National Transportation Safety Board

Marine Accident Brief

Sinking of Towing Vessel *Spence*

Accident no.	DCA16FM011
Vessel name	*Spence*
Accident type	Sinking
Location	Caribbean Sea, about 115 nautical miles (nm) north of Cartagena, Colombia 12°17.6' N, 75°38.1' W
Date	December 14, 2015
Time	1540 eastern standard time (coordinated universal time – 5 hours)
Injuries	Non-life threatening injuries to three crewmembers
Property damage	$1.5 million est.
Environmental damage	None
Weather	Clear skies with 12 nm of visibility, winds north-northeast at 20–25 knots, seas easterly at 6 feet, air temperature 83°F
Waterway information	The Caribbean Sea is bounded by the Greater and Lesser Antilles to the north and east, and by South and Central America to the south and west.

On December 14, 2015, about 115 nm north of Cartagena, Colombia, the US-flagged towing vessel *Spence* listed severely after taking on water. The list increased despite efforts by the crew to correct it. Consequently, the captain activated the vessel's emergency position indicating radio beacon (EPIRB), and the crew climbed onto the barge that the *Spence* was towing. The towing vessel sank shortly thereafter. US Coast Guard District 7 received the EPIRB alert and directed the Coast Guard cutter *Decisive* to the scene. On arrival, the *Decisive* rescued the four crewmembers from the drifting barge. Three crewmembers sustained non-life threatening injuries.

Towing vessel *Spence* under way in April 2015 prior to the accident. (Photo by Sgt. 1st Class Daryl T. Madrid, Joint Task Force Guantanamo Public Affairs)

Pre-Accident Events

From September 28 until December 12, 2015, the 41-year-old towing vessel *Spence* and the 32-year-old barge *Guantanamo Bay Express* completed a shipyard period involving extensive repairs and maintenance work at COTECMAR Shipyard (owned by the Colombian Ministry of National Defense) in Cartagena, Colombia.[1] At the start of the period, there were 42 required hull, deck, and engineering repairs identified for the vessel, including sandblasting, cropping, and renewal of metal for various structural areas of the towing vessel; resealing rudder and propeller hull penetrations; repairing sea valves, the sea chest, and ballast, oil and fuel tanks; repairing or replacing watertight doors; replacing manhole covers; performing weather deck maintenance; overhauling tank vents; replacing fender pads; overhauling bilge and ballast and fuel oil manifold valves; renewing the cooling water expansion tank; and modifying the steering gear hydraulic tank.

***Spence* in the COTECMAR dry dock, September 2015, before repair work had begun. (Photo courtesy of COTECMAR Shipyard)**

On October 2, an American Bureau of Shipping (ABS) surveyor identified an additional 29 repairs required to renew the towing vessel's international load line certificate.[2] These included repairs to buckled bulwarks, wasted side-shell plating, a wasted forepeak ballast tank structural section, and a corroded rope locker hatch coaming on the main deck.

Near the end of the repair period, the crew arrived to prepare the *Spence* for a scheduled sea trial followed by a transit with the barge to Guantanamo Bay, Cuba. The vessel began fueling on December 8, but fueling had to be stopped because oil began leaking through the port fuel tank covers. At that time, the towing vessel had a 7-degree starboard list. The sea trial was canceled until the gaskets to port fuel tank covers were repaired. Once they were repaired, fuel was transferred to the port fuel tanks, which brought the towing vessel to an even keel.

A satisfactory sea trial was conducted on December 10, and the towing vessel returned to the shipyard to fill its potable water tank. The onload of potable water was stopped, however,

