

Tilting of Liftboat *L/B Robert*

On November 20, 2022, at 1256 local time, the liftboat *L/B Robert* was reported to be listing (tilting) alongside a stationary oil platform in the Gulf of Mexico near South Marsh Island Block 137, about 80 miles southeast of Lake Charles, Louisiana.¹ The crew had evacuated 2 days prior due to forecasted adverse weather in the area, leaving the vessel elevated out of the water and unattended. Following the casualty, vessel crewmembers, salvors, and personnel from the operating company assessed the damage and facilitated the tow of the vessel into port. No pollution or injuries were reported. Damage to the vessel and cargo was estimated at \$6.9 million.



Figure 1. *L/B Robert* elevated and operating alongside a platform precasualty. (Source: Peter Dieter Janson)

¹ (a) In this report, all times are central standard time, and all miles are nautical miles (1.15 statute miles). (b) Visit [nts.gov](https://www.nts.gov) to find additional information in the [public docket](#) for this NTSB investigation (case no. DCA23FM007). Use the [CAROL Query](#) to search investigations.

Casualty type	Other
Location	Gulf of Mexico, 80 miles southeast of Lake Charles, Louisiana 28°16.44' N, 92°6.25' W
Date	November 20, 2022
Time	1040 central standard time (coordinated universal time -6 hrs)
Persons on board	None
Injuries	None
Property damage	\$6.9 million est.
Environmental damage	None
Weather	Visibility 4 mi, overcast clouds, winds northeast 31 kts, gusts to 39 kts, significant wave heights 12-15 ft, swells east-northeast, air temperature 61°F, water temperature 63°F, morning twilight 0609, sunrise 0634
Waterway information	Gulf, depth 217 ft (casualty location)

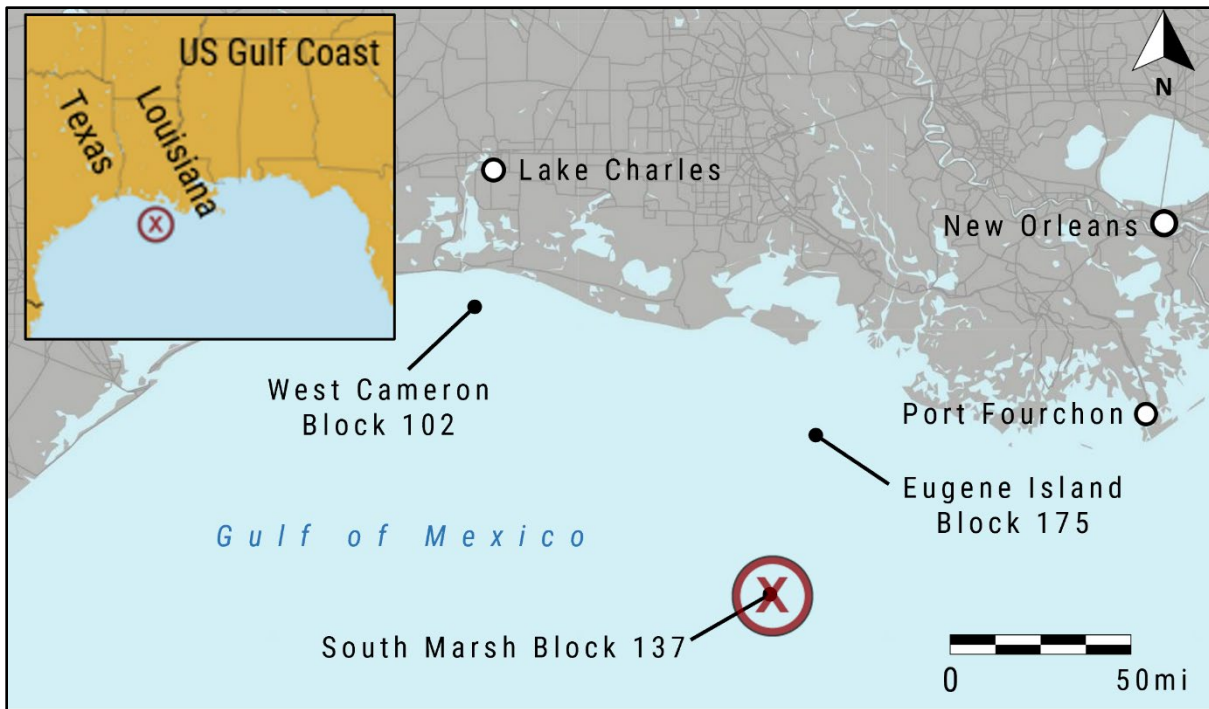


Figure 2. Area where the *L/B Robert* severe listing occurred, as indicated by a red X. (Background source: Google Maps)

