



UNITED STATES COAST GUARD

INVESTIGATION INTO THE CIRCUMSTANCES
SURROUNDING THE SINKING OF THE

TUG VALOUR

40 MILES OFF THE COAST OF WILMINGTON, NORTH
CAROLINA ON JANUARY 18, 2006 WITH MULTIPLE
LOSS OF LIFE





16732

AUG 15 2008

**SINKING OF THE TUG VALOUR
40 MILES OFF THE COAST OF WILMINGTON, NORTH CAROLINA
ON JANUARY 18, 2006 WITH MULTIPLE LOSS OF LIFE**

ACTION BY THE COMMANDANT

The record and the report of the Formal Investigation convened to investigate the subject casualty have been reviewed. The record and the report, including the findings of fact, analysis, conclusions, and recommendations are approved subject to the following comments.

ACTION ON SAFETY RECOMMENDATIONS

Recommendation 1: It is recommended that the Commandant of the Coast Guard issue a safety advisory to the towing industry emphasizing the importance of strict adherence to stability requirements.

Action: We concur with this recommendation. We will publish a safety alert based on the findings from this investigation to advise the towing vessel industry of the importance of strict adherence to stability requirements by towing vessel operators.

Recommendation 2: It is recommended that the Commandant of the Coast Guard issue a safety advisory to all Sector Prevention Departments, Marine Safety Units, Detachments and other Coast Guard entities exercising Officer in Charge, Marine Inspection (OCMI) authority emphasizing the importance of strict adherence to stability requirements for the towing industry.

Action: We concur with this recommendation. We will issue an advisory to all Coast Guard Sectors based on the findings from this investigation emphasizing the importance of strict adherence to stability requirements by the towing industry.

Recommendation 3: It is recommended that the Commandant of the Coast Guard use this investigation to address future safety regulations for towing vessels; specifically, requiring immersion suits in cold water operations.

Action: We concur with this recommendation. A regulatory project to implement inspection of towing vessels is currently underway. We will use this investigation and consider the facts of this case as we develop regulatory proposals.

Recommendation 4: It is recommended that the Commandant of the Coast Guard revise the Coast Guard's stability letter requirements and issue guidance to third party stability letter

issuing agencies to ensure that matters which describe a vessel's natural list or similar factors be included within the text of the stability letter.

Action: We concur with the intent of this recommendation. We believe that there is sufficient guidance in the Marine Safety Manual and existing Navigation and Vessel Inspection Circulars (NVICs) on the details that should be included in stability letters issued on behalf of the Coast Guard. Additionally, the use of liquid ballast is generally not the preferred means to correct a permanent list. The installation of fixed, solid ballast to correct such a list is the norm. Our current oversight of American Bureau of Shipping (ABS) stability reviews performed on the Coast Guard's behalf shows that they regularly include all necessary tank loading restrictions on simplified stability letters; however, it is clear that all the required tank restrictions were not included in the VALOUR's stability letter when issued in 1998. We have added this subject to the agenda for our next quarterly meeting with ABS and will discuss the loading issues raised by this investigation.

Recommendation 5: It is recommended that OSG – Maritrans initiate policy regarding each vessel's operational limitations or parameters to include weather restrictions.

Recommendation 6: It is recommended that OSG – Maritrans initiate policy regarding ballast operations on their towing vessels.

Recommendation 7: It is recommended that OSG – Maritrans initiate policy and an education program regarding the strict adherence to their vessels' stability letters.

Recommendation 8: It is recommended that OSG – Maritrans install adequate remote tank level indicators for each of the fuel tanks and ballast tanks on their towing vessels that can be monitored by the engine room and/or the wheelhouse.

Recommendation 9: It is recommended that OSG – Maritrans install a valve position indicator for each of the fuel valves on their towing vessels that allow easy visual confirmation of the valve's position.

Recommendation 10: It is recommended that OSG – Maritrans conduct an internal review to ensure that all of their vessels' plans are accurate and up to date.

Recommendation 11: It is recommended that OSG – Maritrans revise their crew changeout check list to ensure each crewmember verifies that they have a survival suit that fits him or her in a logical location such as in their stateroom, workplace or the emergency gear locker.

Recommendation 12: It is recommended that OSG – Maritrans revise their getting underway checklist to include documenting tank levels; particularly ballast tank levels.

Recommendation 13: It is recommended that OSG – Maritrans develop procedures and train for a man overboard scenario involving a tug with a stern tow.

Action: We concur with recommendations 5 through 13. We will forward a copy of this report to OSC – Maritrans for their review and action, as appropriate. In addition, we believe that these recommendations and other information provided by this report may benefit other members of the towing vessel industry. Therefore, we will forward a copy of this report to the Towing Safety Advisory Committee (TSAC) and American Waterways Operators (AWO) for their review and action, as appropriate.

Recommendation 14: It is recommended that each Sector Prevention Department, Marine Safety Unit, Detachment and any other Coast Guard entities exercising Officer in Charge, Marine Inspection (OCMI) authority be provided a copy of this report.

Action: We concur with this recommendation. We will include a copy of this report with the advisory that is issued in response to Recommendation 2.

Recommendation 15: It is recommended that the National Transportation Safety Board be provided a copy of this report.

Action: We concur with this recommendation. We will provide a copy of this report to the National Transportation Safety Board.

James A. Watson, Rear Admiral
Director, Prevention Policy
U. S. Coast Guard

U.S. Department of
Homeland Security

United States
Coast Guard



Commander
Seventh Coast Guard District

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17 APR 2008

MEMORANDUM

From: D. W. Kunkel, RADM
CGD Seven (d)

Reply to (dp)
Attn of: CAPT S. E. Englebert

To: Commandant (CG-545,

Subj: TUG VALOUR REPORT OF INVESTIGATION

Ref: (a) Title 46 United States Code, Chapter 63
(b) Title 46 Code of Federal Regulations, Part 4
(c) COMDINST M16000.10

1. In accordance with the above references, LCDR Charles B. Barbee was designated to conduct a one man formal investigation into the tragic sinking of the TUG VALOUR with multiple loss of life on January 18, 2006. The Report of Investigation (ROI) is attached. Two public hearings were convened and multiple dives were conducted to identify the cause of this incident. Unfortunately, the vessel was not salvageable, therefore, the investigation hinged on dive observations and video analysis, video footage of the vessel sinking, testimony, and witness interviews. The Marine Safety Center (MSC) analyzed stability scenarios and provided two plausible sinking scenarios. One was confirmed through visual observation during a series of dives of the vessel. Subsequent dives were hampered by weather, equipment constraints, and personnel limitations. The dynamic factors of this investigation were difficult and ultimately extended the completion of the ROI.

2. I have reviewed and concur with the findings of fact and analysis and concur with the conclusions and recommendations. No action has been taken with respect to the recommendations. Upon final review and approval of this investigation, D7 (dp) will liaison with OSG – Maritrans and Sector St Petersburg to address safety recommendations 5 – 13.

3. No actions have been taken under 46 CFR Part 5; I concur with the recommended enforcement actions discussed within the ROI.

4. LCDR Barbee is commended for his thoroughness and resourcefulness demonstrated during the course of this challenging investigation.

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Encl: (1) Report of Investigation dated March 27, 2008



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MEMORANDUM

From: [REDACTED], LCDR, USCG
LCDR Charles B. Barbee
Lead Investigating Officer

To: Commander, Seventh Coast Guard District (DPI)

Subj: SINKING OF THE TUG VALOUR 40 MILES OFF THE COAST OF WILMINGTON,
NORTH CAROLINA ON JANUARY 18, 2006 WITH MULTIPLE LOSS OF LIFE

Ref: (a) Letter of Designation as Investigating Officer, dated January 19, 2006
(b) G-MOA Policy Letter 2-04: Marine Investigation Process for Marine Casualties

Preliminary Statement:

In accordance with reference (a), you designated and directed me to conduct a formal investigation into the sinking of the tug VALOUR that occurred on January 18, 2006. LT [REDACTED] was assigned as the recorder. With the investigative assistance of MSS2 [REDACTED], MSTCS [REDACTED], BM1 [REDACTED], the Investigations Division of Sector Charleston, the U.S. Coast Guard Marine Safety Center, and others, we held two public hearings, completed several dives on the tug VALOUR, and conducted numerous interviews. In accordance with reference (b) we were able to gather facts, conduct analysis, draw conclusions, and make recommendations regarding this terrible tragedy. All times listed in this Report of Investigation are local time. The MISLE activity number is: 2569550

Executive Summary:

On January 17, 2006, the uninspected towing vessel, VALOUR, on a course of 220 degrees true at a speed made good of 3 knots was towing astern the fully loaded cargo barge M 192 in transit 40 miles off the coast of Wilmington, NC. The wind was blowing approximately 40 to 50 knots gusting up to 70 knots from 180 degrees true. The seas were 15 to 20 feet and the water temperature was 64 degrees Fahrenheit. At approximately 2320, the Master sounded the general alarm as a result of a significant port list brought on by the filling of the #18 port ballast tank and subsequent unanticipated hydrostatic balancing of the #4 and #5 fuel tanks and the washwater tanks. At approximately 2330, the Chief Mate, enroute to the engine room, fell down the ladder leading from the pilot house to the 01 deck (referred to as Stack Deck) passageway. It is believed that both of his legs were broken. He later went into cardiac arrest, died, and presumably, went down with the vessel. At approximately 2338, while trying to assist the Chief Mate out on deck for medical evacuation, one of the Able-Bodied Seaman fell overboard. After calling the Coast Guard and during man overboard rescue operations, the Master turned the VALOUR toward the east which brought the wind and seas off the starboard beam. This aggravated the situation by increasing the vessel's roll. On January 18, 2006, at approximately 0009, barge M 192 was released as a result of its overtaking of the VALOUR on the port side, presenting a hazardous tripping situation. Coast Guard Helicopter 6553 arrived on scene at 0050, located the man overboard, and hoisted him onboard the helicopter at 0106. Shortly after

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0100, the tug JUSTINE FOSS arrived on scene to provide assistance and positioned itself approximately 50 yards away from the VALOUR. The helicopter dropped a 20 person liferaft in the vicinity of the VALOUR and departed at 0140. At approximately 0145, after the Master determined that they could not save the VALOUR from sinking, he mustered all the crew on the bow. During this time the port list increased in severity and fuel had escaped from the port fuel tank vents. At approximately 0225, the stern submerged and the bow of the VALOUR went straight up in the air. The Chief Engineer and an Able-Bodied Seaman fell from the bow landing on the superstructure and then went into the sea. The Able-Bodied Seaman was located by the JUSTINE FOSS, but could not be rescued and was lost at sea. The Chief Engineer was the last crewmember to be rescued by the JUSTINE FOSS. He died onboard the JUSTINE FOSS from shock brought on by hypothermia. Three more of the crewmembers were individually washed into the sea and later rescued by the JUSTINE FOSS. The Master, the Assistant Engineer, and the Cook were the only crew still left on the VALOUR. They all went into the water together and were rescued together. While in transit to Wilmington, NC, the Assistant Engineer was medically evacuated by Coast Guard Helicopter due to diabetic issues. The crew of the VALOUR was transferred to another vessel and brought into Wilmington. The JUSTINE FOSS recovered barge M 192 and safely towed it back to Wilmington.