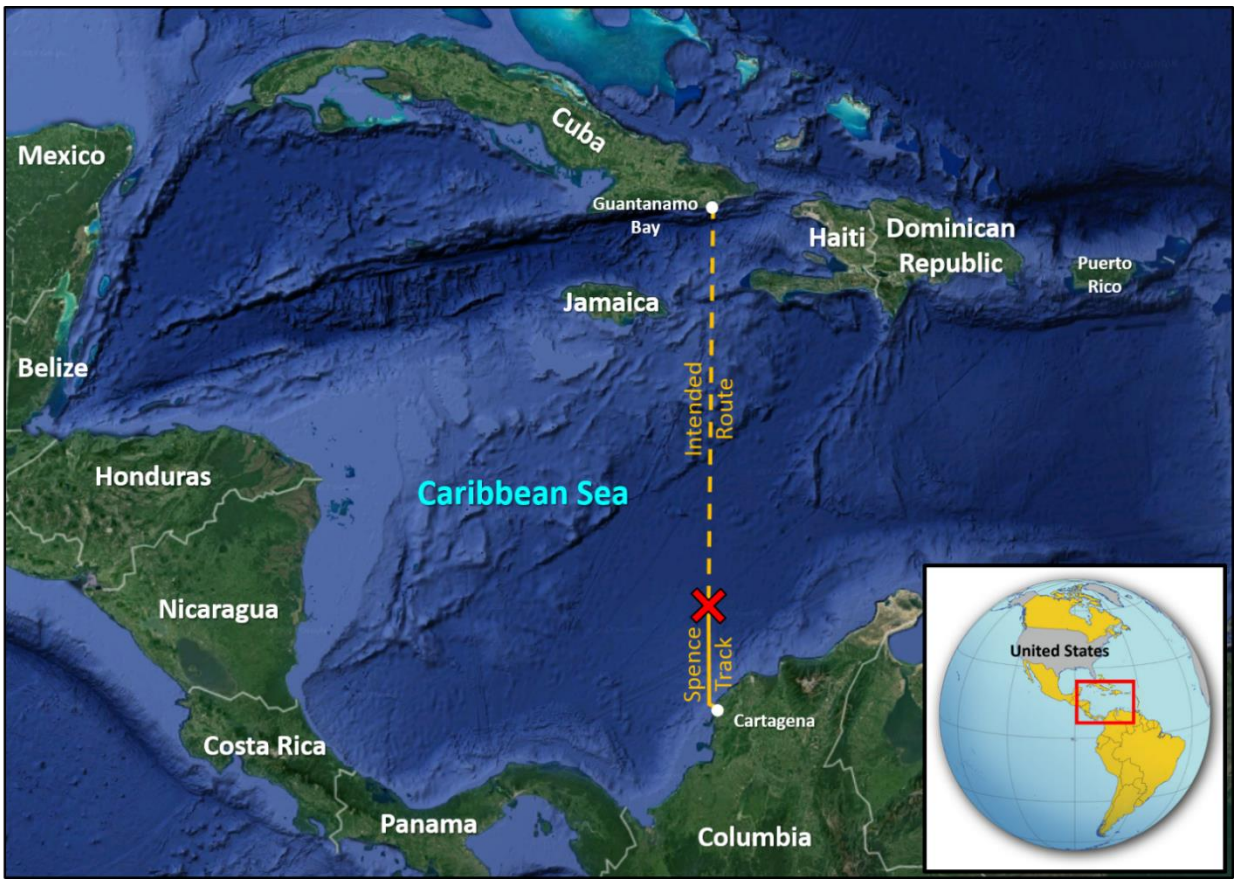
[1] COTECMAR information from http://www.cotecmar.com/quienes-somos, accessed on September 22, 2016, with the assistance of Google translator.

[2] The purpose of a load line assignment is to ensure the seaworthiness of the intact (undamaged) vessel. International load line certificates are issued to vessels that meet the requirements of the International Maritime Organization (IMO) International Convention on Load Lines (ICLL). ICLL certificates are required on US vessels voyaging to foreign ports or waters. A load line certificate is normally issued for a 5-year term, subject to annual topside surveys to verify that hatch covers, doors, vent covers, and other critical closures are in good working condition, and that there have not been any unauthorized modifications or damage that would compromise the vessel's seaworthiness.

when water leaked through two holes in the tank. The potable water tank was repaired on December 11. That same day, the ABS surveyor returned for the load line survey and identified additional deficiencies to the weathertight closures (or dampers) for both the port and starboard stack-mounted machinery room ventilators, weathertight doors in the wheelhouse, and all portholes. The ABS-identified discrepancies were corrected the next day.

