



National Transportation Safety Board

Marine Accident Brief

Capsizing and Sinking of Towing Vessel *Gracie Claire*

Accident no.	DCA17FM025
Vessel name	<i>Gracie Claire</i>
Accident type	Capsizing
Location	Tiger Pass, 1.3 miles southwest of Lower Mississippi River in Venice, Louisiana 29°15.06' N, 089°21.49' W
Date	August 23, 2017
Time	0756 central daylight time (coordinated universal time – 5 hours)
Injuries	None
Property damage	\$565,000 est.
Environmental damage	Narrow oil sheen, 1 mile long, observed; 1,100 gallons of diesel fuel discharged; approximately 655 gallons recovered
Weather	Cloudy, winds northwest at 3 mph, air temperature 80°F
Waterway information	Tiger Pass is an outlet to the Gulf of Mexico near mile marker 10 on the Lower Mississippi River. The channel is 14 feet deep and 150 feet wide.

On August 23, 2017, at 0756 local time, the towing vessel *Gracie Claire* was moored in Tiger Pass near mile marker 10 on the Lower Mississippi River in Venice, Louisiana.¹ While taking on fuel and water, the towboat began to slowly list to starboard. After the wake of a passing crewboat washed onto the *Gracie Claire*'s stern, the list increased. In a short period of time, water entered an open door to the engine room and flooded the space. The towboat sank partially, its bow being held above the water by the lines connected to the dock. All three crewmembers escaped to the dock without injury. Approximately 1,100 gallons of diesel fuel were discharged into the waterway. Damage to the *Gracie Claire* was estimated at \$565,000.



Gracie Claire moored for repair following sinking. (Courtesy of Triple S Marine)

¹ In this report, all miles are statute miles.

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Location where *Gracie Claire* sank in Tiger Pass while vessel was refueling at John W. Stone Oil Distributor dock in Venice, Louisiana. (Base map and satellite image from NOAA ENC® Viewer)

Accident Events

At 2135 on August 20, 2017, the *Gracie Claire*, a 45-foot-long towboat, departed Morgan City, Louisiana, pushing two empty hopper barges. On board were a captain, a mate, and a deckhand. The vessel arrived the next day in Venice, Louisiana, where the barges were dropped off. On the evening of August 22, the crewmembers began assembling another tow and then moored at a nearby dock for the night.

The next morning, on August 23, a new captain and deckhand came aboard the *Gracie Claire*. At 0720, before resuming assembly of the tow, the crewmembers got the vessel under way to load fuel and water. According to one crewmember's statement and video evidence, the vessel's freeboard was only a few inches at the stern.²

About 20 minutes later, the towboat arrived at the fuel dock of John W. Stone Oil Distributor (Stone Oil) in Tiger Pass, an outlet from the Lower Mississippi River to the Gulf of Mexico. The captain moored the towboat bow-in, perpendicular to the seawall (bulkhead), with two lines extending directly ahead from a centerline bitt at the bow to a single mooring bollard ashore. Soon afterward, at 0750, using the starboard-side fill pipes, the captain began loading the fuel tank forward of the deckhouse while the deckhand filled the water tank aft of the deckhouse.

² Freeboard is the distance between the waterline and uppermost watertight deck.

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The deckhand, who had just begun working in the maritime industry a month prior, told investigators that the towboat appeared to be sitting lower in the water before he began loading the water into the tank; however, he did not consider the condition unusual compared to the vessel's draft during other fueling evolutions he had observed. The *Gracie Claire* began listing to starboard as fuel was loaded through the starboard fill pipe at a rate of 140 to 150 gallons (972 to 1,041 pounds) per minute. The new load was in addition to the estimated 1,200 gallons (8,640 pounds) of fuel already in the tank. According to the captain, listing to one side during fuel-loading was not uncommon. He told investigators that the *Gracie Claire* would often list to angles that submerged the deck edge. When the *Gracie Claire* listed to one side during refueling, his practice was to stop fueling and then resume filling the tank on the opposite side to bring the towboat to an even keel because he believed that there were two separate fuel tanks, one on the starboard side and one on the port side. In fact, there was only one fuel tank with a swash bulkhead on the centerline of the vessel that allowed fuel to flow from one side of the tank to the other.

As loading continued, video captured by the camera on the dock shows a disturbance on the surface of the water at the stern of the *Gracie Claire*. The water motion indicated a current acting on the starboard side.

The video footage showed that at 0755 an unidentified crewboat was traveling in the middle of the channel. When the crewboat passed the *Gracie Claire*, its wake washed onto the starboard side of the towboat's stern. The towboat then slowly rolled to starboard as more of the starboard-side main deck became submerged. Within 90 seconds, water began flowing over the sill of the open engine room door on the starboard side. As the crew began evacuating to the dock, the *Gracie Claire* continued to roll until it was almost completely submerged at 0802. The mooring lines held the bow above the water's surface.