Vessel Data:

TUG VALOUR	
Name:	VALOUR
Official Number:	569341
IMO Number:	7509421
Service:	Towing
Year Built:	1975
Built By:	Main Iron Works Inc. – Houma, LA.
Gross Tons:	193
Net Tons:	152
Length:	125 ft
Breadth:	36.16 ft
Depth:	19.21 ft
Propulsion:	Diesel reduction
Horsepower:	6000
Owner	Maritrans Valour Co
Operator	Maritrans Operating Company, LP

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BARGE M 192	
Name:	M 192
Official Number:	614210
IMO Number:	8641393
Service:	Tank Barge
Year Built:	1979
Built By:	Galveston Shipbuilding Co.
Gross Tons:	9800
Net Tons:	8325
Length:	460.3 ft
Breadth:	84 ft
Depth:	35 ft
Cargo Capacity 100%	175305 bbls
Owner	Maritrans 192 Co
Operator	Maritrans Operating Company, LP

Personnel Data:

Deceased	Age	Position	Next of Kin
██████████	██	Chief Mate	██████████
Richard Hugh Smoot	██	Chief Engineer	██████████
██████████	██	AB Tankerman	██████████

Survivors	Age	Position
██████████	██	Master
██████████	██	Second Mate
██████████	██	Assistant Engineer

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[REDACTED]	[REDACTED]	AB Tankerman
[REDACTED]	[REDACTED]	AB Tankerman
[REDACTED]	[REDACTED]	OS Cook

Crewmember	Total Sea Experience	VALOUR Experience
[REDACTED]	25 yrs	2 yrs
[REDACTED]	35 yrs	7 mos (add'l time in 2001)
[REDACTED]	30 yrs	2 yrs 7 mos
Richard Smoot	27 yrs	3 yrs 4 mos
[REDACTED]	38 yrs	5 mos
[REDACTED]	34 yrs	2 yrs 7 mos
[REDACTED]	38 yrs	2 yrs 7 mos
[REDACTED]	13 yrs	6 mos
[REDACTED]	10 yrs	4 mos

Parties in Interest	Role	Counsel
Maritrans Operating Company, LP	Operating Company	[REDACTED]
[REDACTED]	Master	[REDACTED]
[REDACTED]	Chief Mate	Not represented
Richard Smoot (survived by [REDACTED])	Chief Engineer	[REDACTED]
[REDACTED]	Assistant Engineer	[REDACTED]
[REDACTED]	AB Tankerman	[REDACTED]

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Photograph of the VALOUR prior to the incident

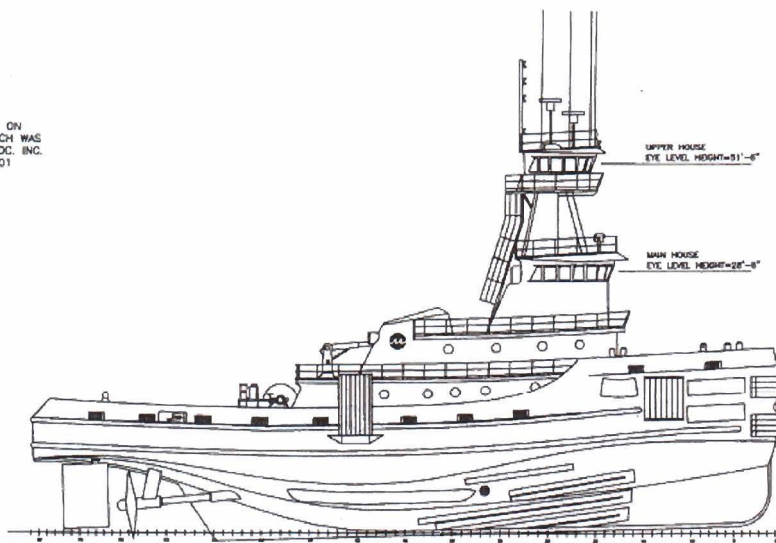
Findings of Fact:

1. The VALOUR was a documented, un-inspected, sea-going, towing vessel built in 1975. The regulations that govern the VALOUR are found in Title 46 of the Code of Federal Regulation, Subchapter C – Uninspected Vessels.
2. The VALOUR was classified by the American Bureau of Shipping (ABS) classification society and at the time of the casualty all surveys and documentation were current. There is no evidence that there were any significant materiel issues regarding the VALOUR. All logs and other documentation onboard the VALOUR were lost with the vessel. The VALOUR was equipped with a RACORDER device (records course, speed, and other information), however it is not known if it was operating at the time of the sinking. Divers were not able to recover the device.
3. The VALOUR's stability letter was issued by ABS on November 20, 1998, as the result of an inclining experiment. The stability letter specifically stated that the master was responsible for maintaining the vessel's stability in accordance with the stability letter. Additionally, the loadline certificate stated that it was only valid so long as the operating restrictions in the vessel's stability letter were observed. The stability letter also stated that the VALOUR may operate in exposed waters provided certain restrictions were observed. One of those critical

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restrictions was that “any cross-connections between port and starboard tank pairs shall be kept closed at all times when underway.” Another restriction listed in the stability letter was that every effort should be made to determine the cause of any list before taking corrective action. Additionally, the stability letter calculations stated that the vessel had a slight natural starboard list that can be corrected with a specific amount of ballast water in #18 port ballast tank, although neither the Coast Guard nor ABS require that the calculations accompany the stability letter onboard each vessel.

GENERAL NOTES
 1-BUILDER: MAIN IRON WORK, HOUMALA
 2-YEAR BUILT: 1975
 3-HULL NO.: 237
 4-OFFICIAL NO.: 569341
 5-ABS NO.: 7509421
 6-GENERAL CHARACTERISTICS:
 LIGHT WEIGHT: 739 LT
 LGA: 136'-8"
 BEAM: 37'-0"
 DRAFT
 (FWD): 17'-6"
 (AFT): 20'-0"
 7-THIS DRAWING BOOKLET IS BASED ON THAT FOR THE TUG HONOUR, WHICH WAS PREPARED BY USING DESIGN ASSOC. INC. DRAWING NO. S-29-05 ALT.01



NOTE
 FRAME SPACING: FR.D-9: 16"
 FR.9-FR.69: 21"
 AFT. OF FR.69: 18"

Number	Updated format, general revisions	7/2/01	RLR
Revisions		Date	By
<i>Stalco, Inc.</i> Marine Engineering Services Tampa, Florida		Drawn by: JGM Checked by: Approved by:	Tug Valour
		Proj. No. 981 Scale: 1/16"=1'	Outboard Profile

Outboard Profile Plan

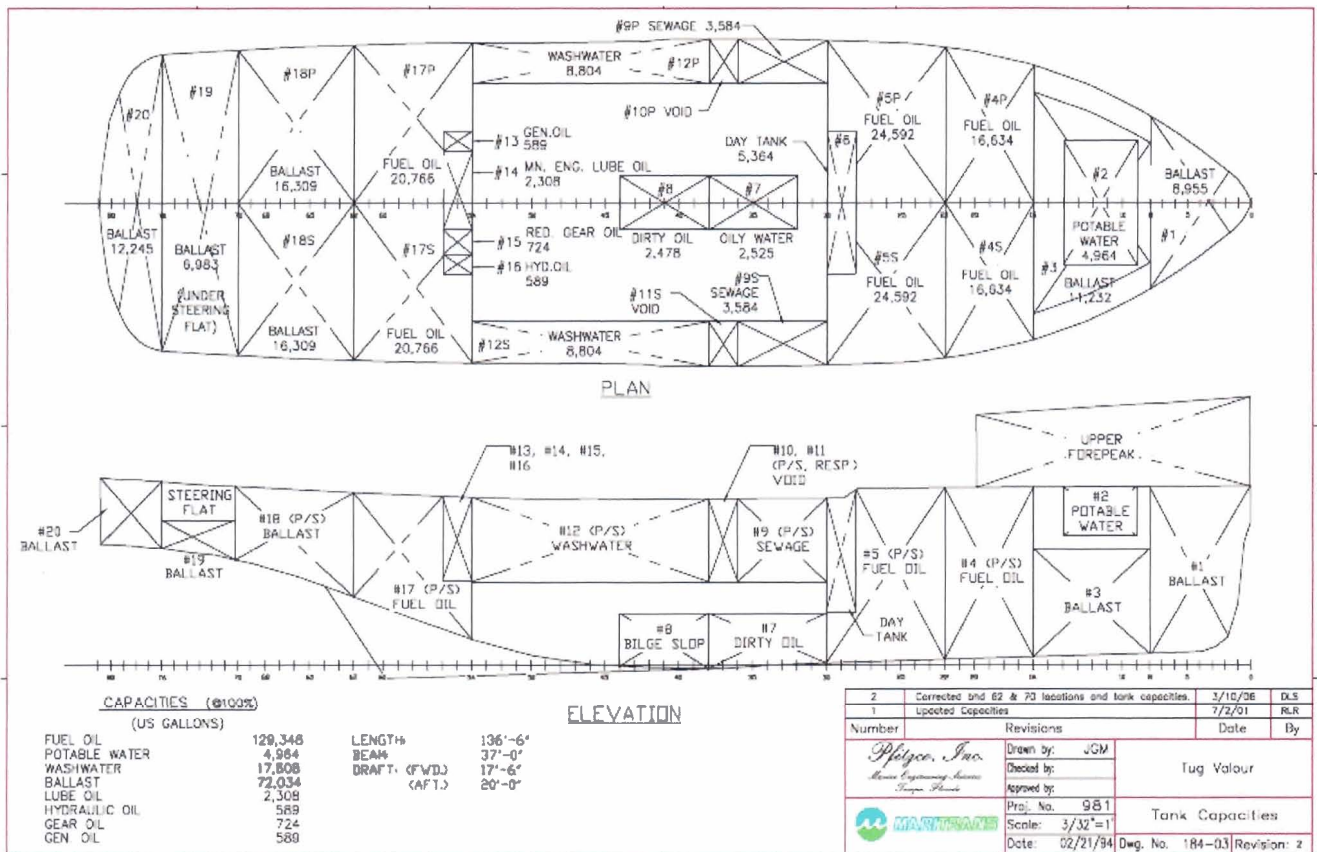
4. 46 CFR 15.405 requires each licensed individual to become familiar with the relevant characteristics of the vessel on which engaged prior to assuming the duties; to include stability and loading characteristics. During the second hearing conducted on February 6, 2007, the VALOUR’s master, Captain (Capt) [REDACTED] who sailed onboard the VALOUR for 2 years, was unaware of the natural list and stated that he believed that the stability letter indicated that tanks could be cross-connected until the VALOUR passed the line of demarcation. There is no evidence that he informed, or had the mates inform, the engineering watch on each voyage when this occurred. During an interview held on April 19, 2007, after reviewing the vessel’s stability letter, Capt [REDACTED] gave testimony that he meant the loadline requirements started at the line of demarcation and the stability letter restrictions started when the VALOUR was at sea. Both of his statements are incorrect. Additionally, there is no evidence that the engineering watch was informed when the VALOUR crossed the line of demarcation or when the VALOUR

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was at sea in order to facilitate closing the cross-connects. Assistant Engineer (2/E) [REDACTED] who sailed onboard the VALOUR for 5 months, was aware of the natural starboard list and the stability letter requirements regarding the cross-connect valves being closed when underway. He also stated that to his knowledge none of the other vessels in Maritrans closed the cross-connect valves on the tanks from which fuel was being drawn. This was confirmed in a meeting that I attended at OSG – Maritrans in Tampa, Florida, with LT [REDACTED] Mr. [REDACTED] Mr. [REDACTED] Mr. [REDACTED] Mr. [REDACTED] and Mr. [REDACTED] on January 11, 2007.