Accident Events

Upon receipt of its load line certificate on December 13, the *Spence* was made up to the *Guantanamo Bay Express* and departed Cartagena at 1530. The towing vessel had a crew of four: a captain, a mate, an engineer, and a deckhand. The tow proceeded en route to the US Naval Station at Guantanamo Bay, where it was intended to continue its normal twice-monthly resupply run to and from Jacksonville, Florida. By 1730, the *Spence* was towing the barge astern with 1,640 feet of wire on a course of 001 degrees true at a speed of 5 knots.

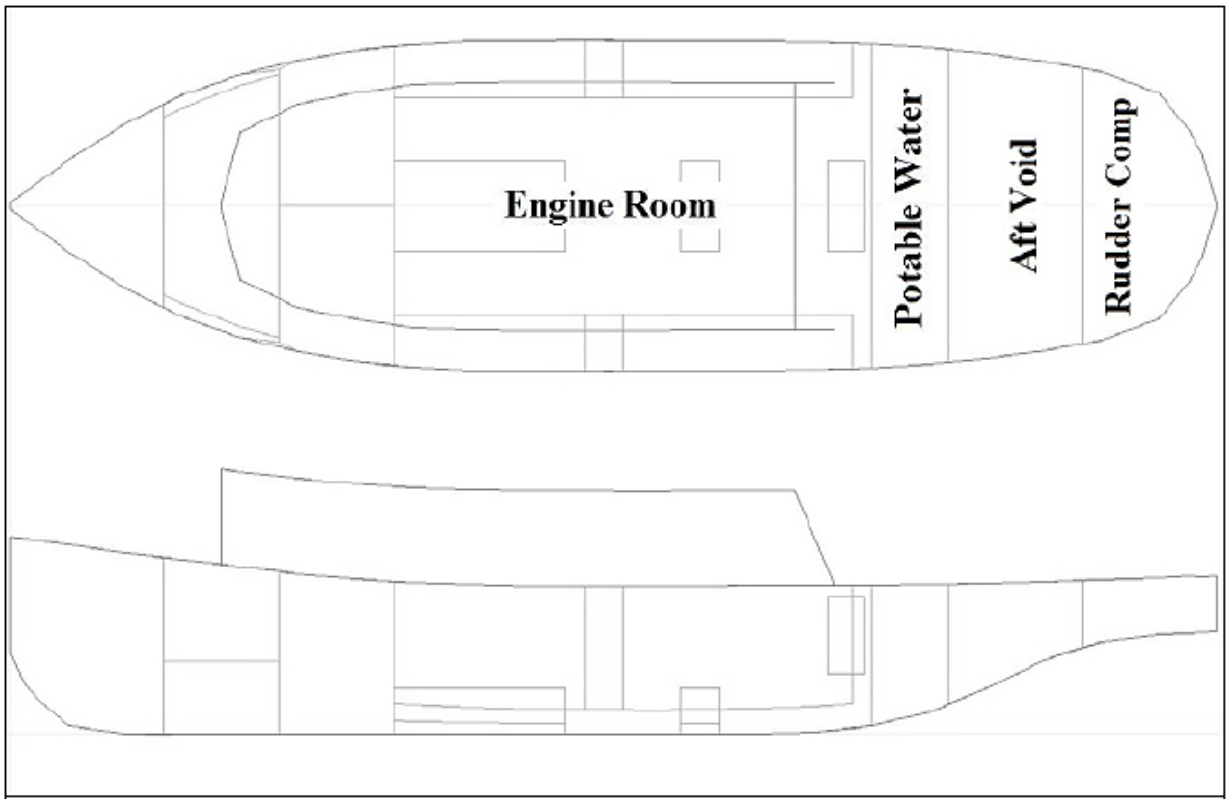


Satellite image of the Caribbean Sea overlaid with *Spence*'s track and intended route. The accident location is shown with a red X. (Background by Google Maps)

At 1200 on the following day, the mate relieved the captain of the navigational watch. About 1500, the captain came up to the wheelhouse to check on the mate, noted "no issues," and went back to his stateroom. The mate told investigators that, at 1545, the towing vessel suddenly listed 25 degrees to starboard, prompting him to sound the general alarm. The crew mustered in the wheelhouse and noted that half of the stern was under water. The engineer and deckhand went to the engine room to investigate, while the mate made international distress Mayday calls on VHF channel 16. The mate received no responses to the distress calls, and there were no contacts on

radar or automatic identification system (AIS) signals from other vessels. The captain called the company's owner in Greenwich, Connecticut, and reported the situation and the vessel's position.