1 Factual Information

1.1 Background

The 185-foot-long *L/B Robert* was a three-legged liftboat constructed of welded steel and built by Gulf Island Marine Fabricators in Houma, Louisiana, in 2012. Falcon Global Robert acquired the *L/B Robert* in 2018, and SEACOR Marine operated it.² The self-propelled, self-elevating vessel was based out of Morgan City, Louisiana, and was used to install, maintain, and repair offshore facilities such as oil-production platforms and wind turbines. After carrying equipment and personnel to a facility, the *L/B Robert* would elevate, or “jack up,” raising its hull clear of the water to provide a stable platform for work at the site. The *L/B Robert* had four cranes positioned around the vessel, a large deck space, and a helideck.

The diesel-electric-powered vessel was propelled by two 2,466-hp azimuthing stern thrusters and had a max speed of about 6 knots. The vessel was also equipped with a 540-hp tunnel thruster to aid the vessel in maneuvering.

The *L/B Robert*'s operating manual outlined the vessel's operating limits. When the vessel's legs were fully extended, the vessel's maximum elevation (including leg pad penetration into the seabed, water depth, and air gap) was 290 feet (figure 4 shows the vessel at maximum elevation after jacking up about 6 weeks before the casualty).³ While elevated in water depths greater than 75 feet, the vessel's operating limits were 15-foot waves and 70-knot winds. While “jacked down” (floating) and underway, the limits were 8-foot waves and 70-knot winds. If weather forecasts predicted conditions exceeding these limits, the vessel was required to proceed to a harbor or an area of safe refuge (area with a water depth less than 75 feet) and elevate the liftboat out of the water. Because of the nature of these restrictions, the vessel was also prohibited from operating more than 12 hours away from a harbor or area of safe refuge.

² In 2021, the liftboat *SEACOR Power*, operated by the same company as the *L/B Robert*, capsized off the coast of Port Fourchon, Louisiana, while underway in a severe thunderstorm. As a result of the NTSB's investigation of this casualty, we issued three safety recommendations to the company to (1) ensure timely and accurate weather forecasts for vessel crews (M-22-13); (2) ensure vessels within the company fleet were operating within limits (M-22-14); and (3) revise operating manuals to require vessels to remain in port or jack up when a special marine warning has been issued for the vessel's planned route (M-22-15). The company provided crews with 24/7 access to real-time weather forecasts, completed a comprehensive operational review of liftboats in its fleet, and revised their operations manual as suggested. Accordingly, in March 2023, all three of these recommendations were classified Closed–Acceptable Action.

³ (a) *Maximum elevation* refers to the distance from the bottom of the elevated hull to the underside of the leg pads in the seafloor. (b) *Air gap* refers to the distance between the underside of the elevated hull and the mean water level beneath it.

The vessel was required to have at least 10 crewmembers. The vessel could carry 132 offshore workers (according to its certificate of inspection) and furnished offshore workers with accommodations.

1.2 Event Sequence

On September 23, 2022, the *L/B Robert* arrived alongside Structure A, a platform in the South Marsh Island Area Block 137 (SM 137) in the Gulf of Mexico, about 80 miles southeast of Lake Charles, Louisiana. The owners of the platform, Apache Corporation, had contracted the vessel to support plug and abandonment operations on several decommissioned oil wells that were accessible from the platform.

After the *L/B Robert* arrived, a third-party underwater survey company (hired by the vessel's operator) used sonar equipment to conduct a survey of the seabed in the area around the platform to develop a base map of the platform and surrounding area. The vessel's captain, operating company vice president of US Operations, and operations manager reviewed the base map to determine potential hazards, such as can holes and depressions left in the seabed from other jack-up drilling rigs or other liftboats, and a location to lower the *L/B Robert's* legs and jack up (company policy prohibited the captain from positioning the vessel's leg pads closer than 25 feet from known hazards).⁴

After reviewing the base map, the captain, operating company vice president of US Operations, and operations manager decided to lower the *L/B Robert's* legs and jack the vessel out of the water on the east side of the platform. To do this, the crew simultaneously lowered the vessel's legs until the pads reached the bottom. Jacking continued until the vessel was out of the water and just above any waves.