5. The master and crew of the VALOUR relied on an incorrect tank capacity plan provided by Maritrans Operating Company, LP, the operating company of the VALOUR, for referencing tank capacities for ballasting and fueling. This plan dated February 21, 1994, had the #17 port and starboard fuel tank capacities at 15,683 gallons each and the #18 port and starboard ballast tank capacities at 8,483 gallons each. The Coast Guard received a corrected tank capacity plan after the VALOUR sank. The corrected capacities for the #17 fuel tanks were 20,766 gallons each and the #18 ballast tanks were 16,309 gallons each.



Corrected Tank Capacities Plan

6. On October 16, 2004, Mr. [REDACTED] conducted an internal audit of the vessel, identified an International Safety Management System (ISM) deficiency, and initiated def # VALO-04-011

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via a Maritrans internal tracking system stating that there were no ballast strapping tables (also referred to as sounding tables) onboard the VALOUR. The deficiency was closed by Mr. [REDACTED] on October 17, 2005; however, the sounding tables that were provided did not include any information about the #18 port and starboard ballast tanks, which was never addressed. Additionally, the VALOUR had no tank level indicators (TLI) and had no way of knowing how full their ballast tanks were. The common practice was to order pumping for a certain amount of time using the VALOUR's only ballast pump which was rated at 250 gallons per minute. Capt [REDACTED] was not aware of the ballast pump or ballast tank capacities.

7. On January 15, 2006, the crew of the tug VALOUR began a voyage from Delaware to Texas pushing the fully loaded cargo barge M 192 as an articulated tug and barge unit. Prior to departure the tug VALOUR properly discharged all slops and dirty oil and topped off all wash water, potable water, and fuel tanks. 2/E [REDACTED] confirmed that there was no ballast onboard.

8. At 1130, on January 17, 2006, in anticipation of heavy weather Capt [REDACTED] ordered the crew to take the tug VALOUR "out of the notch" and reconfigured the tug and barge for a stern towing operation. There was approximately 1500 feet of 2.25 inch steel towing cable between the tug and the tow. The tug VALOUR proceeded on a course of 220 - 225 degrees true at a speed of 7 knots. The VALOUR's autopilot was engaged. From this point on all references to the VALOUR's wheelhouse are specific to the lower wheelhouse.

9. At 1500, the wind was blowing from 200 degrees true at 25 - 35 knots with the seas at 5-7 feet. Chief Mate (C/M) [REDACTED], the mate on watch, noticed that the VALOUR had a "slight port list." He ordered 2/E [REDACTED] the engineer on watch, to pump 15 minutes (equivalent to approximately 3,750 gallons) of ballast into the #18 starboard ballast tank which corrected the list. These types of ballast transfers to correct a "slight list" were typical onboard the VALOUR when it was crewed by Capt [REDACTED] and C/M [REDACTED]. Capt [REDACTED] stated that C/M [REDACTED] often corrected for a one or two degree list.

10. At 1930, Capt [REDACTED] who was now the watch officer, ordered Chief Engineer (C/E) Richard Smoot, who was now the engineer on watch, to pump the #18 starboard ballast tank dry; which he did. Sometime later, Ordinary Seaman (OS) [REDACTED] went down to the engine room and assisted C/E Smoot with tightening the packing gland for the port tail shaft which had a steady leak. Upon finishing the job sometime near 2000 OS [REDACTED] went to bed. He noticed a slight starboard list as this condition made it more comfortable for him to sleep. With the #18 port and starboard ballast tanks empty, this condition is consistent with the VALOUR's natural starboard list. Capt [REDACTED] slowed the tug VALOUR from 7 knots to 5 knots due to increasingly bad weather.

11. At 2130, Second Mate (2/M) [REDACTED] relieved Capt [REDACTED] of the watch. The wind was blowing at 40 - 60 knots gusting up to 70 knots from 180 degrees true. Seas were approximately 10 feet. As 2/M [REDACTED] was not entirely comfortable being alone in the wheelhouse under certain conditions such as these, Capt [REDACTED] would remain in the wheelhouse

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and lay down on the settee off to the starboard of the helm. 2/M [REDACTED] still considered himself a "rookie" despite his extensive sea time and holding a master's license for over two years.

12. At 2200, C/M [REDACTED] went to the wheelhouse and told Capt [REDACTED] that there was a slight starboard list; consistent with the VALOUR's stability letter. Additionally, the wind and seas were pushing the barge due north which may have increased the list. At approximately 2215 Capt [REDACTED] called C/E Smoot to confirm that the #18 starboard ballast tank was empty. C/E Smoot confirmed this. Capt [REDACTED] then ordered C/E Smoot to put 15 minutes of ballast into the #18 port ballast tank. Both Capt [REDACTED] and 2/M [REDACTED] understood that Capt [REDACTED] was now responsible for all ballast operations during 2/M [REDACTED] watch. 2/M [REDACTED] had never before given any ballast orders prior to this casualty and stated that he was unaware of the stability letter requirements for the VALOUR. C/E Smoot was unaware of this transfer of responsibility.

13. Shortly before 2300, C/E Smoot called 2/M [REDACTED] while he was taking the 2300 fix to see if the vessel still had a starboard list. C/E Smoot indicated to 2/M [REDACTED] that he had been pumping ballast into the #18 port ballast tank for approximately 45 minutes (30 minutes more than the 15 minute order). 2/M [REDACTED] told C/E Smoot that the VALOUR was not yet level. Pumping continued with no further communications on the wheelhouse or between the wheelhouse and the engine room. Capt [REDACTED] was not informed of this and no one seemed concerned about the amount of ballast water being pumped into the #18 port ballast tank. No additional orders were given. Capt [REDACTED] stated that on a previous voyage C/E Smoot had corrected a list when the VALOUR was in protected waters using the ballast system without permission from the master or the mate on watch. During that specific occurrence, after correcting the list, C/E Smoot immediately reported his actions to Capt [REDACTED] who told him it was acceptable to do. Capt [REDACTED] stated that the C/Es actions were not normal protocol, but there was no company policy for ballasting vessels like the tug VALOUR.

14. Some time between 2300 and 2315, 2/M [REDACTED] noticed that the VALOUR began to level out and then started listing to port. Capt [REDACTED] noticed this as well and stated that this change took several minutes. At 2316 2/M [REDACTED] observed that the VALOUR was listing to port and beginning to roll to port. Shortly afterward Capt [REDACTED] called C/E Smoot and asked him what he was doing and told him he was getting scared. Capt [REDACTED] then ordered C/E Smoot to pump out all of the ballast. At this point Capt [REDACTED] lost his trust with C/E Smoot. Capt [REDACTED] took the helm and ordered 2/M [REDACTED] to go to the engine room to see what was going on. At no time did 2/M [REDACTED] inform Capt [REDACTED] of the conversation with C/E Smoot regarding the continued pumping of ballast.

15. At 2320, Capt [REDACTED] sounded the General Alarm, slowed their speed to 3 knots, and shifted the helm from autopilot to hand steering. He told the crew over the public announcement system that there was an emergency in the engine room and to assist the C/E as needed but not to overcrowd the engine room. Additionally, he told the crew to get their lifejackets and survival suits. Several of the crew either didn't hear him or didn't follow his direction. The VALOUR was listing approximately 15 degrees to port in rough seas at this point. 2/M [REDACTED] was in transit to the engine room when he heard the alarm. On the way he stopped by his stateroom,

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grabbed a radio, and put his survival suit in the passageway. He passed Able-Bodied Seaman (AB) [REDACTED] in the galley and told him to get his lifejacket. 2/E [REDACTED] reported to the engine room where C/E Smoot ordered him to the upper engine room to close all the watertight enclosures. Follow-up dives verified that all the watertight enclosures were secured. AB [REDACTED] and AB [REDACTED] reported to the galley. C/M [REDACTED] reported to the wheelhouse.

16. When 2/M [REDACTED] entered the engine room, he saw C/E Smoot standing between the main engines and the C/E gave him the 'ok' sign. 2/M [REDACTED] went back up to the wheelhouse and reported this to Capt [REDACTED]. 2/M [REDACTED] still did not inform Capt [REDACTED] about the conversation between himself and C/E Smoot regarding the additional ballast pumping. As Capt [REDACTED] was getting increasingly nervous, he radioed C/E Smoot and told him that he needed to know what was going on. During testimony, Capt [REDACTED] stated that he was not confident with the information he was receiving from C/E Smoot, therefore he sent 2/M [REDACTED] down to the engine room again. OS [REDACTED] awoke and reported to the engine room where C/E Smoot sent him to assist 2/E [REDACTED]. When 2/M [REDACTED] got down to the engine room, C/E Smoot was standing between the main engines and pointing to an area aft of the port main engine saying something that 2/M [REDACTED] could not hear due to the engine noise. 2/M [REDACTED] stood beside C/E Smoot, looked in the area where the C/E was pointing, and observed oily water sloshing around but not up to the deck plate level and below the engine shaft level as neither the turning shaft nor flywheel threw any water in the engine room. 2/M [REDACTED] then departed the engine room. OS [REDACTED] finished helping 2/E [REDACTED] and went back to see if the C/E needed anything else. C/E Smoot gave him the 'ok' sign and OS [REDACTED] departed the engine room right behind 2/M [REDACTED].

17. Upon entering the galley from the engine room, 2/M [REDACTED] contacted Capt [REDACTED] via his handheld radio. Most of the crew now had their radios and they listened and communicated on channel 78. 2/M [REDACTED] told Capt [REDACTED] that there was water in the bilges, but the C/E said the situation was okay⁴.

