National Transportation Safety Board

Marine Accident Brief

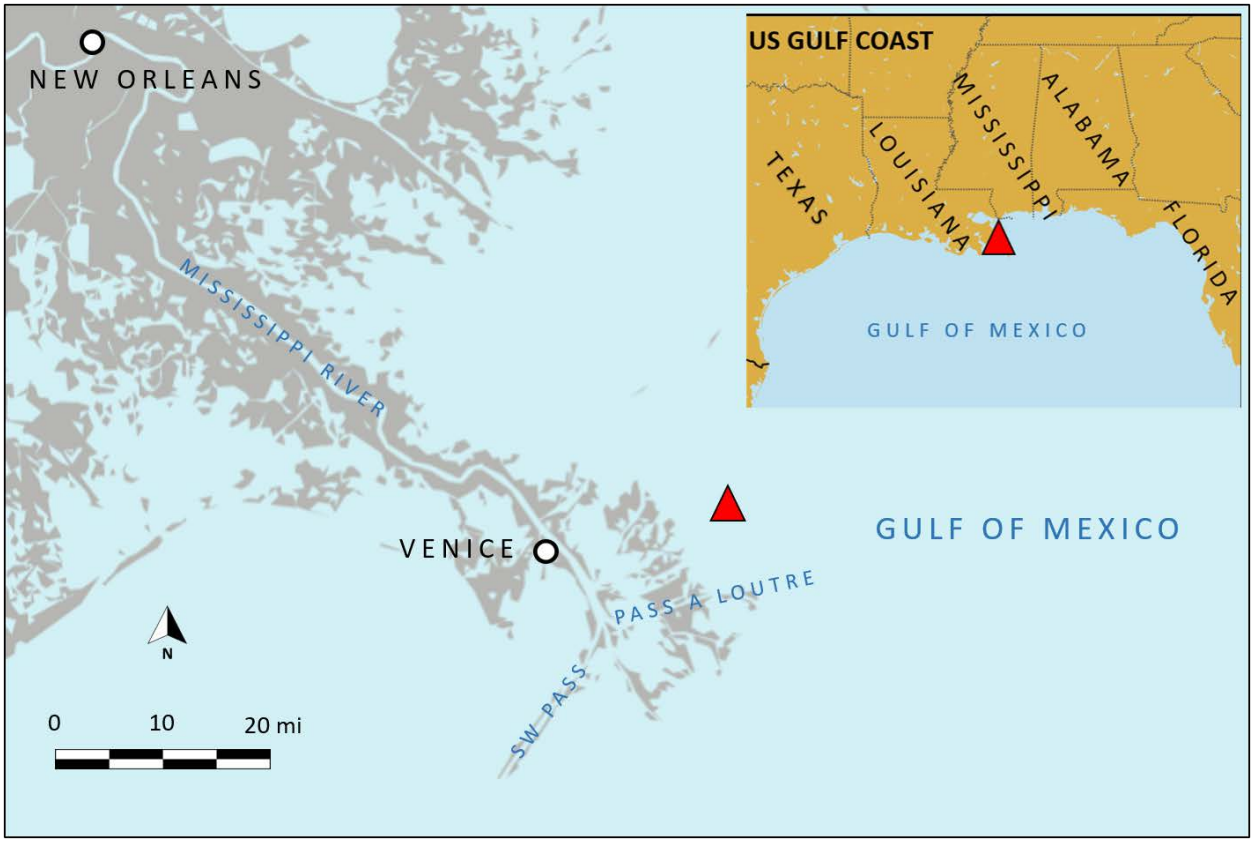
Overturning of the Liftboat *Kristin Faye*

Accident type	Other	**No.** DCA19FM050
Vessel name	*Kristin Faye*	
Location	Gulf of Mexico, Main Pass Block 64, about 18 miles east of Venice, Louisiana 29°18.10' N, 89°03.30 W	
Date	September 8, 2019	
Time	1015 central daylight time (coordinated universal time – 5 hours)	
Injuries	1 minor	
Property damage	$750,000 est.	
Environmental damage	120 gallons of diesel fuel released (sheen 3 miles x 67 feet)	
Weather	Visibility 10 miles, cloudy, winds northwest at 6-7 knots, seas northwest 1-2 feet, air temperature 85°F, water temperature 82°F	
Waterway information	The Main Pass lease area of the Gulf of Mexico lies northeast of the Pass A Loutre entrance to the Mississippi River and abuts the Louisiana coastline.	