The operating company required the crew to complete a preload test by filling the preload water ballast tanks on board the vessel to add extra weight to determine whether the seabed was stable and could support the weight of the elevated liftboat. Typically, the company required the test to last 3 hours without the vessel shifting (leg pads moving across the seafloor) or settling (pads sinking further) to verify that the vessel was on stable ground and safe to elevate further. However, because the vessel's starboard pad was near—although still 25 feet away from—a can hole identified on the base map, office personnel had the crew complete an extended, 36-hour preload test to ensure that the vessel was in a safe location.

⁴ *Can holes* are impressions left in the seabed by previous jack-ups and pose a hazard to subsequent vessels landing (jacking-up) in the vicinity.

Soon after the extended preload test was completed, the *L/B Robert* captain and office personnel decided to jack down the vessel and liberate—raise the legs up, remove the pads from the seabed, and float the vessel—because of a hurricane forecasted to impact the area. The vessel transited about 18 hours northwest to another Apache Corporation project, out of the way of the hurricane, in West Cameron Block 102 (about 95 miles away).

On October 3, the *L/B Robert* returned to Structure A in SM 137. The vessel did not jack up in the same location on the east side of the platform because the crew had discovered during the previous jacking that the vessel's cranes could not reach certain areas of the platform essential to complete required work. Instead, the captain initially opted to jack up the vessel at a slightly different spot on the east side. However, during the preload process, the vessel moved, and its leg pads came within 16 feet of a can hole. As a result, the captain decided to liberate and move the vessel to the south side of the platform and deploy the survey equipment again in order to produce another base map for the new location.

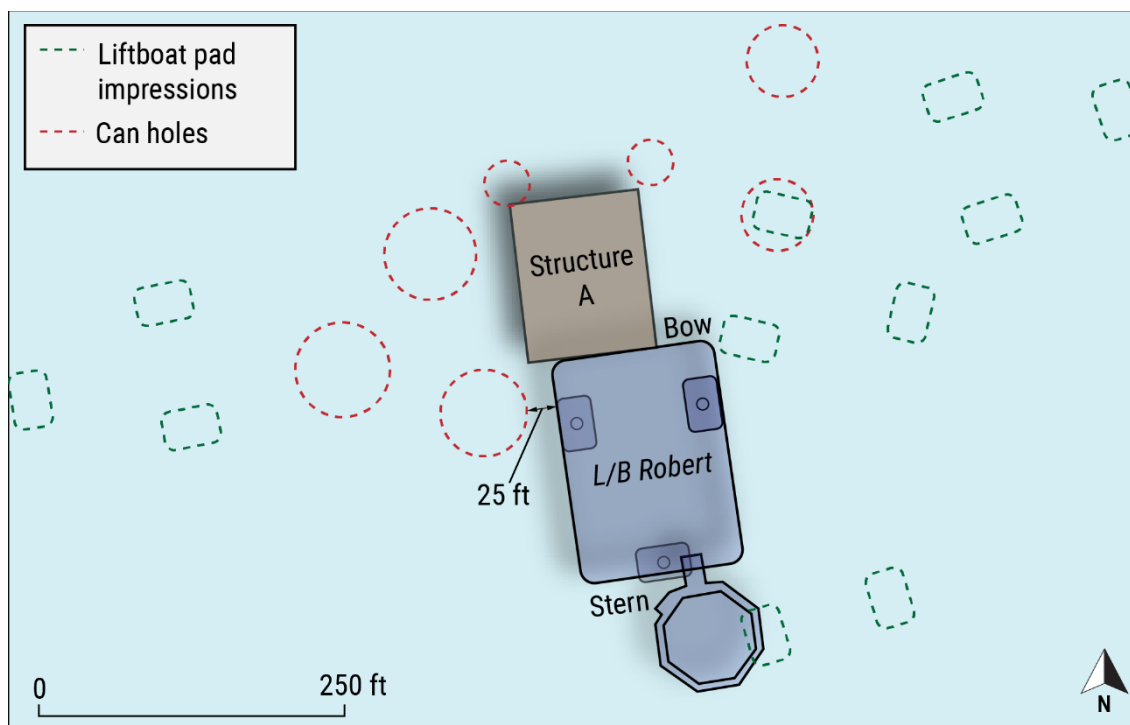


Figure 3. The *L/B Robert*, alongside the southern side of Structure A, and surrounding seafloor, including outlines of documented can holes and liftboat pad impressions from previous vessel jack-ups. (Data source: SEACOR Marine)

After identifying a suitable location, the captain ordered the vessel jacked up, and the crew completed a 17-hour preload test (an extended preload was conducted again as an extra precaution due to a can hole being just over 25 feet west of the vessel's port leg pad). Once the preload test was complete, the crew further jacked

the vessel out of the water alongside Structure A in 217 feet of water. The three leg pads penetrated into the seafloor about 25 feet, leaving the vessel about 48 feet of working air gap. The crew measured this distance on board the vessel using a metered rope with a weight attached to the end.