18. At 2330, Capt [REDACTED] radioed the tug INDEPENDENCE, another tugboat operated by Maritrans approximately 30 miles away, that they have "a little too much water in the boat...engineer's working on it." The message was also heard by Coast Guard Sector North Carolina who immediately initiated contact with the VALOUR. In a calm voice Capt [REDACTED] radioed the Coast Guard that they appeared to have the situation under control. In the engine room C/E Smoot told 2/E [REDACTED] to verify that the #17 port and starboard fuel tanks were not cross-connected. 2/E [REDACTED] verified this and noted a normal amount of water in the aft stern tube sump area. While he was doing this, the C/E was in the forward part of the engine room. 2/E [REDACTED] assumed that C/E Smoot was checking the #4 port and starboard fuel tanks to ensure they were not cross-connected. 2/E [REDACTED] also assumed that the cross-connects between the #5 port and starboard fuel tanks were open as these tanks were currently feeding the day tank. As he stated earlier, this was a standard practice. Additional dives conducted on the VALOUR during the week of September 10, 2007, revealed that the #4 port and starboard fuel tanks as well as the #5 port and starboard fuel tanks were cross-connected. There is no evidence as to when the #4 fuel tanks were cross-connected. This could have occurred at any point during or before the

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VALOUR's final voyage and, as the fuel valves are on 'reach rods,' there was no way to visually confirm whether the valves were open or closed. Each fuel valve must be manually manipulated to determine its status. Additionally, in discussions with the [REDACTED], the Port Engineer representing OSG-Maritrans, he stated that it is probable that the washwater tanks were also cross-connected. Two lines connect the washwater tanks. The main line was most likely isolated; however the smaller, somewhat-observed, secondary line cross-connect was most likely left open.

19. At approximately 2334, Capt [REDACTED] issued a MAYDAY transmission to the Coast Guard and C/M [REDACTED] headed below to get his survival gear. On his way he fell down the ladder from the wheelhouse to the stack deck passageway. Capt [REDACTED] heard the noise and left the wheel to see what happened. He saw C/M [REDACTED] at the foot of the ladder lying on the deck. Capt [REDACTED] went back to the wheel and radioed to the crew that C/M [REDACTED] had fallen down the ladder from the wheelhouse. 2/M [REDACTED] immediately went to assist him. When he got there he noticed that C/M [REDACTED] was dazed, his legs were folded up underneath him, apparently broken. There was no evidence of head trauma. C/M [REDACTED] said, while he was clutching his chest, that he was having trouble breathing and could not feel his legs. 2/M [REDACTED] began administering first aid to C/M [REDACTED].

20. At 2337, Capt [REDACTED] notified the Coast Guard that they had a "man down...may need a helicopter." AB [REDACTED] and OS [REDACTED] were working on securing a refrigerator when AB [REDACTED] froze for 15-20 seconds and then told OS [REDACTED] that something was wrong. This scared the OS. AB [REDACTED] then told OS [REDACTED] to get his survival suit and get up to the emergency deck muster station (behind the wheelhouse). At this point the VALOUR was rolling up to 25 degrees to port and never returned to an even keel.

21. AB [REDACTED] and AB [REDACTED] went up to the stack deck to assist with C/M [REDACTED] followed shortly after by AB [REDACTED] and OS [REDACTED]. When AB [REDACTED] and OS [REDACTED] arrived, they saw AB [REDACTED] and AB [REDACTED] go out the aft door to look for a way to assist in getting C/M [REDACTED] up to the emergency deck. AB [REDACTED] looked at possibly using the port watertight door, however due to the significant list and rolling to port it was ruled out for safety reasons.

22. At approximately 2338, AB [REDACTED] fell overboard from the ladder leading up to the stack deck. The water temperature was 64 degrees Fahrenheit. AB [REDACTED] yelled, "Man overboard!" Capt [REDACTED] notified the Coast Guard. Capt [REDACTED] told AB [REDACTED] to go to the emergency locker and get some marker lights. AB [REDACTED] thought Capt [REDACTED] was referring to signal flares and could not find any. After failing to get the lights, AB [REDACTED] went down to the stack deck to assist 2/M [REDACTED] with C/M [REDACTED]. AB [REDACTED] did not notify CAPT [REDACTED] of the situation or his intended actions. OS [REDACTED] went up to the wheelhouse and Capt [REDACTED] immediately ordered him to focus on a green light that was in the water and not take his eyes off of it as it was AB [REDACTED]. OS [REDACTED] kept Capt [REDACTED] informed about AB [REDACTED] location. He did this for approximately the next hour and 15 minutes. No ringbuoys, waterlights, or anything else was thrown in the water to mark the area where AB [REDACTED] went

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into the water. AB [REDACTED] stated that there was fuel in the water at the time that he fell overboard because it burned his eyes and got in his mouth and nose.

23. At 2341, the tug INDEPENDENCE relayed the VALOUR's MAYDAY message to Maritrans via their emergency number. Despite Maritrans company policy, Capt [REDACTED] did not make the required emergency call to Maritrans. Capt [REDACTED] stated that he had used the emergency number on a previous occasion and that the VALOUR's cell phone coverage was notoriously bad. He did not feel that it was safe for him to divert his attention to this process and knew that the tug INDEPENDENCE did this for him.

24. At 2345, C/M [REDACTED] stopped breathing and 2/M [REDACTED] commenced cardiopulmonary resuscitation (CPR). Capt [REDACTED] reported to the Coast Guard that C/M [REDACTED] might have 2 broken legs and appeared to be having a heart attack. At this point the VALOUR was listing 20-30 degrees to port. At 2347 Capt [REDACTED] told the Coast Guard, "Got my hands full right now trying to keep the boat floating...I've lost my gyro, I believe I am steering 103 degrees." Capt [REDACTED] stated in testimony that it was not the gyro that failed. He stated that it was the digital display for the gyro that failed and he knew this because the display was blinking '103' instead of a steady display of '103.' Capt [REDACTED] stated that despite a man overboard he made no course changes and strictly kept the VALOUR headed into the wind and seas.

25. After pumping ballast water out of the #18 port ballast tank for approximately 20 minutes, it was decided by C/E Smoot and agreed to by Capt [REDACTED] to stop discharging ballast and start pumping ballast into the #18 starboard ballast tank. At 35 degrees of list to port, the ballast pump sea suction would be above the waterline and incapable of providing ballast water to the ballast pump. After realigning the ballast system, 2/E [REDACTED] then went to his stateroom and got lifejackets for himself and C/E Smoot. C/E Smoot's stateroom was blocked so that 2/E [REDACTED] could not access it to retrieve C/E Smoot's survival suit

26. At approximately 2356, Capt [REDACTED] ordered AB [REDACTED] to get the VALOUR's EPIRB. At this time AB [REDACTED] saw that barge M 192 was just off the port quarter of the tug VALOUR; however he did not notify Capt [REDACTED] of this situation. Capt [REDACTED] told 2/M [REDACTED] to get up to the wheelhouse and asked him where the barge was. 2/M [REDACTED] stopped CPR on C/M [REDACTED], put some aspirin in his mouth, and went to the wheelhouse. Capt [REDACTED] and 2/M [REDACTED] observed the barge on the port quarter and began to worry that it might trip the tug. This was the first time it was considered that the barge should be released. Capt [REDACTED] ordered 2/M [REDACTED] to go release the tow wire to let the barge go. 2/M [REDACTED] told Capt [REDACTED] that he was not familiar with the procedures required to accomplish that, but Capt [REDACTED] sent him anyway. When 2/M [REDACTED] got to the aft main deck he observed the barge to be abeam to port of the VALOUR with the towline roller as far to the port side of the tow bar as it could get. The entire port gunwale and stern of the tug were underwater with a couple of feet of water on deck. 2/M [REDACTED] was worried that he might be washed overboard while trying to release the barge. With AB [REDACTED] guidance, 2/M [REDACTED] released both the winch hand brake and the air brake. All of the towline payed out but the end of the wire hung up on a connecting U-bolt and failed to

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release. 2/M [REDACTED] notified Capt [REDACTED] of the situation and then returned to assist C/M [REDACTED].

27. Capt [REDACTED] called 2/E [REDACTED] out of the engine room to assist with releasing the tow. 2/E [REDACTED] grabbed his survival suit from his stateroom on the way up to the wheelhouse. When he got to the stack deck he saw C/M [REDACTED] lying at the foot of the stairs with no pulse. When he got to the wheelhouse, Capt [REDACTED] told him that AB [REDACTED] had fallen overboard. This was the first he had heard about any other emergencies other than the VALOUR's list and the tow. Capt [REDACTED] directed 2/E [REDACTED] to go help 2/M [REDACTED] with releasing the tow.

28. After activating the EPIRB, AB [REDACTED] went back down to assist C/M [REDACTED]. He and 2/M [REDACTED] moved C/M [REDACTED] to the center of the passageway to better assist him. 2/M [REDACTED] performed CPR on him, gave him oxygen, and used the ship's automated external defibrillator (AED) on him. At 0004, on January 18, Capt [REDACTED] told the Coast Guard, "...pumping to starboard side. Right now the boat is floating and it looks good. I think we might be able to keep the boat floating...we've not found the person in the water. We thought we located him, we're trying to get over there."

29. 2/E [REDACTED] passed 2/M [REDACTED] near the emergency gear locker on his way aft to the towing winch. Once 2/E [REDACTED] got there he began "jiggling it" and it did not take long for the bitter end to break free from the winch. The barge was released and, at 0009, Capt [REDACTED] notified the Coast Guard. 2/E [REDACTED] then went to the muster station behind the wheelhouse and worked with AB [REDACTED] gathering ringbuoys in the event that they got close enough to AB [REDACTED]. 2/E [REDACTED] never returned to the engine room. At this point the VALOUR would lay almost all the way over to port when she rolled.

30. Capt [REDACTED] maneuvered the VALOUR toward AB [REDACTED]. When they were close, he began backing the VALOUR toward him. 2/E [REDACTED], AB [REDACTED] and OS [REDACTED] threw ringbuoys to AB [REDACTED] and he was able to retrieve one. The crew tried several tactics to bring him onboard the VALOUR; however all attempts to recover him failed.

31. Coast Guard Helicopter 6553 arrived on-scene at 0050. Just prior to AB [REDACTED] being hoisted from the water, Capt [REDACTED] noticed the VALOUR's liferaft floating away still in its case, undeployed. Several crew members also saw it floating in the water. It is undetermined as to why this occurred. Shortly after 0100, the tug JUSTINE FOSS arrived on scene. The Coast Guard Helicopter crew rescued AB [REDACTED] and had him onboard the helicopter at 0106. At 0110, the Coast Guard Helicopter reported to Coast Guard Sector North Carolina that the VALOUR was, "sinking fast." They then determined that they did not have enough fuel to rescue any others and decided to drop and deploy a 20 man liferaft for the crew of the VALOUR before they departed. Due to the on-scene weather the crew of the VALOUR was unable to retrieve the inflated liferaft; however, Capt [REDACTED] was able to maneuver the VALOUR in such a way that it was stationed at and touching their port side for approximately 30 seconds. Capt [REDACTED] gave the crew the option of making for the liferaft or staying on the tug. The crew opted to stay. On February 6, 2007, Capt [REDACTED] also stated that while the liferaft was along side the

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VALOUR he asked C/E Smoot and AB [REDACTED] how they felt about jumping into it. He stated that C/E Smoot and AB [REDACTED] both said they were not capable of doing it. Although 2/M [REDACTED] was just down the ladder from the wheelhouse, neither he nor anyone else heard these conversations involving the liferaft.