The engineer told the captain the engine room appeared normal; the bilges were dry, the fuel tanks and potable water tank were not leaking, the main engine and generator were running normally, and the rudder hydraulic pump was running. The mate stated that they concluded that one of the aft compartments—either the void space or the rudder equipment room—had flooded, possibly where the stern tube or the rudder stock penetrated the hull. The engineer began transferring fuel from starboard to port, but this did not correct the list. During this operation, he suffered minor burns to his arms, leg, and feet from contact with the generator exhaust manifold.

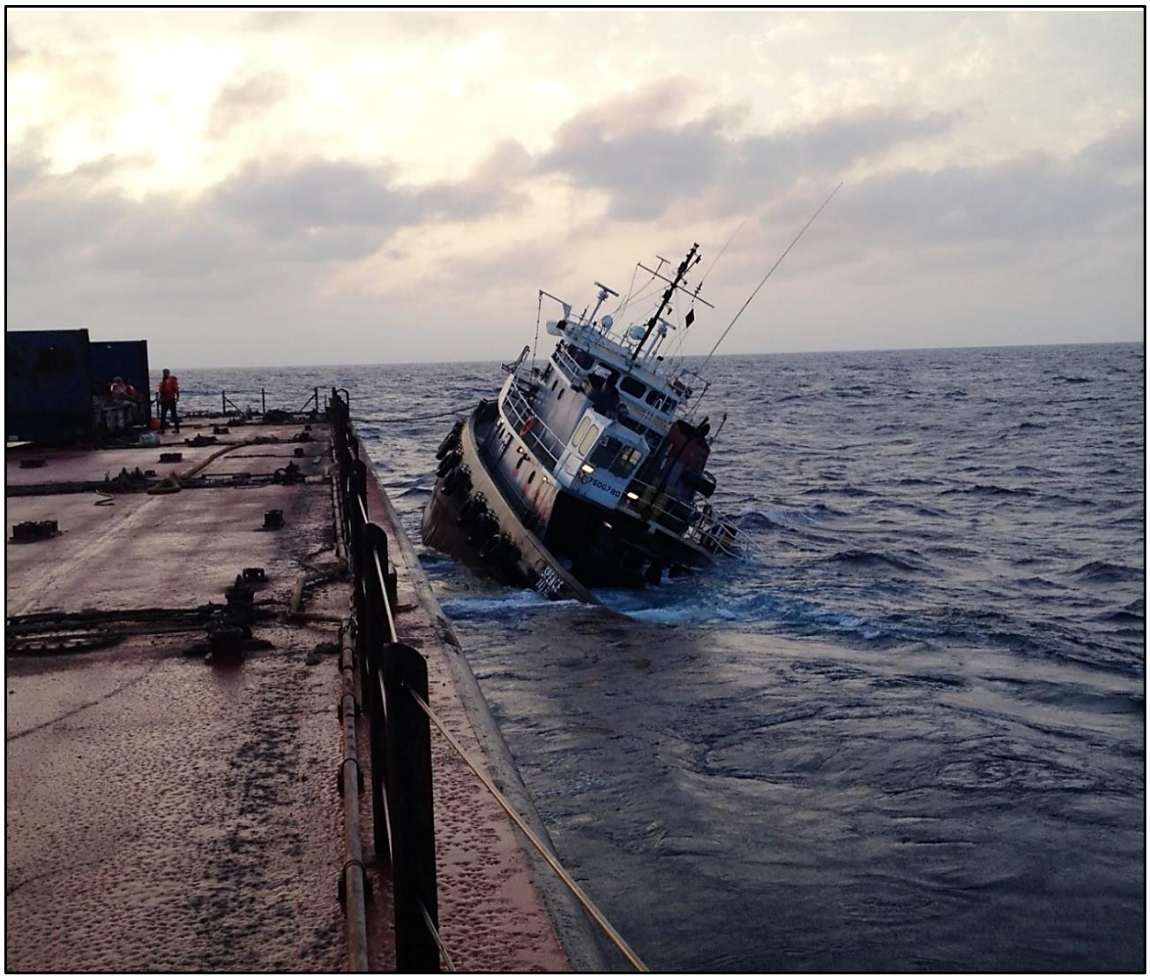


General arrangements, annotated by the Coast Guard Marine Safety Center, for *Spence* stability study. Shown are compartments extending aft of midship beneath the main deck. (Provided by US Coast Guard)