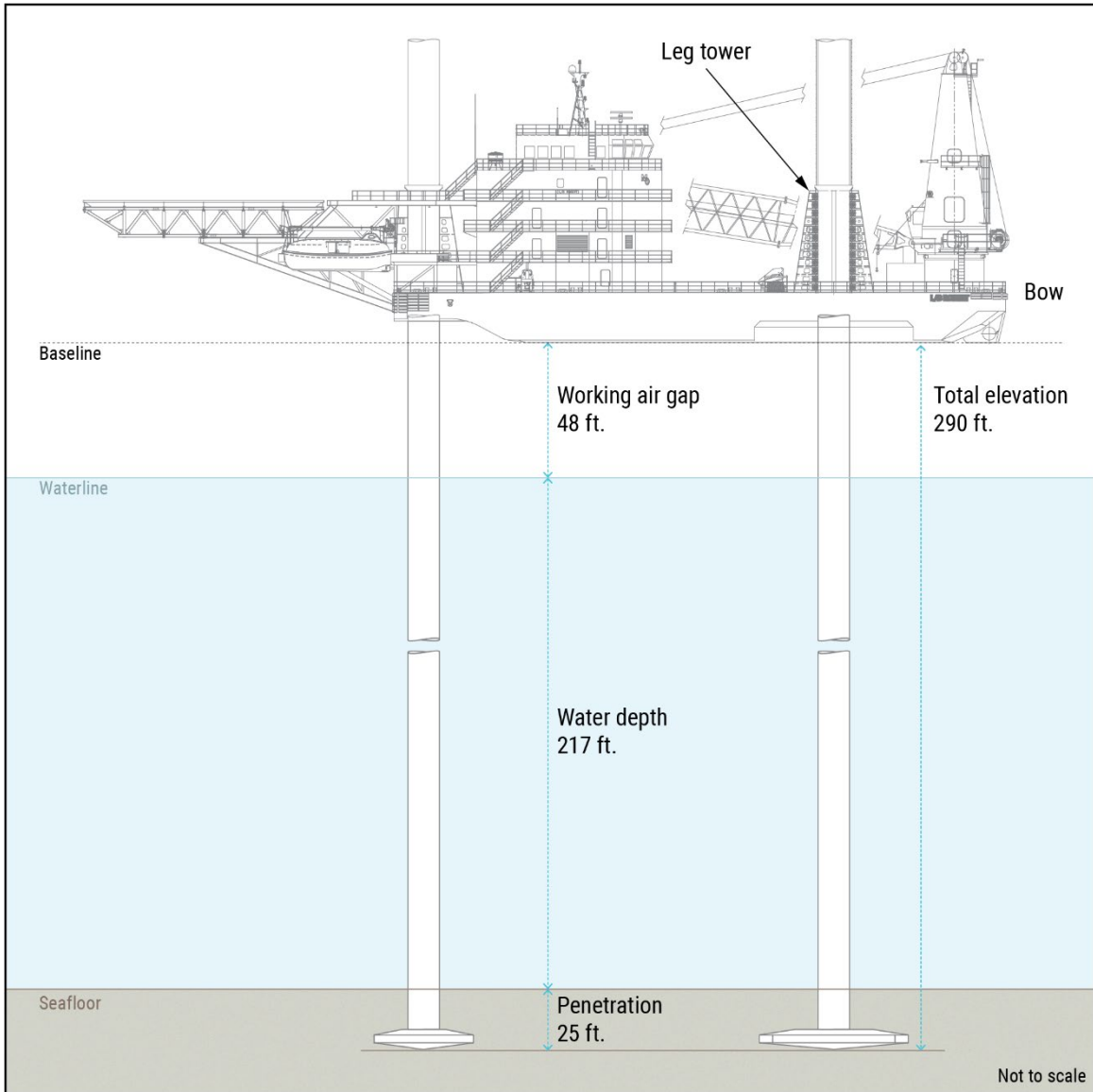


Figure 4. *L/B Robert* approximate operating measurements at the casualty site after initially jacking up at Structure A in early October.

