bay 100 yards West of Houston ship channel Buoy 22 (LL 2926) (USC&GS Chart No. 519) at about 0315 CDT on 22 July 1970. Of the five crew members on board, two lost their lives and three were rescued by a passing vessel without major injury. Damage to the vessel was substantial but no damages were sustained by the barges.

2. The vessel involved:

Name	MV JOAN ELLIS
Official Number	269219
Gross Tons	55
Net Tons	37
Service	Towing
Registered Length	52'
Registered Breadth	19.0'
Registered Depth	7.1'
Propulsion	Twin Screw Diesel
Horsepower	800
Homeport	Galveston, Texas
Built	Houston, Texas
Year Built	1955
Date inspected	Not inspected
Master	Clinton E. Kennedy
Owner and Operator	Island Towing Company P.O. Box 513 Galveston, Texas
Document	Enrollment and License for Coasting Trade in Towing Service.

3. The barges towed:

MV-679, official number 276694, an unmanned uninspected steel hulled hopper type cargo barge of 911 gross tons, 911 net tons, 193.9 feet registered length, 35.1 feet registered breadth, and 10.9 feet registered depth, homeport St. Louis Missouri; built at Ambridge, Pennsylvania in 1958, owned by the Mississippi Barge Line, 411 N. 7th St., St. Louis, Missouri.

CL-605, official number 297463, an unmanned, uninspected, steel hulled hopper type cargo barge of 885 gross tons, 885 net tons, 195.1 feet registered length, 35.1 feet registered breadth, 9.7 feet registered depth; homeport Wilmington, Delaware built in 1964 at Neville Island, Pennsylvania; owned by Northwestern Mutual Life Insurance Co., 720 E. Wisconsin Ave., Milwaukee, Wisconsin.

14, official number 507195, an unmanned, uninspected steel hopper type cargo barge of 909 gross tons, 909 net tons, 195.1 registered length, 35.1 registered breadth, 10.8 registered depth; homeport Wilmington, Delaware; built in 1967 at Neville Island, Pennsylvania; owned by Dundee Cement Co., P.O. Box 122, Dundee Michigan.

S-711, official number 272381, an unmanned, uninspected steel hopper type freight barge of 476 gross tons, 476 net tons, 175.1 feet registered length, 26.1 feet registered breadth, 9.3 feet registered depth; homeport Wilmington, Delaware, built in 1956 at Paducah, Kentucky; owned by H.T. Post & Co., 611 E. Marcean St., St. Louis, Missouri.

4. The following crew members lost their lives as a result of this casualty. Their bodies have been recovered and identified.

Name & Address	Capacity	Next of Kin
Gilbert Edwards 311 15 th St. Galveston, Texas	Deckhand Z-None SS#451-92-4982 DOB 15 October 1950	Father Walter Edwards Houston, Texas
Stuart N. Davies 1908 Church St. Galveston, Texas	Cook Z-None SS#276-07-6075 DOB 27 March 1909	Unknown

The following crew members are survivors:

Clinton Euel Kennedy Box 152 Scurry, Texas	Master Z None License # None

William Allen Walker	Pilot
Box 62	Z 1262442 - Tankerman
Matagorda, Texas	License # None
William Roy Eimers	Deckhand
8036 Dunn Road	Z None
Caseville, Michigan	License # None

5. Weather: The weather at the time of the casualty was, partly cloudy with good visibility, the ambient temperature was 71° F, the wind was northeasterly at 14 miles per hour. The surface of the bay was choppy with seas estimated at 2 to 3 feet in height. The tide was in late ebb.

6. At about 2100 on 21 July 1970 the towboat JOAN ELLIS departed the Southwest barge fleet moorings in the San Jacinto River at Houston, Texas with 4 empty barges made up in tandem, towed astern. The vessel was enroute Brownsville, Texas by way of the intracoastal waterway with stops to be made at the intermediate ports of Point Comfort and Corpus Christi, Texas to drop off barges. The tow, made up of empty hopper type, freight barges, consisted of the MV 679, CL 605, 14 and S 711, in that order. The MV 679, the lead barge was being towed with its blunt stern forward, on a short hawser with bridle, to facilitate handling and to prevent the barge overrunning the stern of the tug.