On September 8, 2019, about 1015 local time, the liftboat *Kristin Faye* overturned while preparing to conduct work alongside a platform in the Gulf of Mexico, in Main Pass Block 64, located about 18 miles east of Venice, Louisiana.[1] All three crewmembers abandoned the vessel and were rescued. One person suffered minor injuries during the evacuation. An estimated 120 gallons of diesel fuel were released. The vessel was declared a constructive total loss at an estimated $750,000.

The liftboat *Kristin Faye* in an elevated position alongside *Platform AQ* before the accident. (Source: Sanare Energy Partners, LLC)

[1] All miles in this report are nautical miles (1.15 statute miles).



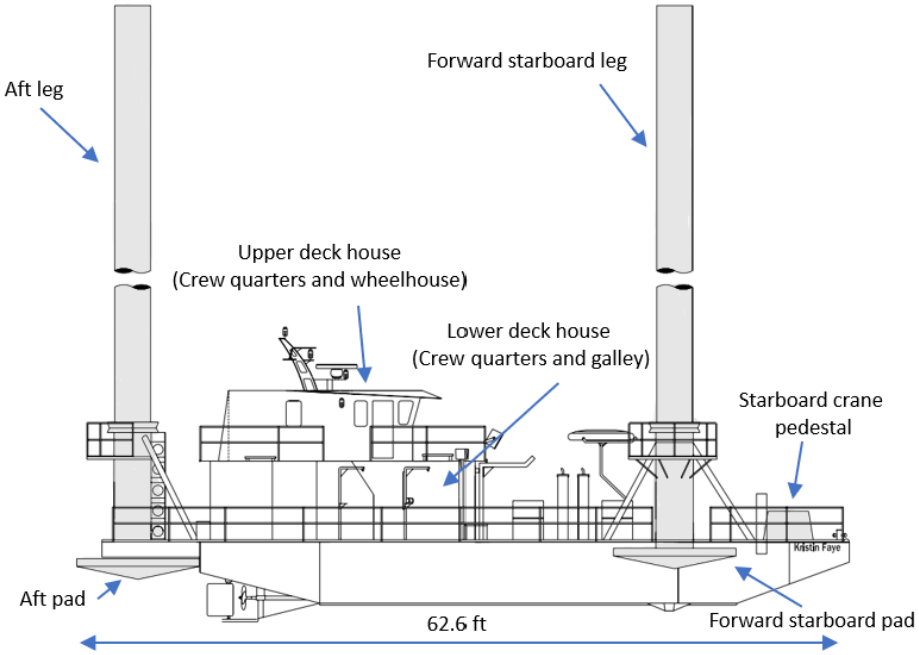
Area of accident where the *Kristin Faye* overturned, as indicated by the red triangle. (Background source: Google Maps)

Background

Liftboats are three- or four-legged, self-propelled, self-elevating vessels. They typically service offshore facilities (such as oil drilling platforms) by providing cranes and deck space. They carry cargo and personnel offshore and, once on location, elevate or "jack up" out of the water to allow crews to carry out work. The liftboat *Kristin Faye* was outfitted with three 105-foot-long hydraulically-driven legs that allowed the vessel to lift out of the water once the 7-foot-by-20-foot pads of the legs were in place on the seafloor. The *Kristin Faye* was crewed by three: a captain, a deckhand, and a cook. The vessel was fitted with two extending/telescoping boom cranes on its bow: one crane mounted on a pedestal to starboard and a larger-capacity crane to port.

The *Kristin Faye* was working in the Main Pass lease area of the Gulf of Mexico, servicing various platforms for 37 days prior to the accident. Operations included the September 3 removal and transfer of a 17,000-pound tank from the offshore *Platform AQ* to a supply boat, which brought it ashore for repair. Prior to this operation, on September 2, a third-party contractor hired by Sanare Energy Partners, LLC, the owner of *Platform AQ*, conducted a bottom survey in the vicinity of *Platform AQ* to ensure the ocean floor was clear of pipelines, any existing "can holes" (impressions left in the seabed by previous jack ups), bottom impressions left by another vessel, or any other hazards to a liftboat setting down its legs in the area. A bottom survey consists of a sonar reading of the seafloor bottom and is sometimes conducted prior to liftboat operations taking place. Five days before the accident, the *Kristin Faye* began working at another platform in the Main Pass 64

field, remaining in a jacked-up position for approximately 4 to 5 days without incident, before returning to *Platform AQ*.