The mate slowed the vessel's speed as the captain received a satellite phone call from the company's Jacksonville, Florida, office. The captain provided the company with the vessel's situation and position and requested help. When the captain hung up the satellite phone, he noticed that the starboard list had increased to about 35 degrees and three quarters of the aft deck was under water. The captain went to the engine room and told the engineer and deckhand to put on their lifejackets and prepare to abandon ship. The captain then retrieved and activated the EPIRB

while the mate maneuvered the towing vessel alongside the barge.[3] The mate used engines only to maneuver the vessel because he did not think the rudder would be effective with the list and slow speed. As the list increased to 40 degrees, the aft deck was almost completely under water. When alongside, the captain threw the EPIRB onto the barge. The deckhand and the engineer jumped from the *Spence*'s bow to the barge before the vessels drifted apart. The deckhand twisted his left knee when he jumped aboard the barge.

The captain then took the helm and maneuvered the towing vessel back alongside the barge to allow the mate to board it. With his lifejacket on, the mate slipped as he jumped, and then hung by his hands on the side of the barge until the two crewmen pulled him aboard. During the transfer to the barge, the mate broke two ribs. The vessels once again drifted apart, so the captain steered the towing vessel back alongside, went to the bow of the *Spence*, and jumped onto the barge.



***Spence* shortly before sinking, after crewmembers had abandoned ship to barge *Guantanamo Bay Express.* (Photo by *Spence* crewmember provided by Coast Guard)**

[3] An emergency position indicating radio beacon (EPIRB) alerts search and rescue services in an emergency by transmitting a coded message on the 406-MHz distress frequency via satellite and Earth stations to the nearest rescue coordination center. The device can be activated manually or automatically when submerged and deployed from the vessel.

Sinking of Towing Vessel *Spence*

About 1730, the towing vessel, while still connected to the barge by the towing wire, began drifting away and sank without capsizing. An hour or two later, the crew felt and heard three bangs, presuming that the noise was the towing line parting as the 189-gross-ton *Spence*, with an estimated value of $1.5 million, sank under the barge. The charted depth was 11,500 feet. The crewmembers stated they spent a windy and cold night on the barge awaiting rescue.

On receiving the EPIRB signal from the *Spence*, the Coast Guard diverted the Coast Guard cutter *Decisive* to the EPIRB's broadcast position, about 115 nm north of Cartagena. A commercial containership, a Colombian Air Force surveillance aircraft, and the Colombian Navy Ship ARC *Punta Espada* also responded. The towing company dispatched another vessel to recover the barge.

The containership located the barge that night and remained within about 0.5 mile before departing the morning of December 15 after confirming that the Coast Guard cutter would arrive soon. The *Decisive* arrived on scene about 0830. The *Spence* crew was transferred from the barge to the cutter by the Coast Guard vessel's rescue boat, where the cutter's medical personnel treated the crew.

The Colombian government arranged for the *Punta Espada* to rendezvous with the *Decisive* and bring the *Spence*'s crew back to Cartagena. The two vessels met about 1100 and the crew was transferred to the coastal patrol vessel, which arrived in Cartagena about 2200 that evening. The crewmembers were taken to a hospital where they were tested for drugs and alcohol. All test results were negative.