32. The CG video footage showed that the VALOUR was heeled over, rolling hard to port and squatting. The aft main deck was completely awash. Capt [REDACTED] gave the order for the crew to muster on the bow and told them to put on lifejackets or survival suits as they came up on deck. He told 2/M [REDACTED] to cease resuscitation efforts on C/M [REDACTED] who was unresponsive to the CPR. Capt [REDACTED] waited for everyone else to get to the bow before he left the wheelhouse to join them. 2/M [REDACTED] retrieved the EPIRB and put it inside his survival suit. Only 2/M AB [REDACTED], AB [REDACTED] and OS [REDACTED] wore survival suits. AB [REDACTED] did not have a light on his suit because AB [REDACTED] had accidentally pulled it off that suit after he first tried the same suit on and it did not fit. 2/E [REDACTED] also grabbed a suit that did not fit as it was too small and there was no other suit to fit him that he could access. There was no survival suit on board of a size made to fit C/E Smoot.

33. At 0155, the crew of the JUSTINE FOSS indicated they saw the crew of the VALOUR mustered at the bow. CG video footage showed the vessel was positioned between 20 to 50 yards away waiting for the VALOUR's crew to abandon ship. The crew was mustered on the bow for at least 23 minutes and Capt [REDACTED] never gave the order to abandon ship. During the February 6, 2007, hearing Capt [REDACTED] stated that the reason he did not give the order was because he did not think the vessel was going to sink, despite ordering 2/M [REDACTED] to stop CPR and leave C/M [REDACTED] mustering the crew on the bow, and abandoning the wheelhouse. In earlier testimony provided the same day Capt [REDACTED] stated that the reason he was not wearing a survival suit was that he wanted to get out of the wheelhouse because he thought the VALOUR was going to roll over. He stated that he was happily surprised that he got out of the wheelhouse.

34. 2/E [REDACTED] 2/M [REDACTED] and OS [REDACTED] were at the very forward most part of the bow as Capt [REDACTED] was making his way forward. At 0223, when the VALOUR was severely trimmed by the stern, the bow shot straight up into the air. AB [REDACTED] immediately fell into the water and C/M Smoot and AB [REDACTED] fell from the bow, landed on the superstructure, and then fell into the water. Shortly afterward, a large wave washed 2/M [REDACTED] into the water. OS [REDACTED] was on top of the bow fenders trying to pull 2/E [REDACTED] up while Capt [REDACTED] was pushing him up from below. 2/E [REDACTED] was very nervous as he was not a strong swimmer. The crew of the JUSTINE FOSS found AB [REDACTED] first. After several attempts to rescue him he went face down in the water. The decision was made by the master of the JUSTINE FOSS to leave AB [REDACTED] and retrieve crewmembers that they knew were alive. Once Capt [REDACTED] 2/E [REDACTED] and OS [REDACTED] were all on the fender of the VALOUR, Capt [REDACTED] observed 2/M [REDACTED] being rescued by the JUSTINE FOSS. Another large wave came and washed Capt [REDACTED] 2/E [REDACTED] and OS [REDACTED] into the water. They stayed together, assisted 2/E [REDACTED] and at 0246 were all rescued together by the crew of the JUSTINE FOSS approximately 15-20 minutes after going into the water. A Coast Guard C-130 aircraft assisted in locating the crewmembers.

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35. Approximately 45 minutes after being washed overboard, the JUSTINE FOSS located and rescued AB [REDACTED]. The JUSTINE FOSS located C/E Smoot who appeared to be alive and had him aboard at 0325. He appeared to have a broken leg and arm. Shortly after getting onboard he stopped breathing and went into cardiac arrest. The JUSTINE FOSS crew and 2/M [REDACTED] conducted CPR and used the AED on C/E Smoot. C/E Smoot died onboard. As stated in the Medical Examiner's report he died of "hypothermia/exposure." The JUSTINE FOSS continued to search for AB [REDACTED] for several hours.

36. At 0442, while they were searching the JUSTINE FOSS reported that 2/E [REDACTED] is [REDACTED] and his [REDACTED] was getting high. At 1057, a Marine Corps Helicopter lowered three Coast Guard personnel on to barge M 192 to rig an emergency tow line. At 1235, 2/E [REDACTED] was medically evacuated by Coast Guard Helicopter. At 1354, the JUSTINE FOSS took barge M192 in tow bound for Wilmington, North Carolina. At 1424, a Coast Guard Helicopter hoisted the Coast Guard personnel from barge M 192 and delivered them to Fort Macon, North Carolina. On January 19, 2006, the crew of the VALOUR was transferred from the JUSTINE FOSS to a launch and taken into Wilmington. Shortly after that, Coast Guard Station Oak Island sent a small boat out to retrieve C/E Smoot's body and delivered it to the coroner at the state pier at 1425. At 1700, the JUSTINE FOSS and barge M 192 were moored up at the state pier in Wilmington.

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Analysis:

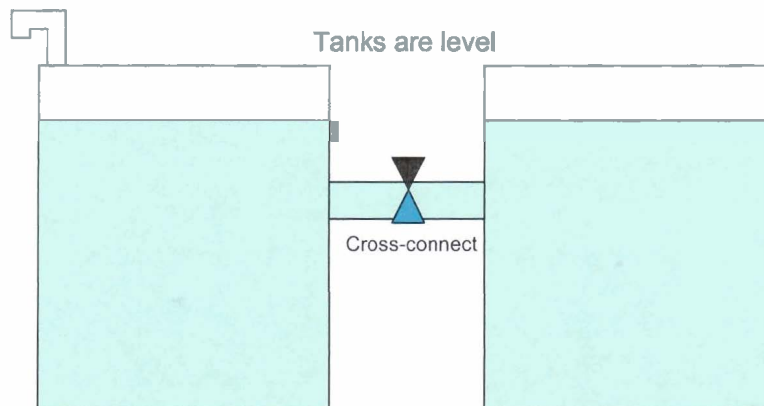
1. *Ballast Operations:* At 1930 on January 17, all ballast water was pumped out of the VALOUR. At 2215, Capt. [REDACTED] ordered ballast water to be pumped into #18 port ballast tank for 15 minutes. Pumping continued until approximately 2316, or just over an hour (approximately 61 minutes). With a ballast pump rated at 250 gallons per minute, approximately 15,250 gallons of ballast water was pumped into #18 port ballast tank which had the capacity for 16,309 gallons. The #18 port ballast tank was approximately 94% full which created an environment for hydrostatic balancing (explained below) to occur sometime after 2230. Shortly after 2316, Capt. [REDACTED] ordered all the ballast be pumped out. Approximately 20 minutes later, with Capt. [REDACTED] approval, they stopped pumping ballast out of the #18 port ballast tank and started pumping water into the #18 starboard ballast tank. 20 minutes of pumping using a 250 gal/min pump is 5000 gallons. Using these rough figures, there was still approximately 10,250 gallons of water in the #18 port ballast tank. When the vessel reached 35 degrees of list, the sea suction for the ballast pump, located on the starboard side of the hull below the turn of the chine, was out of the water. Once the ballast system was lined up to start pumping into the #18 starboard ballast tank, ballast operations virtually ceased and the negative impacts of free surface effect were amplified and remained.

2. *Stability:* Having pairs of fuel tanks cross-connected impaired stability which was deemed to be a causal factor. As the vessel heeled, fuel from the higher tanks flowed to the lower tanks, moving the center of the fuel weight off of centerline and increasing the heel angle. This event is known as hydrostatic balancing. Several scenarios were analyzed to assess the feasibility of capsize given a specific set of events and the cross-connection of various fuel tanks and the washwater tanks. Based upon the evidence, the scenario most likely was that the #4 and #5 port and starboard fuel tanks and the washwater tanks were cross-connected. In this scenario, some tank levels were lowered based upon usage. The #4 port and starboard fuel tanks, #17 port and starboard fuel tanks, and #18 port ballast tank were full and 40 knots of wind was applied to the port beam. All the other ballast tanks and the steering flat were empty. As hydrostatic balancing occurred between the cross-connected tanks and with the dynamic environment in which the VALOUR was transiting, liquid eventually began to spill out from the low-side tank vents and the listed increased. As more balancing occurred, weight would increase on the lower side and decrease on the upper side. This occurred sometime before AB [REDACTED] fell into the water at 2338, which explains why there was fuel in the water. Additionally, an unknown amount of sea water entered the aft ballast tanks whose tank vents were submerged as the port side stern and at one point the entire stern became awash. Once the pumping of ballast water out of the #18 port ballast tanks ceased and the filling of #18 starboard commenced, the VALOUR's reserve buoyancy continued to reduce. Eventually, the VALOUR heeled over and squatted enough for downflooding to occur through the port engine room exhaust and supply vents. The exhaust vents are 2 ft in diameter and located on the stack deck. The supply vents are approximately 2ft x 3ft and are located between the stacks. Both sets of vents have manual closures and were stowed for sea (bolted to the bulkhead) during the casualty as they are never closed when the engine room is operating. Water can be seen entering the vents in the Coast Guard video footage. In the scenario, 10,000 gallons of floodwater were added to the engine room, equating