Outboard starboard profile of the liftboat *Kristin Faye.*

Accident Events

The morning of September 8, the *Kristin Faye* was jacked up at a platform in the Main Pass Block 64 area. The *Kristin Faye* completed its work, offloaded all equipment, and headed toward *Platform AQ* for the next task, to receive and transfer the repaired tank it had offloaded several days earlier.

When the *Kristin Faye* arrived near *Platform AQ*, about 0800, the captain maneuvered the liftboat to a position slightly (about 10 feet) closer to *Platform AQ* than it had been a few days earlier, so the liftboat would be close enough to the platform to put out a walkway between them. The captain said he was confident that the bottom survey used for the *Kristin Faye*'s operations at the platform five days earlier still verified the sea bottom clear of hazards or obstructions.

The captain then began the procedures to jack the boat out of the 35-foot-deep water, starting with a preload test (a weight test). A preload test is used to determine that the sea bottom is stable and can support the weight of an elevated liftboat. The *Kristin Faye*'s operations manual stated if the liftboat does not move and remains level for a period of one hour, the test is considered satisfactory. Using the controls located in the wheelhouse, the captain began the preload test. He jacked the boat up above the water so that there was an air gap of about 6 feet between the hull of the *Kristin Faye* and the water, then let the liftboat sit for an hour. During this time, the captain was waiting to see if any further settling of the pads would occur. He felt for any shifting of the boat, listened for the tilt alarm, and monitored the (bubble) inclinometers on the liftboat (forward,

aft, port, and starboard) to make sure they were steady.[2] After about an hour, the captain was satisfied with the liftboat's preload test. He then jacked the boat up to the desired operating height, an air gap of roughly 20 to 25 feet between the hull of the *Kristin Faye* and the sea surface. Again, he let the liftboat sit for about an hour to ensure no further settling or movement.

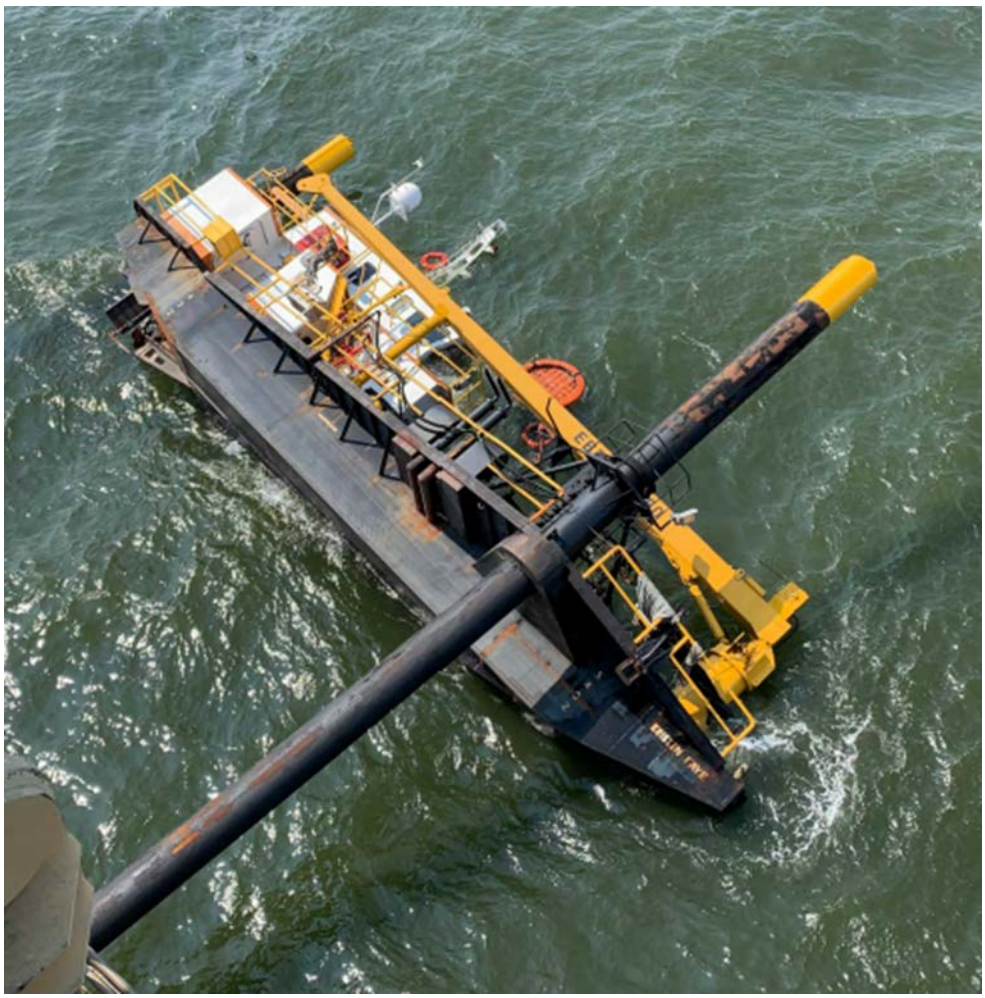
Next, the captain left the wheelhouse and went to the port crane control station on the crane's pedestal to test the movement of the crane to ensure it would clear *Platform AQ* during operations. The two other crewmembers were stationed on the forward deck of the liftboat, in a position to observe the crane movement. From the crane control station, the captain moved the crane boom from its stowed horizontal position, brought it completely vertical, and started turning it to make sure it was going to clear the platform. Immediately, the *Kristin Faye* began tilting to port. The captain left the crane control station and ran to the wheelhouse, where he attempted to level the hull by raising (retracting) the starboard and aft legs to match the height of the falling port corner (bow), to stop the tilting to port. However, although he began moving the starboard and after legs upward, the vessel continued to fall to port.