Analysis

The Coast Guard Marine Safety Center (MSC) conducted a post-sinking analysis of the *Spence* to determine the most likely source of flooding during the accident.[4] The MSC was provided with copies of some of the original construction drawings and the 1974 stability letter listing lightship weight, vertical center of gravity (VCG), and longitudinal center of gravity (LCG). The MSC analysis noted that because these parameters were not updated during the vessel's 41-year service life to reflect material additions, removals, and repairs, the MSC had to estimate the vessel's displacement and LCG at the time of the sinking using photographs of the vessel's departure condition and tank levels reported by the engineer during his interview. A range of possible VCGs were evaluated to ensure the vessel's actual condition was bracketed by the analysis. The MSC used the crew's description of how the *Spence* behaved as it sank in an attempt to validate or discount possible flooding scenarios.

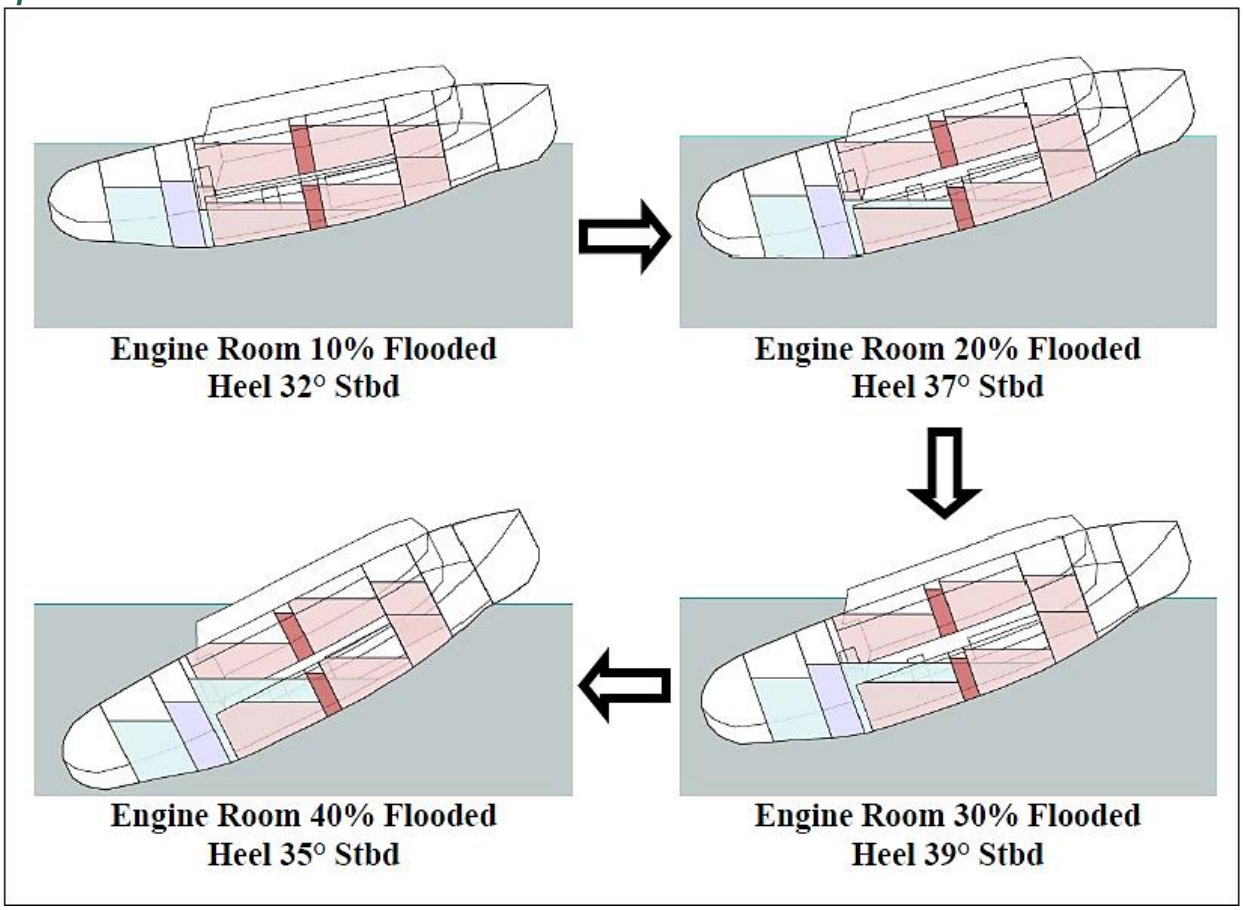
The MSC analyzed several flooding scenarios. The first indicated that flooding the potable water tank alone would not have caused the vessel to list nor the aft deck to submerge as the crew described. The second scenario indicated that complete flooding of only the rudder compartment would submerge half the aft deck, but would not cause a list. The third scenario showed that with only the aft void completely flooded the entire aft deck submerged, but the vessel again did not