For the next 6 weeks, the *L/B Robert* remained in position, without incident. Because the vessel was at its maximum elevation almost consistently and its legs effectively fully extended, the vessel occasionally swayed when exposed to winds greater than 25 knots. When this occurred, the crew and personnel on board would halt construction operations on the platform and crane operations on the vessel, and the vessel would typically jack down to just above the maximum wave height,

reducing the elevation and air gap—thereby minimizing the sway. The captain said that there was some minor settling of the stern leg throughout the month due to some of the weather but the slight settling was “normal.”

To monitor the weather, the captain consulted three third-party weather forecast sources in addition to the vessel’s NAVTEX (navigational telex) system—which included the National Weather Service forecasts—and other online weather forecasting sites (the vessel was equipped with internet connectivity).⁵ On November 15, the captain of the *L/B Robert* and the shoreside operations manager for the vessel discussed the forecasted weather for the area in which the vessel was operating. Forecasts for the evening of November 19 and during the day of November 20 predicted potential maximum wave heights greater than 20 feet, and the captain was concerned because the forecasted wave heights would exceed the vessel’s operating limit (15-foot waves when jacked up in water depths greater than 75 feet).

Throughout the day of November 16, the captain and office personnel continued to monitor weather forecasts to see if they would improve; observed seas of 7-9 feet were noted in the ship’s log. They also considered liberating the vessel’s legs and leaving the area to avoid the forecasted weather as they had done previously. The captain stated that he needed “a whole day” to safely liberate the vessel’s legs and transit to safe refuge (identified by the company to be 37 miles away in the Eugene Island Block 175). He told investigators that it would take about 12 hours to liberate the vessel’s legs and ready the vessel to get underway. If underway at 4 knots, the transit would take the vessel about 9 hours. However, with consistently forecasted wave heights above 8 feet in the area, the operating limit for the *L/B Robert* while underway, the captain believed he would not have had a window of time long enough to reach the safe refuge (before the liftboat’s operating limits were exceeded).

On the morning of November 17, the captain and shoreside operations manager again consulted the weather forecasts for the operating area, which indicated that maximum wave heights for the evening of November 19 and throughout the day of November 20 would remain above 20 feet.

At 1000 on November 17, because the weather in the coming days was forecasted to exceed the operating limits of the vessel, shoreside office personnel and the captain of the *L/B Robert* decided to evacuate all personnel on board the liftboat. Beginning at 1100 on November 17, all non-crew personnel evacuated via helicopter, and by 1538, only nine crewmembers remained on board.

⁵ One of the three third-party sources was not available until November 16.

Throughout the afternoon and evening of November 17, the crew prepared the vessel to be left unattended. Shoreside technical support, including a company-hired naval architect, helped the crew determine which shipboard systems would remain operating, the configurations of machinery and ventilation, and the vessel's elevation. The crew lashed down cargo on deck and ensured watertight hatches were secured. The maximum wave height forecasted by one of the third-party sources was between 19 and 26 feet, so the captain and office personnel decided to lower the vessel and leave it elevated about 25 feet above the water level, believing this would provide the vessel the greatest ability to resist the overturning, or toppling, forces of the combined wind (against the exposed profile of the rig) and waves.

On November 18, at 1125, with the vessel's air gap about 25 feet and its starboard generator left online to power minimal operating vessel systems, the remaining nine crewmembers evacuated the *L/B Robert* via helicopter.

Two days later, about 0910 on November 20, recovered onboard CCTV that had remained operating after the crew evacuated captured video of the vessel slowly tipping to port (to the west). An hour and a half later, at 1040, the CCTV recorded the vessel leaning to port and deck cargo shifting in the same direction. Later, at 1256, a helicopter crew transporting personnel from another rig in the area flew over the *L/B Robert* and noticed the liftboat was listing (tilting) to port. The vessel remained supported by its legs, but the port deck edge was submerged and three of the vessel's liferafts had inflated and floated away from the vessel (they were still attached by their sea painters). The helicopter crew notified the US Coast Guard, and the Coast Guard contacted the operating company.