The captain estimated that it took less than one minute from the time he first felt the liftboat tilting until the port side was in the water. Unable to get to the bow of the liftboat with the other crewmembers, the captain initiated emergency calls, donned his lifejacket, jumped into the water, and swam to the safety of a supply vessel about 50 to 100 yards away. The two other crewmembers held onto the starboard rail until they were rescued from the *Kristin Faye*'s bow with a personnel basket from *Platform AQ*. The cook felt his "back snap" as he held onto the hand rail while the liftboat was tilting.

[2] The *Kristin Faye*'s tilt alarm sounded at 1.5° and 2.5°.

The *Kristin Faye* tilting over into the water with two crewmembers on the starboard side of the bow. (Source: Sanare Energy Partners, LLC)

About 5 hours later, the *Kristin Faye* was resting on the seafloor nearly submerged, with just a small part of the starboard bow protruding out of the water. On September 12, a contractor began salvage operations. Salvage divers reported that the port leg had penetrated roughly 40 feet down into the mud, and the port side of the vessel was completely embedded in the mud. Salvage operations continued daily; however, challenging weather conditions impeded a successful salvage. On September 13, the vessel's owner declared the *Kristin Faye* a total constructive loss, with estimated cost of damages at $750,000. The salvage company was eventually able to right the *Kristin Faye* and transport it to a scrapyard in Belle Chase, Louisiana, where it arrived on October 7.



Starboard side of the toppled *Kristin Faye,* taken from *Platform AQ.* (Source: Sanare Energy Partners, LLC)

Additional Information

A US Coast Guard inspector examined the *Kristin Faye*'s three legs and jacking gear in the scrapyard following salvage and found no signs or indications of failure or damage.

In 2003, the National Offshore Safety Advisory Committee's Subcommittee on Liftboat Operations described preloading as a "safety procedure to assess the load bearing capacity of the soil, to achieve maximum penetration, namely, to compress the soil to hold the maximum weight expected, to prevent unexpected leg penetration ("punch through") during operations, in order to prevent damage to the vessel and injury to the crew." The methods used to determine the adequacy of the seabed to support elevated operations of vessels such as mobile offshore drilling units (MODUs), large liftboats, and small liftboats (such as the *Kristin Faye*) can vary based on the size and weight of the vessel. MODUs may use in-situ tests such as using a penetrometer to measure the resistance of the soil in pounds per square inch (PSI), giving an indication of how compacted the soil is; seabed sampling; laboratory tests; remote operated vehicle, sonar, or diving surveys; and preload tests using preload tanks specifically constructed to add weight to the MODU during the test. Preload tanks are used for testing the bottom-bearing soil for capacity at a short height

above the water, and for testing the integrity of the legs, hull, and jacking system, before jacking a vessel into an elevated position.