[4] Coast Guard Marine Safety Center, "Post-Sinking Analysis of UTV Spence, O.N. 559788" and enclosure "Explanation of Analysis and Assumptions," memorandum, January 23, 2017

list. The MSC surmised that because none of these scenarios matched the crew's description of the sinking, gradual water ingress into the aft void was more likely than sudden flooding.

The MSC then analyzed gradual flooding of the aft void in 10-percent volumetric increments. The results showed that for a range of vessel VCGs, when the aft void was flooded approximately 70–90 percent, the vessel would likely enter a lolling condition, resulting in a sudden list to starboard of 20–30 degrees, consistent with crew reports.[5] The study determined that, at a minimum, downflooding could have occurred through several gooseneck vents at the aft end of the superstructure, which likely submerged in the lolling condition. Additional analysis with the aft void flooded 70 percent and the engine room progressively flooding through downflooding points indicated the vessel would sink by the stern without capsizing.

Sinking of Towing Vessel *Spence*



[5] Angle of loll – The angle at which a ship with initial negative metacentric height regains stable equilibrium and will lie at rest in still water. In a seaway, a ship in a lolling condition will oscillate between the angle of loll on the starboard side and the angle of loll on the port side. Depending on external forces such as wind and waves, a ship may suddenly flop over from starboard side to port side (or vice versa) and then back again to starboard. Such abrupt oscillations, different from a continuous roll, are characteristic of negative initial stability.

The effects of progressive flooding in the engine room after the vessel entered the lolling condition. In this evaluation, the overall VCG is 9.9 feet, the aft void is 70 percent flooded, and the rudder compartment is dry. (Provided by Coast Guard)

The MSC stated, "the most likely sinking scenario involved gradual flooding in the aft void, which caused the aft deck to submerge and the vessel to enter a lolling condition, resulting in a sudden list to starboard. In this state, water would then have likely entered other spaces through downflooding points, causing progressing flooding and sinking by the stern without capsizing."

The MSC analysis stated that not enough information was available to comment on the possibility of repairs having compromised the hull of the vessel.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the sinking of the towing vessel *Spence* was gradual flooding from an unknown point of ingress into the aft void space followed by downflooding to the engine room.

Vessel Particulars

Vessel	*Spence*	*Guantanamo Express*
Owner/operator	Transatlantic Lines LLC	Transatlantic Lines LLC
Port of registry	New York, New York	New York, New York
Flag	United States	United States
Type	Towing vessel	Cargo barge
Year built	1974	1983
Official number (US)	559788	661704
IMO number	7506780	None
Construction	Steel	Steel
Length	90.7 ft (27.7 m)	250 ft (76.2 m)
Draft	9.8 ft (3 m)	3 ft (0.9 m)
Beam/width	26 ft. (7.9 m)	72 ft. (21.9 m)
Gross tonnage	189 gross tons	2,529 gross tons
Engine power; manufacturer	2,400 hp (1,618 kW) diesel, reduction	N/a
Persons on board	4	0

NTSB investigators worked closely with our counterparts from Coast Guard Sector Jacksonville, Florida, and the Coast Guard Marine Safety Center, Washington, DC, throughout this investigation.

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA16FM011.

Issued: March 24, 2017

The NTSB has authority to investigate and establish the probable cause of any major marine casualty or any marine casualty involving both public and nonpublic vessels under Title 49 *United States Code*, 1131. This report is based on information either gathered by NTSB investigators or provided by the Coast Guard from its informal investigation of the accident.

The NTSB does not assign fault or blame for a marine casualty; rather, as specified by NTSB regulation, "[NTSB] investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person." Title 49 *Code of Federal Regulations*, 831.4.

Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by conducting investigations and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. Title 49 *United States Code*, 1154(b).