7. The bridle consisted of two parts of 1 1/8" plow steel wire, eye spliced at each end. The eyes on the after ends were placed over button bollards on each side of the lead barge and led forward around outboard of the bitts at each corner, coming together at the 7" nylon hawser, connected there by means of two shackles, one which was through a thimble in the eye splice of the hawser. The hawser was made fast to the towing bitt on the after deck of the JOAN ELLIS in such manner as to bring the shackles of the bridle approximately 2' aft of the towing bitt and the distance between the stern of the boat and the lead barge to approximately 10 feet. The on board end of the hawser was led aft and faked on wooden gratings installed on the stern aft of the towing rail. These gratings were fitted across the stern and lay loosely on angle iron supports approximately 15" off the deck and several inches below the 18 to 20" height of the towing rail which ran thwartships from bulwark to bulwark. The barges were secured together, headlog to headlog, by soft lines secured from bitt to bitt and with crosslines to prevent sway.

8. The tow proceeded down the Houston ship channel, with the Master, Clinton Kennedy at the wheel, at a speed of approximately 5 mph. The passage from the San Jacinto River to

Morgan Point was without incident although the barges tended to trail at an angle slightly to starboard because of the northeasterly wind. During the passage, the deckhand on watch, William Eimers checked the machinery space bilges and stood by to perform duties as directed by Mr. Kennedy. Mr. Eimers had no occasion to pump bilges from the time of departure Houston until relieved.

9. At approximately 2300 or 2315 Mr. Kennedy was relieved at the wheel by Mr. Walker, the Pilot. At this time, the vessel was proceeding as before and was at the first set of beacons outside Morgan Point. After relief Mr. Kennedy left the Pilothouse, and went to the engine room to look around as is custom when coming off watch. Seeing nothing unusual he went forward, smoked a cigarette then went to his cabin on the 2nd deck, turned in his bunk and read until 0130 when he turned off his light and went to sleep.

10. After relief of the watch the vessel continued down the Houston ship channel with Mr. Walker at the helm and Gilbert Edwards, the deckhand, on watch. When well by Morgan Point in open waters of Galveston Bay, small choppy seas estimated at 2 to 3 feet in height were encountered. Wheel wash and the slap of the seas against the barge together with the bow wave of the barge tended to cause water to splash over the stern bulwark on to the deck. At approximately 0300 when in the vicinity of buoy 25A speed was reduced by 1/4. The vessel was now approaching a point in the channel near Buoy 22 where a turn to the starboard into the Galveston-Freeport cutoff of the intra-coastal waterway was to be made. Mr. Walker noticed that the vessel began to feel sluggish and response to helm was poor. He mentioned this to Edwards who was then in the Pilothouse and directed him to go below to check the engine room bilges for water. Edwards returned in a few minutes and stated that there was no water in the bilges. Walker then resumed normal speed. At about 0310 he felt that the vessel was becoming more sluggish and he again directed Edwards to go below and check the bilges. After Edwards left the wheelhouse Walker looked aft through the Pilothouse windows and saw that wash of seawater generated by the chop of the sea and bow wave of the blunt end of the barge was coming over the vessel's stern bulwark rail and was carrying well up on deck. He stepped back over to the throttle controls and raced the engines two times intending this as a signal for Edwards to get out of the engine room. Edwards was then seen on the port side main deck outboard of the port engine room door. Edwards waved an arm to Walker, obviously a signal, the exact significance

of which was not clear to Walker. Walker assumed that it meant either: Edwards was indicating no water in the bilges or that he understood the meaning of racing the engines twice. Edwards then was seen by the light of the sternlight to walk to the after deck which was by that time approximately 6 inches under water.

11. About this time the Master, awakened by the unusual motion of the vessel, got out of his bunk, looked out toward the stern and saw that the after part of the main deck was approximately a foot and a half under water and that the bulwark rail was barely visible. He then ran to the Pilothouse and told Walker that the vessel was sinking. Walker replied that he was aware of the situation and was doing all he could about it. Kennedy ran aft, still on the 2nd deck, intending to get to the towing hawser to slack it off the bitt. He saw that the hawser was taut, tending at a slight angle to starboard 35 to 40 feet astern and that Edwards was standing near the towing bitt on the deck below. William Eimers, the other deckhand, was seen coming down the deck from the quarters forward.