Larger liftboats may use sonar equipment to survey the bottom before conducting a preload using the extra weight of seawater in their preload tanks.

Smaller liftboats like the 63-foot *Kristin Faye* are typically not fitted with preload tanks. The *Kristin Faye*'s Coast Guard-approved operations manual included instructions for ensuring the seabed was dense enough to support the vessel in an elevated position. The method used was typical of small liftboats operating in the Gulf of Mexico: using procedures to safeguard personnel and cargo, the vessel would conduct a preload test by jacking up a short distance above the water so the vessel's weight would be distributed among the three legs. If no movement occurred, the test was adequate. If there was continuous or excessive settling of the legs into the sea bottom, that "usually indicates a soil failure problem, such as scouring," and the *Kristin Faye*'s operations manual instructed to "consider further preloading or moving the vessel."[3]

The manual warned that a "punch through" may occur during preload operations and even after the vessel has been jacked up for some time. As described in the operations manual:

> A "punch through" occurs when a thin layer of strong seabed overlies a weaker layer of soil, and a pad(s) suddenly breaks through the weather layers and begins to sink [further into the seabed]. The pad will continue to sink until stopped by adequate resistance at a deeper penetration or by increased buoyancy when the hull enters the water. This sudden penetration can cause a sharp inclination of the vessel, resulting in leg fracture, structure distortion or worse.

The *Kristin Faye*'s operations manual included instructions for conducting a preload test before the *Kristin Faye*'s hull was moved to an elevated position. The instructions for the preload test read:

1. Copy the weights, longitudinal moments, and transverse moments from the Loading Form.
2. Relocate the deck load, if necessary, to the best positions for elevated operations.
3. Load each leg to the required load for the anticipated wave height.
4. Keep the load distributed as evenly as possible on the 3 legs.
5. Keep the hull level and wait at least one hour after all settling has stopped.

The operations manual did not include any guidance for changes in the position of the crane booms once the vessel was elevated. The 40-foot-long port crane boom weighed 22,500 pounds and was cradled in a horizontal position extending aft from its pedestal base located inboard and forward of the port leg. The captain told investigators that his practice, once he started working the crane after waiting the hour at the elevated level, was to monitor the inclinometers on the vessel. He and his crew would "check the levels to make sure the boat's not moving because that

[3] A specific form of the more general term "erosion," scouring is the removal by hydrodynamic forces of granular bed material in the vicinity of coastal structures.

[the crane] is kind of a lot of weight." If there was vessel movement, he would bring the boom to a vertical position and "leave it [crane] alone for another hour until it [*Kristin Faye*] stops moving."

According to the *Kristin Faye*'s owner, the entire Main Pass area, and the whole stretch up the east side of the Mississippi River, was not a good area for liftboats. "There are a lot of silt deposits in that area because the river dumps freely. 'Can holes' exist; they silt over so quickly that you don't know they're there. There's a lot of mud ledges and shelves and typically horrendous bottom conditions there." In his opinion, the way to prevent this from happening again would be to avoid hiring liftboats without full preload capability to operate in that area. With full preload capability attained from preload tanks, a liftboat "can simulate a full loaded condition or actually an overload condition by pumping a tremendous amount of water"; with the liftboat only one foot out of the water, if the liftboat were to fall into a "can hole" or experience another overloading condition, the results would not be catastrophic.