Figure 5. *L/B Robert* tilting to port as seen on November 21, 2022, at 0914. (Source: Coast Guard)

On November 23, aided by a salvage company, SEACOR Marine personnel and vessel crewmembers, including the captain, boarded the tilting vessel to assess the damage. According to the captain, he observed that, based on the vessel's onboard position monitoring system, the vessel had moved 19 feet to port (in a westerly direction). The starboard generator remained online, powering the vessel's electrical system, but the main engine was inoperable due to damage to its cooling water system. Cargo on deck had broken free from lashings and shifted, and seawater was entering the starboard thruster room through a small hull breach (a crack in the steel

plating). The crew hooked up a 1-inch compressed-air-operated diaphragm pump to keep up with the flooding.

Over the next 2 weeks, the salvage company and vessel crewmembers successfully jacked-up all three legs fully and had the vessel towed. It arrived in Amelia, Louisiana, on December 5.

1.3 Additional Information

1.3.1 Damage

In addition to the cargo that shifted and was damaged, the *L/B Robert* sustained multiple stress fractures around the vessel on bulkheads and decking, including in port and starboard z-drive thruster rooms (one in the starboard thruster room created a hull breach). All three legs showed deflections and several cracks toward their upper sections where they were housed inside the jacking leg towers. The racks that facilitated jacking on all three legs were also damaged, consistent with the leg deflections. Total damage costs were estimated to be \$6.9 million.

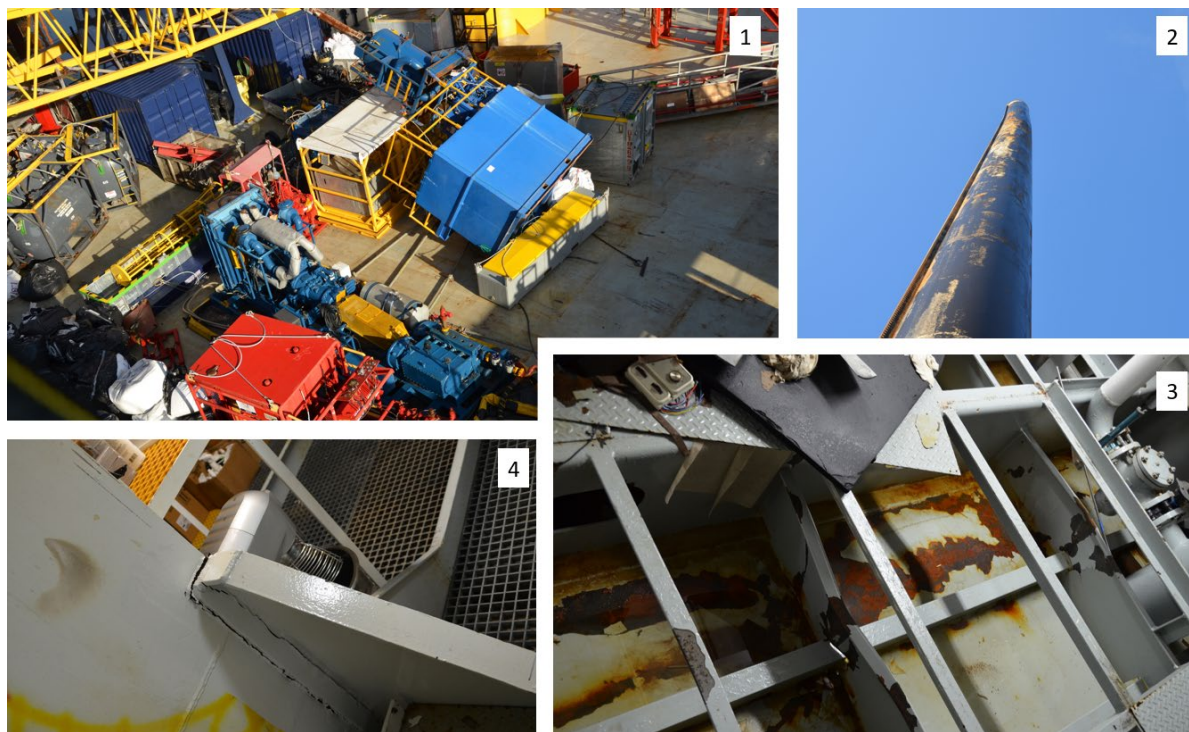


Figure 6. Damage sustained during the *L/B Robert* casualty, including shifted deck cargo (1), leg deflections (2), starboard z-drive room damage (3), and port z-drive room damage (4). (Background source: SEACOR Marine)

1.3.2 Weather

Onboard weather data was not available following the casualty. The closest weather station was KGHB, located 27 miles south of the casualty site. Data from this station indicated winds gusted to gale force (sustained winds of 34 to 37 knots) as early as 2320 on November 16. Another weather station, KGBK, located 65 miles south of the casualty site, recorded gale-force winds as early as 2335 on November 16, with winds gusting to storm force (sustained winds of 48 to 63 knots) by 1755 on November 19.