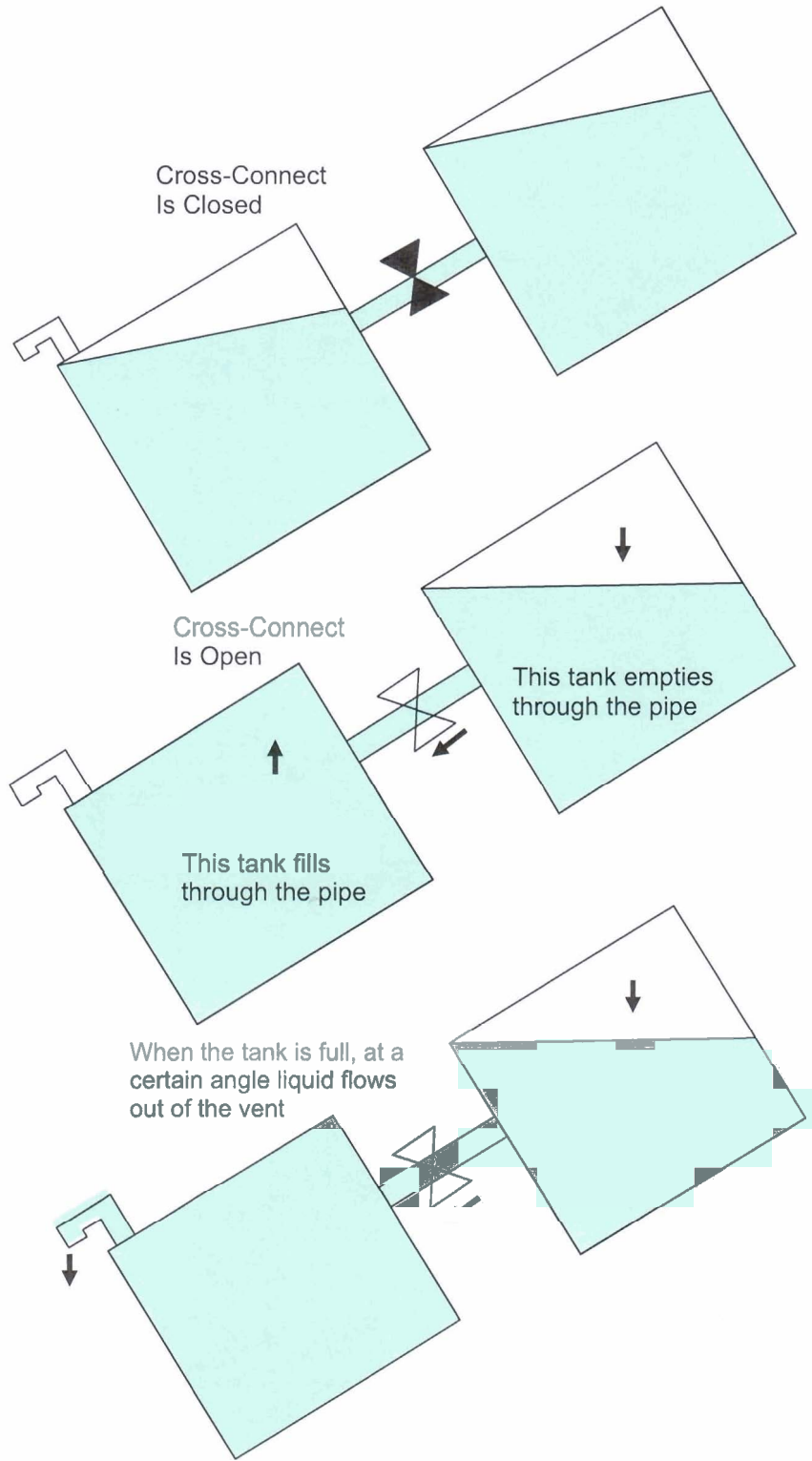
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to approximately 6% of the permeable volume. Based upon the static angle of heel, limited righting energy, and submergence of the aft deck, the VALOUR would have had negligible stability and probably could not have stayed upright in the 12-20 ft seas reported at the time of the casualty. Once the VALOUR heeled over enough for continuous downflooding through the port engine room vents, sinking was inevitable. Determining the amount of time it takes for pairs of tanks to hydrostatically balance is difficult, especially taking into account the unknown but extreme vessel roll dynamics at the time of the casualty. However, assuming the difference in the fluid levels of the largest pair of tanks (#5 port and starboard fuel tanks) was 5 ft and the tanks were connected by a straight 10 ft section of 2.5 inch diameter pipe, the maximum initial flow rate would be approximately 210 gallons per minute. The modeling indicated that in balancing between successive conditions, a pair of tanks would need to transfer at most 2,700 gallons. Given the assumptions above, which are not exact to the actual conditions on the VALOUR, the balancing time would be at least 13 minutes. In practice it would take longer because of the differences in head pressure, piping diameters, piping configuration, the presence of multiple fittings, and the quantity of liquid to be transferred.



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Lastly, there were a few leaks discovered during the vessel's transit to include the port tail shaft packing gland. These leaks were insignificant to the vessel's sinking and deemed not to be causal factors.

3. *Loss of Gyro / Maneuvering:* The wind was at least 40-50 knots gusting up to 70 knots and the seas ranged from 12 to 20 feet. Both were coming from approximately 180 degrees true. At 2320, Capt [REDACTED] slowed the VALOUR to 3 knots and shifted from autopilot to manual steering. At 2347, Capt [REDACTED] reported that he lost his gyro and that he was steering 103 degrees true according to the digital display. In his testimony he restated that the gyro did not fail. The digital display for the gyro was what he was referring to when he said he lost his gyro. Technical representatives for the gyro digital display (the LR40 shown below) stated that it has two alarm modes; the "Signal Alarm from Gyro Compass" and the "Power On Alarm." With the "Signal Alarm from Gyro Compass," the LR40 senses something wrong with the gyro signal and starts flashing the display, but it does not re-set the numbers to zero. The ships heading will be accurately displayed; however, it has most likely lost a "decimal" update. This means that it only loses or gains 1/6 of a degree. With the "Power On Alarm," the LR40 must lose power completely. In this case, once the unit regains power, the display will flash, but the numbers reset to 000.0 and begin counting up or down with the gyro signal. Meaning, if the unit lost power and then regained power when the vessel is on a gyro heading of 090 degrees true, then 090 degrees true is displayed as 000.0, 095 degrees true would be displayed as 005.0, 085 degrees true would be displayed as 355.0, and so on. When Capt [REDACTED] stated that the gyro display read 103 degrees; if this had been a "Power On Alarm," and Capt [REDACTED] was heading into the wind and seas (approximately 180 degrees true), then the VALOUR's gyro heading would have had to have been approximately 077 degrees true when the unit regained power in order for it to read 103. This is unlikely, as a course of 077 degrees true with a strong wind and sea coming from due south would have likely pushed the VALOUR much farther north.



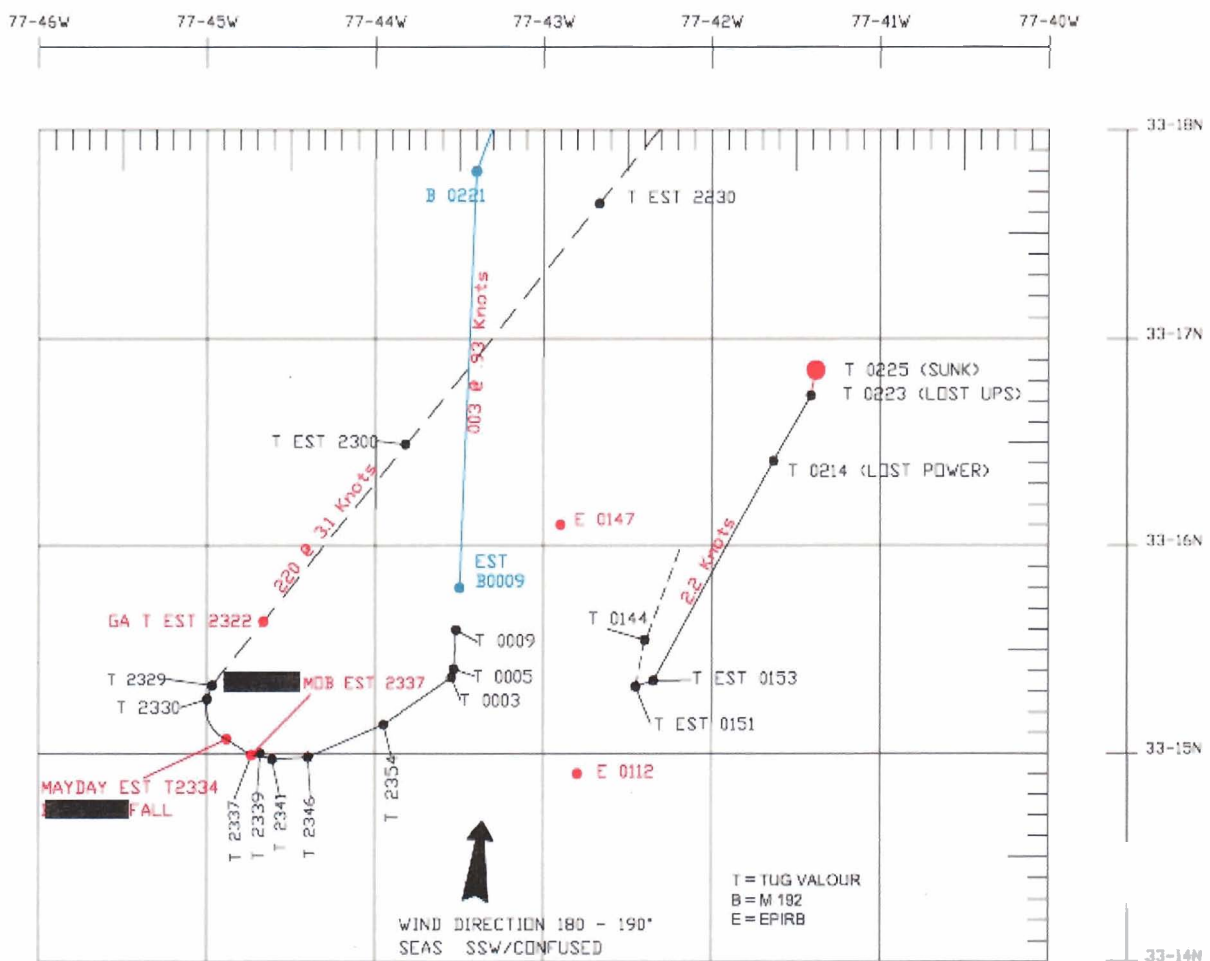
LR40 (same gyro digital display unit found on the VALOUR)

The VALOUR's trackline shows that it began tracking to the east shortly after 2330, and from 2337 to 2346, was on a course made good of 093 degrees true. There is speculation as to what the VALOUR's heading was as Capt [REDACTED] stated that he was heading into the wind and seas. From 2330 to 2354, the VALOUR went a distance of approximately 1 nautical mile during the

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24 minute timeframe on a course made good of 102 degrees true which could easily be accounted for on a course of 103 degrees true at 3 knots. It is however very unlikely that the VALOUR would drift 1 nautical mile east when she was heading into winds and seas coming from due south. The winds and seas coming from the south could not have had such an eastward effect on the VALOUR without a significant port heading change. Additionally, barge M 192 was being towed 500 yards behind the VALOUR and was subject to the same winds and seas. Once the tow was released, from 0009 to 0221, with only winds and seas exerting force upon it, the barge drifted on a course of 003 degrees true at approximately 1 knot.

Therefore, regardless of whether this is the result of maneuvering to locate the man overboard or a loss of spatial awareness, it is likely that the VALOUR was transiting on a course of 103 degrees true with a "Signal Alarm from Gyro Compass" causing the display to flash.



Tracklines of the VALOUR and Barge M192 (via transponders on each vessel)

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Conclusions:

1. In accordance with reference (b) the Initiating Event (or first unwanted outcome) for this casualty was the hydrostatic balancing that occurred between the cross-connected #4 port and starboard fuel tanks, #5 port and starboard fuel tanks, and the port and starboard washwater tanks as a result of filling the #18 port ballast tank.

2. The causal factors that led to the casualty are as follows:

a) Environment: There are two primary environmental causal factors.