Screenshots of *Gracie Claire*, starting a minute after loading began through sinking, from video captured by southwest view of dock's camera. (Video courtesy of John W. Stone Oil Distributor)

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While the vessel was sinking, the captain tried to close the fuel tank vents and fill pipes to prevent oil from discharging from the tanks, and the deckhand went into the deckhouse to awaken the relief captain and help him escape. All three crewmembers abandoned the towboat without injury.

The *Gracie Claire* was salvaged 2 days later. Due to the water damage, the owner refurbished or replaced machinery and equipment, including wiring, motors, electrical fixtures, and galley equipment. Additionally, the owner converted the rudder compartment into three separate compartments, each with access from the main deck, by installing two longitudinal watertight bulkheads.



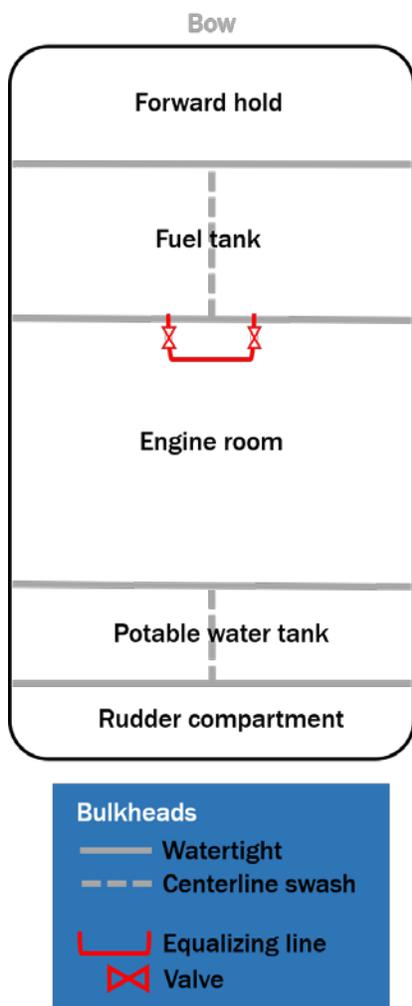
Gracie Claire during salvage. (Courtesy of Central Maritime)

Additional Information

The *Gracie Claire*'s owner, Triple S Marine, began operating the vessel after purchasing it in 2006. The towing vessel was built in 1977 as a twin-propeller inland push boat with a steel hull and a three-level deckhouse. The exterior of the main deck was fitted with a 14-inch-high bulwark that included freeing ports to allow water to drain from the deck. Located on the starboard side of the main deck were two doors, one to the galley, forward, and one to the engine room, amidships. There was another engine room door on the port side. The bottom coaming of each door was elevated 20 inches above the deck.

Beneath the main deck, four watertight bulkheads divided the hull into five compartments. In the fuel and water tanks, centerline swash bulkheads were installed to improve the towboat's stability by preventing the quick shift of the weight of fuel and water from one side to the other when the tanks were slack (not full). The first opening in these bulkheads was 24 inches above the bottom of the tank.

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Plan view of *Gracie Claire's* hull, not drawn to scale. (Based on postaccident sketch by marine surveyor)

The *Gracie Claire* was drydocked on August 1, three weeks prior to the accident. Employees from Triple S Marine inspected the underwater portion of the hull, and shipyard workers replaced the port shaft and propeller. No alterations or new equipment were added that would have increased the weight of the towboat and thereby changed its stability.

Following the accident, a damage assessment of the vessel during drydock revealed a 1-inch diameter hole in the bottom of the rudder compartment. The marine surveyor performing the assessment told investigators that the hole was likely present before fuel was loaded onto the towboat.

A company representative stated that, among measures to ensure stability of the *Gracie Claire*, Triple S Marine's policy required the captain to check the rudder compartment for leaks each week and did not allow the vessel to be moored "bow first" (bow-in) if "excessive current was present." Investigators estimated the current's speed at the time of the accident was 1 to 2 knots (1.1 to 2.3 mph).

The captain obtained his mariner's license in 1983. He told investigators that he had served as a captain for Triple S Marine for over 5 years before the accident, had worked on the *Gracie Claire* often, and had fueled the company's towboats more than 100 times. The deckhand started working in the maritime industry and with Triple S Marine only 4 weeks prior to the capsizing.