The closest weather stations with significant wave height information included Stations 42002 (about 157 miles southwest of the casualty site) and 42019 (about 173 miles west of the casualty site). Data from these stations indicated the casualty site may have experienced significant wave heights as high as 6.9 meters (22.6 feet) and 4.9 meters (16.1 feet) on November 19.⁶ The Ocean Prediction Center, which is responsible for National Oceanic and Atmospheric Administration forecasts for the northern Atlantic and Pacific Oceans, completed a wind and wave analysis of the casualty location and found significant wave heights between 12 and 15 feet on November 20 at midnight.

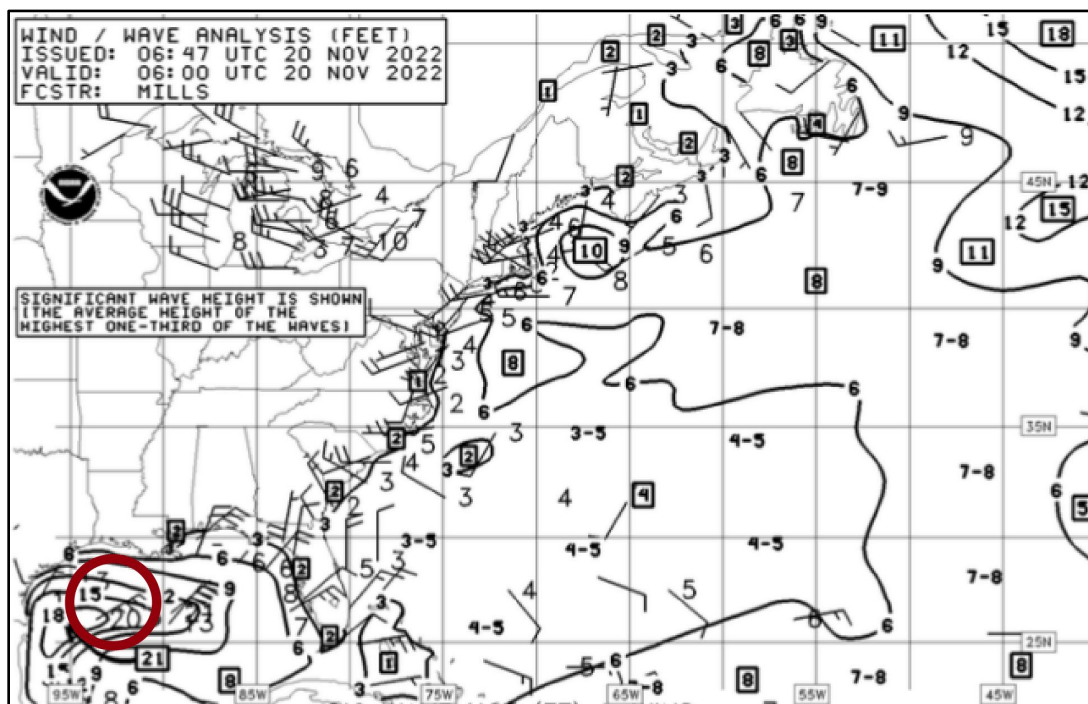


Figure 7. Ocean Prediction Center marine wind and wave analysis, valid until November 20 at midnight, with casualty location circled in red. (Background source: Ocean Prediction Center)

⁶ *Significant wave height*, the value given in weather forecasts, is the average of the highest third of waves measured or forecasted.