12. Eimers, who stood watch with Captain Kennedy had been asleep in the crew's berthing compartment located on the main deck just below the pilot and master's quarters, was awakened by Edwards who shouted through the port screen door that "we are sinking". Eimers immediately got out of his port lower bunk and left the space. As he came on deck he noted that the vessel was listing sharply to starboard and the stern was going down. He shouted to Edwards to cut the towline, and saw him move toward the stern. At that point Eimers left the vessel, experiencing some difficulty in crawling over the port bulwark rail into the water as the boat heeled further to starboard. The other occupant of the berthing compartment, Stuart Davies, the cook, who had been asleep in the lower starboard bunk was heard to shout but was not seen alive after this time.

13. Moments after the Master appeared at the Pilothouse door, Mr. Walker resumed full speed and put the vessel's helm over in a shallow turn to starboard in attempt to hold the vessel's stern up by tension on the hawser and to get the boat out of the path of the barges. As the stern submerged further the power failed, the lights went out and the vessel heeled sharply to starboard, almost on beams end, sinking rapidly stern first. Captain Kennedy stepped into the water over the port rail of the 2nd deck. Mr. Walker observed the time to be 0315. He then put the engine controls in neutral and left the Pilothouse through the port door. As the vessel went under Walker heard Mr. Davies shout from the berthing space below. When the boat was completely under water Walker saw the forward end of the lead barge strike the top of the

Pilothouse, overriding the boat, as the string of barges continued forward of their own momentum.

14. Within seconds after Captain Kennedy went over the side into the water he saw the bow of the JOAN ELLIS go under with a loud roaring noise and at that time the lead barge passed over him forcing him underwater until he finally emerged on the starboard side about amidships of the lead barge. He swam about until he located a section of the wooden grating amongst the flotsam to which Eimers was clinging. The two men clung to the grating as gear from the sunken vessel floated by. Several attempts to find something better to hold on to were unsuccessful. After a while a waterproof flashlight which was kept in the wheelhouse floated by. Kennedy retrieved it and by the light of it determined that his watch indicated 0315.

15. Approximately one hour later the lights of the downbound towing vessel MV GRAMPUS were sighted. As the vessel came nearer Kennedy signalled by waving the flashlight. The light was seen on the tug and after some manuevering and with the aid of the vessel's more effective searchlight Kennedy and Eimers were located in the water and hauled aboard by the crew of the MV GRAMPUS.

16. Mr. Walker, after leaving the sinking vessel attempted to swim to buoy 22A 100 yards to the West but, because of the distance, gave up on the attempt and clung to floating debris until rescued by MV GRAMPUS at about 0420, very shortly after the rescue of Kennedy and Eimers. None of the survivors wore life preservers although the vessel carried a number, several of them were stowed in the Pilothouse and the remainder, approximately four, in the crew's sleeping quarters. The vessel also carried two approved 24 inch ring buoys, neither of which were used. One was found after the vessel was raised, fouled by its grab line on the rail outboard of the Pilothouse door. The other floated away as the vessel was being raised. No rafts or buoyant apparatus were carried on board, although a skiff was lashed to the starboard rail outboard of the captain's cabin on the second deck.

17. At 0355 Coast Guard Group Galveston received a report of the sinking. Two utility boats from Base Galveston and a helicopter from Coast Guard Air Station Houston were dispatched to the scene to assist and to search for the missing men. The probable position of the wreck was marked with a 3' international orange marker buoy. The search continued until early afternoon of the 22nd and active search was suspended at 0505 on 23 July pending further developments.

18. At 1444 on 22 July the USCGC GENTIAN marked the wreck which was laying in 45 feet of water parallel to the channel

with a black 6x20 buoy numbered WR 23, showing a quick flashing green light. It was placed in position Lat. 29°21'47"N, Long. 94°47'52"W bearing 139.5 degrees true 1730 yards from the Houston Ship Channel entrance range front. The wreck lay in the channel 40 feet from the buoy bearing 228 degrees true. Local marine interests were notified of the buoy and wreck.