Analysis

Several factors affecting the stability of the *Gracie Claire* led to its capsizing. Before the vessel arrived at the Stone Oil dock to take on fuel, the rudder compartment likely had been flooding from the hole in the bottom of the hull, a water ingress that the crew was not aware of. The water level in the compartment would have risen until it equaled the water level outside the towboat, nearly filling the compartment and creating the equivalent of a slack tank.³ The lost buoyancy from the water in the compartment would have resulted in the towboat having less freeboard. A lower freeboard would have decreased the towboat's stability, because the main deck edge would be submerged at lesser angles of heel.⁴ The lower freeboard would also have made it easier for waves to wash across the main deck.

By mooring perpendicular to the seawall and not parallel to the waterway, the *Gracie Claire* was subjected to a heeling moment caused by the river current. When the captain and deckhand

³ A *slack tank*, which is partially filled, generally causes a reduction in a vessel's stability due to the motion of liquid in the tanks, an effect described as *free surface*. Free surface effect occurs because the liquids can shift to the low side of the tank as a vessel heels.

⁴ Generally, when a vessel's freeboard deck edge submerges, the vessel's maximum righting arm is reached. *Righting arm* is an indication of a vessel's ability to counter capsizing moments at heel angles.

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began loading fuel and water through the starboard fill pipes, the vessel already had a starboard list. Although the fuel and water tanks ran the full breadth of the hull, the centerline swash bulkheads would have contained the loaded liquids on the starboard side of the tanks until they reached the height of the 24-inch openings above the tank's bottom. Because the liquids would have filled only the starboard side of their respective tanks, the vessel began listing further to starboard.

At the time, the equalizing line valves for the fuel oil tank were open, which was intended to balance the level of the tank's contents on each side of the centerline swash bulkhead. Based on 24 inches of fuel oil above the pipe, investigators calculated that the line would transfer approximately 70 gallons per minute. However, considering a fill rate of 140 to 150 gallons per minute and the vessel's continued heel to starboard, the captain was filling the tank at a rate that exceeded the capacity of the equalizing line to level the tank.

Aware of the increasing starboard list during filling, the captain decided to shift fuel-filling to the port side of the tank to counter the starboard list. He believed that a reduction in the list would occur because the fuel being loaded would accumulate on the port side, or high side, of the tank. However, with the vessel already listing to starboard, once the fuel reached the holes in the swash bulkhead on the port side of the fuel tank, the added fuel would shift by spilling over to the starboard side through the swash bulkhead openings, therefore exacerbating the starboard list. At the same time, the floodwater in the rudder compartment and in the water tank would also shift further to starboard. Had the water in the rudder compartment been discovered, the *Gracie Claire*'s owner or captain presumably would have taken measures to eliminate the water in the space before taking on fuel and water.

While the captain was filling the tank from the port side, the crewboat that passed astern added to the heeling forces on the starboard side. First, the displaced water of the passing vessel pushed the side of the hull below the waterline. Second, as the waves from the crewboat's wake washed over the bulwark and onto the main deck of the towboat, they added weight on the starboard side of the main deck.⁵ With the starboard deck edge submerged, the *Gracie Claire* would have rolled more easily. Once the vessel reached a heel angle that allowed water to reach above the 20-inch coaming of the open door leading to the engine room, the vessel down-flooded and rapidly sank.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the capsizing and sinking of the *Gracie Claire* was the towing vessel's decreased stability and freeboard due to undetected flooding through a hull leak in the rudder compartment, which made the vessel susceptible to the adverse effects of boarding water from the wake of a passing vessel.

⁵ Water from boarding seas trapped on decks by bulwarks can significantly reduce a vessel's stability due to several factors: (1) the additional weight of the water is added high on the vessel; (2) the freeboard is reduced due to the added weight; (3) the weight, which is added to the vessel's low side, shifts the vessel's center of gravity farther outboard.

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Vessel Particulars

Vessel	<i>Gracie Claire</i>
Owner/operator	Triple S Marine LLC
Port of registry	Morgan City, Louisiana
Flag	United States
Type	Towing vessel
Year built	1977
Official number	584694
IMO number	N/A
Classification society	N/A
Construction	Steel
Length	45.1 ft (13.7 m)
Draft	6.6 ft (2.0 m)
Beam/width	21 ft (6.4 m)
Gross registered tonnage	62
Engine power; manufacturer	900 hp (671 kW) (2) 12V71; Detroit Diesel
Persons on board	3

NTSB investigators worked closely with our counterparts from Coast Guard Sector New Orleans throughout this investigation.

For more details about this accident, visit www.nts.gov and search for NTSB accident ID DCA17FM025.

Issued: August 13, 2018

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*, Section 1131(b)(1). This report is based on factual 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*, Section 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*, Section 1154(b).