1) The weather in this case had a constant negative impact during this casualty. The weather was reported by multiple sources all of which stated that it came from due south. During the casualty, the wind speed ranged from 40 knots to 50 knots sustained with gusts up to 70 knots. 40 knot winds are considered Gale force winds by the National Weather Service (NWS). The NWS rates 50 knot winds at Tropical Storm force. 70 knot winds (sustained) are rated at Hurricane force. When these winds hit the beam of the VALOUR, it caused a significant amount of heel. The sea height also played a major role in this casualty as it exaggerated the pitching and rolling that the VALOUR and her crew experienced. This may have also helped set up a situation known as synchronous rolling where the wave excitation which causes rolling matches the vessel's natural rolling period which causes large often unexpected rolls. It may have also helped set up a situation known as parametric rolling which can occur when a vessel is headed into or away from a strong sea, the wavelength is comparable to the vessel's length, there is a large wave height, and the vessel's roll dampening characteristics are low. Parametric rolling also results in large and unstable rolls. There is no company policy regarding the weather parameters for operating their various vessels. Decisions to sail and to continue sailing are based upon the master's discretion.

2) Due to the noisy environment, communications with and within the engine room were difficult at best. The best communications taking place between the wheelhouse and the engine room occurred when the engineer came out of the engine room and talked on the galley phone. Even when a runner was sent, he went down into the engine room, could not hear, and relied on sign language. The communications difficulties greatly increased the amount of stress on Capt [REDACTED] and also increased the lack of confidence regarding engine room operations. Communications became strained between the wheelhouse and the engine room which was demonstrated when there were no communications with the engine room regarding the man overboard or when the C/M fell down the ladder. As operations are drastically affected by emergencies, it would have been prudent to ensure that the entire crew knew about them.

b) Personnel: There are four primary casual factors that involve crewmembers.

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- 1) In general the crew had a tremendous amount of experience and should have been able to avert this casualty. However as the tragic events unraveled, the crew began to decrease in number and experience. First, C/M [REDACTED] fell down a ladder and was incapacitated, and then 2/M [REDACTED] went to attend him and no longer contributed to the recovery efforts of the VALOUR. Soon after, AB [REDACTED] fell overboard and Capt [REDACTED] crew was reduced by a very seasoned deckhand as well as by the crewmembers that were directed into action to recover him; OS [REDACTED] and AB [REDACTED]. C/E Smoot and 2/E [REDACTED] were busy in the engine room dealing with the VALOUR's stability problem, which left AB [REDACTED] and, from time to time, AB [REDACTED] to assist Capt [REDACTED] as needed. This kept Capt [REDACTED] in a constant state of being overwhelmed.
- 2) Capt [REDACTED] lack of command presence with his crew and poor knowledge of his vessel exacerbated the environment for this casualty to occur and progress. Capt [REDACTED] is a very friendly, easy-going, pleasant person. He treated his crew like both family and friends. He is also a professional with a lot of experience and mariner knowledge. However, his knowledge of VALOUR specifics was lacking. He was not aware of the VALOUR's natural starboard list, although crewmembers with much less time aboard the VALOUR were. He conducted ballast operations without knowing either the pump or tank capacity. He was not familiar with the specific requirements of the VALOUR's stability letter. As a result of his easy-going manner with his crew, he is the primary source of the breakdown of bridge resource management that occurred. This is demonstrated in the allowing of unnecessary, dangerous ballast transfers to be conducted with little or no oversight. His C/M often corrected very slight lists using the ballast system. On one occasion, the C/E conducted ballast operations without direction from the wheelhouse or Capt [REDACTED]. C/E Smoot immediately notified Capt [REDACTED] afterward. Capt [REDACTED] responded by saying it wasn't the normal protocol, however as there is no company policy it was acceptable to do this. This established the acceptability of C/E Smoot continuing to pump ballast well after the 15 minutes of ballast pumping that Capt [REDACTED] ordered. Additionally, during this casualty Capt [REDACTED] directed AB [REDACTED] to throw lights in the water for the man overboard. Due to a misunderstanding, AB [REDACTED] couldn't find any and felt it was acceptable for him not to report back and go do something else. Capt [REDACTED] lack of specific knowledge of the VALOUR violates regulation 46 CFR 15.405.
- 3) 2/M [REDACTED] still considered himself a "rookie" despite his extensive sea time and his holding a master's license for over two years. He also was not familiar with the requirements of the VALOUR's stability letter. Additionally, he was not comfortable being alone in the wheelhouse under certain conditions. Capt [REDACTED] would remain in the wheelhouse after his watch and lay down on the settee off to the starboard of the helm. This may have also added to Capt [REDACTED] normal fatigue following watch. This also allowed for a later situation in which the

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responsibilities were split during the watch and; was a precursor for the communications and trust problems between the wheelhouse and the engine room. Specifically, the ballasting responsibility was taken by the master while 2/M [REDACTED] kept all other operational responsibilities; C/E Smoot was not aware of this and reported his adjustment in ballasting operations to 2/M [REDACTED]; 2/M [REDACTED] did not report the change in ballasting operations to Capt [REDACTED]. As C/E Smoot did report his ballasting change to the wheelhouse, he would not see the need to 're-inform' Capt [REDACTED] of information that he already should have had. 2/M [REDACTED] is responsible for much of Capt [REDACTED] loss of situational awareness with regard to their stability situation, as well as for the atmosphere of non-trust between the wheelhouse and the engine room. The fact that 2/M [REDACTED] holds a master's license but remains uncomfortable executing a standard bridge watch alone may display the inability on the part of a person to perform required duties and constitute incompetence; a contributing factor is the lack of knowledge of the contents the vessel's stability letter. However, not reporting the ballasting condition of the VALOUR while knowing it was in a major stability crisis is an act which constitutes negligence.

- 4) The last issue involves both of the licensed engineers. Although the Stability Letter is addressed to the Master, the deck officers are primarily responsible for stability issues, the licensed engineers had a responsibility to ensure that the master and other deck officers were aware of any violations of the Stability Letter that occur within the engine room. In this case, 2/E [REDACTED] stated that leaving the cross-connect valves on the pair of fuel tanks that are feeding the day tank is a standard practice within the company, and possibly within the entire industry. 2/E [REDACTED] was aware of the specific stability letter requirements and knew that he and C/E Smoot were violating them. This also contributed to Capt [REDACTED] loss of situational awareness with regard to the VALOUR's overall stability condition. Both C/E Smoot and 2/E [REDACTED] violated the Stability Letter, an established rule, which constitutes an act of misconduct on each of their parts.

c) Ballast Operations: There are four primary casual factors regarding ballast operations.

- 1) There is no company policy regarding ballasting operations for their towing vessels. Onboard the VALOUR, Capt [REDACTED] did not provide any specific direction regarding ballasting operations while in charge of the VALOUR, to the point that he allowed not only the mates, but also the engineers to make ballast transfers on their own without notifying him.
- 2) The crew of the VALOUR under Capt [REDACTED] direction was using the #18 port and starboard ballast tanks to correct minor lists. This only occurred when Capt [REDACTED] and C/M [REDACTED] were running the VALOUR. In interviews with the VALOUR's relief master, and the masters of the INDEPENDENCE and the HONOUR (other OSG-Maritrans tugs), none of them said they conducted or

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allowed ballast operations for minor lists. In addition to all of the other masters knowing the contents of their respective stability letters, none of the other masters allowed anyone else other than themselves to authorize ballast operations. The filling and eventual overfilling of the #18 port ballast tank is a direct result of this mistake. Capt [REDACTED] decision to allow ballast transfers for such minor lists was negligent.

- 3) There were ineffective communications coming from the wheelhouse during ballast operations. During 2/M [REDACTED] final watch on the VALOUR, Capt [REDACTED] took responsibility for ballast operations and did not inform the engine room watch. As C/E Smoot was unaware of this transfer of responsibility, he continued communicating with 2/M [REDACTED] regarding ballast operations. 2/M [REDACTED] told C/E Smoot in their only communication that the VALOUR was not yet level. Though he should have, 2/M [REDACTED] did not communicate any of the ballasting information provided by C/E Smoot to Capt [REDACTED]. This led directly to ballast being pumped into the #18 port ballast tank for over an hour.
 - 4) The decision to allow the engineers to stop pumping ballast water out of the #18 port ballast tank and start pumping water into the #18 starboard ballast tank effectively stopped ballast operations. This was a mistake for three reasons. The first is that the VALOUR was listing to port and sinking by the stern. They should not have introduced more water weight aft of the engine room as this reduced the VALOUR's reserve buoyancy. Secondly, due to the angle the VALOUR was listing, the ballast pump sea suction was out of the water and pumping a minimal amount of ballast water into #18 starboard ballast tank ensuring the VALOUR would never be righted. Lastly, it amplified the negative impacts of free surface effect in the partially filled ballast tanks.
- d) Stability Letter: Stability letters are addressed to the master and it is the master's responsibility to know the stability letter and ensure that it is strictly followed. Although this may also be an industry-wide or company-wide practice, specifically, on the VALOUR under Capt [REDACTED] supervision, it was common practice to leave cross-connect valves open on the pairs of fuel tanks that were feeding the day tank. Capt [REDACTED] stated that he believed this only occurred inside the line of demarcation; however there is no evidence that the wheelhouse notified the engine room when the VALOUR went outside the line of demarcation for the purposes of isolating the cross-connected tanks. Regardless of this fact, anytime the VALOUR was underway and any tanks were cross-connected, they were in violation of their stability letter. Had the #4 port and starboard fuel tanks, #5 port and starboard fuel tanks, and the washwater tanks not been cross-connected allowing hydrostatic balancing, this casualty may not have occurred. Capt [REDACTED] failure to properly enforce the requirements of the VALOUR's stability letter was an act of misconduct.

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- e) Vessel Maneuvering: Turning to port and allowing the 40-50 knot winds to hit the starboard beam of the VALOUR was extremely detrimental. It increased the VALOUR's heel, decreased its stability, and increased the severity and speed at which the cross-connected tanks hydrostatically balanced. This may have been the result of Capt Lynch losing spatial awareness because so many other things were occurring that he failed to recognize that he had turned to port; or Capt [REDACTED] may have actively decided to turn the vessel to port while he was maneuvering to recover AB [REDACTED] from the water. As Capt [REDACTED] denies turning to port, we cannot make the distinction as to what type of human error occurred. Regardless of whether the error was active or passive, evidence suggests that the turn was made. This should not have occurred when a significant stability problem existed and a turn to port would have increased the problem due to the strong winds and seas hitting the VALOUR's beam.
- f) Tank Level Indicators: There was no way to tell how much liquid was in any of the tanks without going out on deck, which was not feasible during this casualty. As a result, there was no way to tell how much ballast water was going into the #18 port ballast tank and there was no way to tell that the #4 and #5 fuel tanks and the washwater tanks were hydrostatically balancing. Knowledge of either of these two events would have greatly reduced the risk of this casualty occurring.
- g) Valve Position Indicators: As a result of only being equipped with reach rods, there was no way to visually tell the position of the cross-connected fuel valves. Each valve would need to be manually manipulated in order to determine if it were opened or closed. Additionally, if the valve's packing was tight causing the valve to be 'stiff,' meaning that it was particularly difficult to manipulate, it may have confused the valve operator into thinking it was open or closed. A valve position indicator would have ensured the valve operator of the its position. Knowledge of the fuel valve positions may have eliminated the condition of the #4 fuel valves being cross-connected which would have slowed the effects of hydrostatic balancing.
- h) Tank Capacity Plan: The tank capacity plans for the VALOUR were grossly inaccurate and there were no sounding tables for the #18 port and starboard ballast tanks. Though Maritrans should have discovered and corrected both the capacity errors and the lack of sounding tables, they were not relied upon onboard the VALOUR to determine the vessel's liquid loading and were not significant casual factors to this casualty.
- i) Engine room Vent Closures: The only way to sink the VALOUR in modeled simulations is to flood the engine room. The engine room has two supply and two exhaust vents. They each have manual closures which are stored between the stacks bolted to the bulkhead. They are not installed while the engine room is in operation. In this case, this is the source of downflooding that eventually led to the sinking of the VALOUR. However, in an emergency such as this, when the engine room is no longer required to be in use, there is no way to close the vents without going up to the stack deck and manually installing them. The only way to have prevented water from entering the engine room in

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this casualty was to have those covers installed, which in this situation was impossible and may not have been that effective.