2 Analysis

On the morning of November 16, the liftboat *L/B Robert* was jacked up next to Platform A in SM 137 in the Gulf of Mexico when weather forecasts called for potential maximum wave heights greater than 20 feet. Concerned that waves would exceed the vessel's elevated operating limits (15-foot waves while jacked up), the captain considered raising the vessel's legs and transiting away from the storm—a decision the captain and vessel owner had made and executed as recently as 2 months prior. However, the immediate forecast called for seas greater than the operating limit of 8-foot waves while underway. Because it would take about 12 hours to liberate the vessel's legs from the seafloor and get underway, and the nearest safe refuge area was 9 hours away, the captain—in consultation with shoreside vessel management personnel—decided instead to evacuate the vessel. In the 2 days that followed, the unattended *L/B Robert* tilted to port, submerging its deck edge. Therefore, the decision to evacuate personnel and crewmembers from the vessel, rather than attempt a transit to an area of refuge or remain on board, was appropriate for the forecasted conditions and eliminated the risk to personnel from continued vessel operations on board.

When the crew evacuated the *L/B Robert* on November 18, leaving it unattended, they left an air gap about 25 feet above the water's surface per guidance from shoreside management personnel to stay just at the maximum wave heights predicted by the weather forecasts, believing this would maintain the vessel's greatest resistance to overturning from the combined forces of wind and waves. The vessel was jacked up to an elevation of 267 feet, in a water depth of 217 feet, with the leg pads averaging about 25 feet of penetration into the seafloor. All these conditions were within the limits identified in the vessel's operations manual. The vessel had been elevated and operating for 6 weeks without incident, and the base map of the seafloor produced by a third-party survey company indicated no obstructions, debris, or can holes within 25 feet of the *L/B Robert's* three leg pads.

Two days after the crew evacuated the vessel, CCTV showed the elevated vessel tipping to port, and a helicopter crew flying over the *L/B Robert* also reported the liftboat tilting to port. Based on observations from the closest observation points, gale-force wind conditions (greater than 34 knots) began to occur at the casualty site around midnight on November 17. These wind conditions continued to increase in strength through the evening of November 19, with peak winds likely near 45 knots (based on the observations at KGBK). Additionally, based on analysis completed by the Ocean Prediction Center, it is likely that the significant wave heights at the casualty site peaked early November 20 between 12 and 15 feet; thus, the vessel likely experienced waves as high as 24–30 feet, exceeding the 25-foot air gap, as well as the forecasts at the time the captain and shoreside personnel decided to evacuate the liftboat.

According to the captain, after the casualty, the vessel's onboard position monitoring system recorded the vessel had moved 19 feet to port from its original position. A postcasualty inspection of the legs and pads indicated no catastrophic failures that could have contributed to the vessel tilting—although the vessel's legs were bent within the leg towers on the vessel, the legs and the leg pads were otherwise undamaged. In the time leading up the tilting, overturning forces from the waves striking the elevated liftboat and gale-force winds would have transferred down the legs to the pads, causing the seabed foundation under and surrounding the leg pads to deteriorate. Although the vessel was originally positioned 25 feet from the nearest can hole, the deteriorated seabed foundation under the vessel's port leg likely gave way, causing the leg to slide into the can hole and the vessel to tilt to port, submerging its deck edge.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the tilting of the elevated liftboat *L/B Robert* was gale-force winds combined with waves that exceeded the vessel's air gap, causing vessel movement, which led to a leg sliding into an adjacent can hole in the seafloor.

Vessel	<i>L/B Robert</i>
Type	Offshore (Liftboat)
Owner/Operator	Falcon Global Robert / SEACOR Marine (Commercial)
Flag	United States
Port of registry	New Orleans, Louisiana
Year built	2012
Official number (US)	1237383
IMO number	9649809
Classification society	American Bureau of Shipping
Length (overall)	185.1 ft (56.4 m)
Breadth (max.)	135.1 ft (41.2 m)
Draft (casualty)	N/A (elevated)
Tonnage	487 GRT
Engine power; manufacturer	2 x 3,150 hp (2,349 kW); Caterpillar 3516C diesel engines 2 x 1,341 hp (1,000 kW); Caterpillar C32 diesel engines

NTSB investigators worked closely with our counterparts from **Coast Guard Marine Safety Unit Houma** throughout this investigation.

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable cause of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for any accident or event investigated by the agency. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident 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 investigating accidents and incidents 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)).

For more detailed background information on this report, visit the [NTSB Case Analysis and Reporting Online \(CAROL\) website](#) and search for NTSB accident ID DCA23FM007. Recent publications are available in their entirety on the [NTSB website](#). Other information about available publications also may be obtained from the website or by contacting—

National Transportation Safety Board
Records Management Division, CIO-40
490 L’Enfant Plaza, SW
Washington, DC 20594
(800) 877-6799 or (202) 314-6551