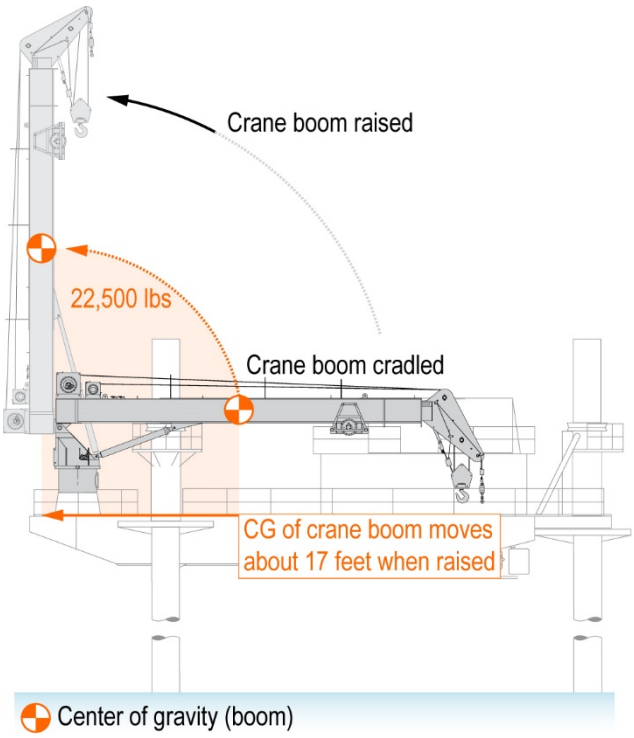
Post-casualty drug testing for the three crewmembers showed negative results. Alcohol tests were not conducted since testing equipment was lost on the abandoned vessel.

Analysis

Because the *Kristin Faye* overturned in less than a minute, it is likely that the seabed below the port leg became unstable, causing the leg to settle very quickly in what is known as a "punch through" in the industry. This caused the liftboat to lean over despite the effort of the captain to raise (retract) the other two legs.

The *Kristin Faye* and other small liftboats that lack preload tanks operating in the Gulf of Mexico typically conduct a preload test using only the weight (displacement) of the vessel, including any cargo or equipment. It is a simple concept used to conclude the vessel will remain stable while jacked up in an area of the Gulf where silt deposits, mud ledges, and "can holes" are prevalent. If the vessel does not shift an hour after planting its pads on the seafloor, the procedure assumes the vessel will remain stable.

After waiting for an hour at the elevated level, the captain raised the boom. Once the port crane boom was moved from its cradle (horizontal position) to the vertical position, the 22,500-pound boom's center of gravity shifted about 17 feet toward the port crane pedestal at the forward port corner of the liftboat. With this shift, the weight supported by the port forward leg pad increased due to the boom's weight shift toward it. The weight supported on the forward port pad increased until the pad suddenly "punched through" the bottom, resulting in the vessel overturning



When the captain raised the *Kristin Faye*'s port crane boom, its center of gravity shifted about 17 feet.

in less than a minute, during which there was no time for the captain to adjust the legs to level the vessel and counteract the tilt.

A preload test should account for the most extreme loading conditions the liftboat will experience at the elevated level. In anticipation of lifting a 17,000-pound pressure vessel onto the platform, the preload test for the *Kristin Faye*, a liftboat without preload tanks, should have included sufficient weights, appropriately placed to replicate the load on each of the pads. For instance, the *Kristin Faye*'s preload test could have included locating the boom, with the pressure vessel attached, in the position that would have applied the greatest force on the respective pad.

Many alternatives are available to test the sea bottom before commencing elevated operations. Testing methods include: measuring the resistance of the soil in PSI as an indication of how compacted the soil is; seabed sampling; laboratory tests; remote operated vehicle, sonar, or diving surveys; replicating loads and weight shifts in the preload test; and, as mentioned by the *Kristin Faye* owner, using liftboats fitted with preload tanks specifically constructed to add weight to the vessel during the preload test.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the overturning of the liftboat *Kristin Faye* was the company's inadequate preload procedure that did not account for crane movements or the planned loads (weights) to be lifted, resulting in a "punch through" of one of the vessel's three legs.

Liftboat Preload Tests

Prior to jacking up to expected operating height and commencing operations, liftboat operators should conduct preload tests, with the hull close to the water, that simulate all planned operational loads.

Vessel Particulars

Vessel	*Kristin Faye*
Owner/operator	Mitchell Liftboats, LLC
Port of registry	New Orleans, Louisiana
Flag	United States
Type	Offshore Supply Vessel
Year built	1973
Official number (US)	548383
IMO number	N/A
Classification society	N/A
Construction	Steel
Length	62.6 ft (19.1 m)
Beam/width	31.9 ft (9.8 m)
Draft	N/A
Tonnage	97 GRT
Engine power; manufacturer	2 x 300 hp (224 kW); Detroit Diesel reduction engines
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.ntsb.gov and search for NTSB accident ID DCA19FM050.

Issued: November 4, 2020