19. The following day the barges were found lightly aground on the north end of Pelican spit approximately 150 yards South of the intracoastal waterway Buoy C7. No damage was sustained by the barges and they were removed without incident.

20. Salvage efforts to raise the JOAN ELLIS were commenced on 23 July by a local salvage company and the vessel was brought to the surface on 24 July by means of a derrick barge after wire slings were placed under the vessel by divers. As the main deck surfaced, men from the Galveston County Sheriff's Department assisted by company employees searched the vessel and located the bodies of Gilbert Edwards and Stuart Davies in the crew's berthing compartment. The bodies were removed in custody of local officials and death certificates issued attribute the cause of death of both men to drowning.

21. Hatch covers and manhole plates to under deck compartments were then removed and dewatering was accomplished by portable pumps at the site and the vessel was later towed to Galveston, Texas for repairs.

22. The vessel was examined by board members and counsel on 27 and 31 July 1970 while on the Marine Railway. A part of the 7" towing hawser was found still on the bitt, jammed by a turn, the bitter end wedged and held fast between the towing rail and the angle iron supports for the wooden gratings. The standing part of the hawser was found parted at about 5' from the turn on the bitt. Several strands appeared to have been severed and the remainder were frayed as though parted under strain. Bits of rope yarn were found in the broken weld of the dislodged flat plate lighting fixture on the bulkhead above the towing bitt.

23. Since the date of build the MV JOAN ELLIS has been modified and re-engined. A major modification to the topside structure included raising the wheelhouse one deck level and adding to and fitting out the master/pilot's quarters on the deck below. Both changes resulted in added weight. The vessel has not been inclined or subjected to stability tests. Equipment in the wheelhouse included a magnetic compass, whistle pull, radios and radar, all of which were operative though not in use at the time of the casualty. Radio gear was capable of use on distress voice frequencies and those frequencies commonly used on the intracoastal waterway to arrange passing with other vessels and to communicate with the home

office. There was no general alarm system operable from the wheelhouse nor was there any means to determine engine direction or RPM.

24. The vessel's hull is subdivided into six compartments the largest of these, located midships, is the machinery space. From forward aft these are: Forepeak, Fuel tanks, machinery space, fuel tanks, void with an independent 1200 gallon water tank and a void through which the rudder stock housings are installed. At the time of the casualty the fuel and water tanks were full or nearly full, having been topped off at the last port. The draft at departure from Houston was 5 1/2' forward and 7 1/2' aft. Freeboard at the stern was approximately 5". The bulwark rail around the after deck is 18" high and is penetrated at intervals by a number of freeing ports which vary in size from 6"x12" to 3"x6".

25. The forepeak space is normally empty and is entered through a manhole on the fore deck which is normally secured. The next compartment aft is a fuel space divided into three separate tanks by longitudinal bulkheads. These tanks were full, containing approximately half of the 6000 gallons of fuel on board.

26. Abaft the machinery space are three watertight compartments. The first of these are the after fuel tanks which are similar in size, subdivision and layout to those located forward. The next adjacent compartment contains two independent water tanks of 1200 gallons total capacity. Access to this space is through a 15" circular manhole, located on the starboard side of the deck, which is fitted with a cover, flush with the deck and secured by means of a center bolt and underdeck cross bar arrangement. The cover was found deteriorated and holed at the boss of the bolt hole. No proper bilge piping is installed but the space is drained by gravity by means of a 1" pipe running forward through the fuel compartment into the engine space. There were no valves or shut offs in this line.

27. The aftermost space is entered through a rectangular manhole on the starboard side of the deck, fitted with a cover plate secured by bolts and nuts. The rudder stock housings run through this space to the deck above. They were found intact and watertight inside the space. Although the cover plate was in place and bolted by 6 to 8 bolts, the compartment was flooded when the vessel was raised. No internal piping is fitted in this space.