3. The causal factors that existed or occurred during the rescue efforts and abandon ship are as follows:

- a) Slips, Trips, and Falls: C/M [REDACTED] falling down the ladder and AB [REDACTED] falling overboard are events that are extremely difficult to prevent. Generally, slips, trips, and falls occur due to a minor attention failures leading to catastrophic results. Regarding C/M [REDACTED] fall, the ladder was very steep and with the VALOUR's port list it was nearly vertical. The additional roll, pitch, and yaw caused by the weather aggravated the situation. Going down the ladder backward may have reduced the risk of this happening, but it is not certain. AB [REDACTED] was also on a vertical ladder when he was washed overboard. In addition to the dynamic conditions on the vessel, he was also out in the weather and seas at night. Both are considered execution errors as their plans were good; however there was an issue with how the plans were executed. In order to prevent this type of human error there has to be some sort of reminder or 'attention getter' to hold on particularly tight. A visual and/or audible alarm is standard for this situation. Another option is to implement a mechanical solution to either prevent the human error or mitigate the potential consequences. A ladder safety cage or safety lines would be good examples of defenses against falling overboard from a ladder.
- b) Releasing The Tow: The decision to release the tow did not occur until barge M192 began to overtake the VALOUR and threatened to trip the tug. The time to release the tow was when AB [REDACTED] fell overboard. **Releasing the tow would have provided instant maneuverability.** All commercial vessels train and practice man overboard drills. Seldom does this exercise include a scenario in which a tug is towing a barge in a stern-tow configuration. The reason given by Capt [REDACTED] for not releasing the tow at the time was that he was trying to prevent an environmental catastrophe. The risk of that occurring 40 miles off shore with wind and seas pushing the barge to the north was minimal. Additionally, the highest priority should have been the life of his crewmember. As a secondary affect of releasing the tow, it may have relieved some of the VALOUR's list as the barge was tending slightly to port earlier in the casualty. The act of not releasing the tow in order to save a human life constitutes negligence.
- c) Abandoning Ship: The leading causal factor that contributed to the loss of AB [REDACTED] at sea and the death of C/E Smoot was the decision not to order the crew to abandon ship. However, had Capt [REDACTED] given the order to abandon ship there is no guarantee that AB [REDACTED] and C/E Smoot would have survived this casualty. There were two opportunities to for Capt [REDACTED] to give the order. The first was when Capt [REDACTED] maneuvered the VALOUR to the liferaft that was dropped by the Coast Guard Helicopter. He stated that he gave his crew the option of making for the liferaft. He stated that he did not give the order to abandon ship because he had a conversation with AB [REDACTED] and C/E Smoot where they told him they could not physically do it. He had the opportunity again when

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the crew was mustered on the bow of the VALOUR. Again, he gave his crew the option of abandoning ship. Again, he mentioned the conversation with AB [REDACTED] and C/E Smoot as his reason not to abandon ship. No one else heard the conversations despite being in the near proximity. Regardless of whether or not these conversations took place, Capt [REDACTED] had the duty to order his crew to abandon ship. Giving the crew the option to abandon ship effectively relinquishes his responsibility and duty as the VALOUR's master. As they waited on the bow, instead of the crew abandoning the ship, he let the ship abandon the crew which led to people falling on the superstructure and being washed off at different times most of whom were alone in the dark in the cold water. Abandoning ship would have given them some measure of control. The primary benefits to abandoning ship are:

- 1) The stronger people can assist those who may need it;
- 2) There are more people available to assist in supporting each other physically and mentally;
- 3) Everyone stays together and no one drifts away;
- 4) It makes a larger target to spot for rescue; and
- 5) Everyone gets rescued together at once.

Due to the proximity of the rescue tug, it is very likely that everyone would have been rescued in a very short amount of time. The significant risks were exposure to the water temperature (64 degrees F) and the act of getting into the water; which was eventually forced upon them in a very uncontrolled manner.

On February 6, 2007, Capt [REDACTED] stated that the other reason that he did not give the order to abandon ship was that he did not believe that the VALOUR would sink. In his earlier testimony that same day he was unclear as to what he thought would happen. Had the abandon ship order been given, C/E Smoot and AB [REDACTED] may not have fallen from the bow to the superstructure. With the exception of CM [REDACTED] and AB [REDACTED] everyone would have been rescued together by the JUSTINE FOSS. All other tug boat masters interviewed stated they would have given the order to abandon ship in this situation. Capt [REDACTED] decision not to abandon ship constitutes negligence.

- d) Survival Suits: C/E Smoot died from hypothermia/exposure due to the temperature of the air and water and the amount of time he spent in the water. The primary way to prevent exposure is to don a survival suit (also called an immersion suit). The largest survival suits onboard were Stearns model I590 (Adult Oversize Cold Water Immersion Suit), of which there were three. These suits are made to fit a person whose maximum weight is 375 lbs. C/E Smoot weighed between an estimated 375 and 400 lbs. according to the medical examiner's report. His latest doctor's report prior to the casualty recorded him at 379 lbs. and his spouse said she believed he weighed approximately 385lbs. prior to reporting to the VALOUR in January 2006. 46 CFR 25.25-5(c) requires that all crewmembers have a lifejacket. 46 CFR 25.25-5(e) allows for the substitution of an immersion suit for a lifejacket. However, there is no federal regulatory requirement for

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an uninspected towing vessel to have any immersion suits. Maritrans' internal policy was that they have survival suits onboard to fit everyone. In this case, they did not.

4. Although not deemed to be a causal factor, it should be mentioned that the calculations in which ABS and Coast Guard stability letters are based are not required to be attached to the stability letter onboard the vessel. As these calculations are technical, to some they may not have any real meaning or value. In the VALOUR's case, on the first page of the calculations a note at the bottom of the page states, "Ballast in Tank No. 18 P adequate to remove list." This is in reference to the #18 port ballast tank being 8% full in the condition summary table on that same page. The amount in this case is relatively insignificant, however this information does add to the mariner's overall situational awareness regarding the vessel.

5. With the above exceptions, there is no other evidence of actionable misconduct, inattention to duty, or negligent or willful violation of law or regulation on the part of Coast Guard licensed or certificated personnel.

6. With the above exceptions, there is no evidence of failure to properly respond to this situation by Maritrans, the crew of the JUSTINE FOSS, the U.S. Coast Guard or any other responsible agency.

7. With the above exceptions, there is no evidence that any personnel of the Coast Guard or of any other agency or any other person contributed to this casualty.

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Recommendations:

Safety

1. It is recommended that the Commandant of the Coast Guard issue a safety advisory to the towing industry emphasizing the importance of strict adherence to stability requirements.
2. It is recommended that the Commandant of the Coast Guard issue a safety advisory to all Sector Prevention Departments, Marine Safety Units, Detachments and other Coast Guard entities exercising Officer in Charge, Marine Inspection (OCMI) authority emphasizing the importance of strict adherence to stability requirements for the towing industry.
3. It is recommended that the Commandant of the Coast Guard use this investigation to address future safety regulations for towing vessels; specifically, requiring immersion suits in cold water operations.
4. It is recommended that the Commandant of the Coast Guard revise the Coast Guard's stability letter requirements and issue guidance to third party stability letter issuing agencies to ensure that matters which describe a vessel's natural list or similar factors be included within the text of the stability letter.
5. It is recommended that OSG – Maritrans initiate policy regarding each vessels' operational limitations or parameters to include weather restrictions.
6. It is recommended that OSG – Maritrans initiate policy regarding ballast operations on their towing vessels.
7. It is recommended that OSG – Maritrans initiate policy and an education program regarding the strict adherence to their vessels' stability letters.
8. It is recommended that OSG – Maritrans install adequate remote tank level indicators for each of the fuel and ballast tanks on their towing vessels that can be monitored by the engine room and/or the wheelhouse.
9. It is recommended that OSG – Maritrans install a valve position indicator for each of the fuel valves on their towing vessels that allow easy visual confirmation of the valve's position.
10. It is recommended that OSG – Maritrans conduct an internal review to ensure that all of their vessels' plans are accurate and up to date.
11. It is recommended that OSG – Maritrans revise their crew changeout checklist to ensure each crewmember verifies that they have a survival suit that fits him or her in a logical location such as in their stateroom, workplace or the emergency gear locker.

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12. It is recommended that OSG – Maritans revise their getting underway checklist to include documenting tank levels; particularly ballast tank levels.

13. It is recommended that OSG – Maritans develop procedures and train for a man overboard scenario involving a tug with a stern tow.

14. It is recommended that each Sector Prevention Department, Marine Safety Unit, Detachment and any other Coast Guard entities exercising Officer in Charge, Marine Inspection (OCMI) authority be provided a copy of this report.

15. It is recommended that the National Transportation Safety Board be provided a copy of this report.

Enforcement

1. It is recommended that Sector Southeastern New England, which exercises OCMI authority closest to Capt [REDACTED] home of record, conduct a Personnel Action marine investigation and initiate Suspension and Revocation (S&R) action against Capt [REDACTED] license for negligence, misconduct, and a violation of law or regulation.

2. It is recommended that Sector Long Island Sound, which exercises OCMI authority closest to 2/M [REDACTED] home of record, conduct a Personnel Action marine investigation and initiate Suspension and Revocation (S&R) action against 2/M [REDACTED] license for negligence and possibly incompetence.

3. It is recommended that Sector Jacksonville, which exercises OCMI authority closest to 2/E [REDACTED] home of record, conduct a Personnel Action marine investigation and initiate Suspension and Revocation (S&R) action against 2/E [REDACTED] license for misconduct.

Other

1. It is recommended that the master and crew of the JUSTINE FOSS be put in for Silver Lifesaving Awards. This may already have occurred as they each already received Public Service Awards.

2. It is recommended that this casualty investigation be closed.

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