28. The machinery space contained the two diesel main propulsion engines, two diesel driven generators with switch gear

air compressors, hydraulic steering pumps and motors, batteries, one electrically powered 1 1/4" bilge pump, and a float operated bilge alarm system. The bilge pump was fitted to take suction only from the machinery space bilge and the alarm system was electrically connected through a switch to an alarm bell located on the forward engine room bulkhead. The same alarm bell was also connected to vital main engine systems such as cooling water and lube oil pressure. The alarm was not heard prior to the casualty. After the casualty the guided float rod for the bilge alarm was found bent and slightly distorted but free to move vertically when activated by hand.

29. The galley space located in the after part of the deck house over the after part of the machinery space, is entered from the main deck port or starboard sides thrugh wooden joiner doors fitted with 9" coamings. Distance to the galley deck floor is 1 foot below the main deck. Drainage of this space to the engine room bilge is accomplished through two 1 1/4" unvalved drain lines at each after corner. While underway the galley doors as well as all other doors leading to the main deck were hooked back in the open position.

CONCLUSIONS

1. The casualty was caused by gradual flooding of the aftermost compartments, including the engine room bilge areas, with resultant loss of stability and freeboard to the point at which sea water began to flood freely into the vessel over the galley and engine room door coamings.

2. The initial source of the flooding was the bow wave generated by the blunt end of the barge as it was being towed stern first on a short bridle and hawser very close astern. The bow wave was of sufficient height and size to carry over the stern bulwark rendering the after deck awash. Ingress of water to the aftermost underdeck compartments was through manhole covers improperly secured; and in the case of the circular manhole, through a wasted and holed raised boss portion of the cover. From this void space water drained into the engine room through an open 1" drain line. The galley space also drained into the engine room bilge through 1 1/4" open drains located on each side.

3. Considered as a major contributory factor was the sudden heeling moment imposed by the towing hawser as it fetched up and jammed on the bitt after having been allowed to run. The immediate effect of this moment was an accelerated rate of flooding into the engine room through the open door.

4. The available evidence indicates that Gilbert Edwards, aware of the danger of the barges overrunning the boat, on his own initiative, attempted to cast off the towing hawser by throwing off several turns to allow the hawser to run off the bitt. The distance between the barges and the towboat increased as the hawser paid until the bitter end of the hawser lodged between the towing rail and the angle iron grating support on the stern.

5. Gilbert Edwards and Stuart Davies perished by drowning after they were trapped in the crew's sleeping compartment by the sudden roll to starboard, the resultant ingress of water and the consequent rapidity of sinking. It cannot be determined why Edwards returned to this compartment after having been seen on the after deck and after he shouted a warning to the occupants just prior to the sinking.

6. The water proof flashlight found afloat in the water by Captain Kennedy and William Eimers was instrumental in their being sighted and rescued.

7. There is evidence which indicates that the Pilot on watch erred in his judgement in that:

a. He failed to recognize the symptoms of instability due to flooding and free surface.

b. He failed to notify the Master or to alert the crew when danger was imminent.

c. His final actions with regard to helm movement and increase of engine RPM aggravated an already grave situation and probably hastened the vessel's sinking.

8. The casualty may have been prevented or at least its effects mitigated had:

a. The Pilot recognized his predicament in time.

b. The Pilot notified the Master and crew of impending danger.

c. The vessel been fitted with a general alarm system operable from the bridge.

d. The persons on watch conducted proper security rounds about the vessel while underway.

e. The vessel been fitted with a quick release device rigged between the towing bitt and the hawser, operable from the wheelhouse or accessible part of the after deck.

9. There is no evidence of willful violation of Law or Regulations, misconduct, inattention to duty or negligence which would warrant further action under the provisions of RS 4450.

10. There is no evidence that any personnel of the Coast Guard or any other government agency contributed to the casualty.

11. No aids to navigation were involved.

12. That this casualty exemplifies the narrow margin of safety which exists in this, a typical small inland towboat operation common to the inland waters and gulf intracoastal waterway. It is further affirmation of the need for regulation and establishment of minimum standards for construction, manning and safety equipment.

RECOMMENDATIONS

That efforts leading to the passage of legislation requiring the licensing of Masters and deck officers of towing vessels be continued.

That legislation be sought which would prescribe minimum standards of design, structure, machinery and safety equipment for towing vessels.

R. G. Schwing

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