National Transportation Safety Board

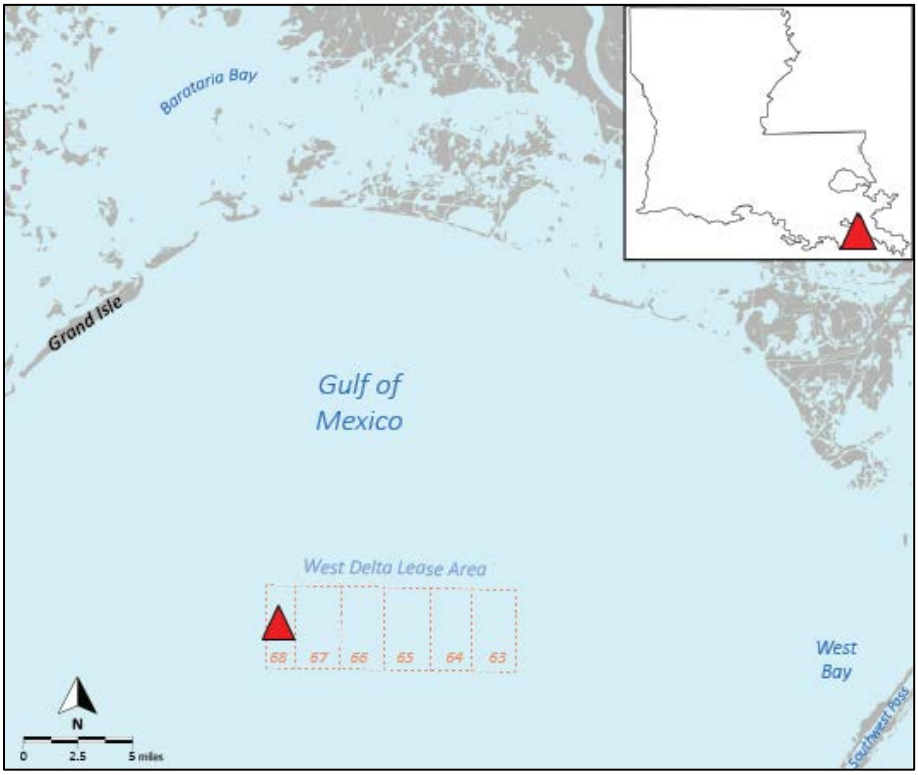
Marine Accident Brief

Overturning of the Liftboat *Ram XVIII*

Vessel name	*Ram XVIII*	**Accident No.** DCA19FM007
Accident type	Other	
Location	Gulf of Mexico, West Delta Block 68, about 15 miles south-southeast of Grand Isle, Louisiana 29°00.87' N, 089°50.50' W	
Date	November 18, 2018	
Time	0200 central standard time (coordinated universal time – 6 hours)	
Injuries	Three minor	
Property damage	$1,140,000 est.	
Environmental damage	1,000 gallons of hydraulic fluid	
Weather	Visibility 10 miles, winds southeast 5 knots, combined seas 3 feet, air temperature 61°F, water temperature 62°F	
Waterway information	The West Delta lease area of the Gulf of Mexico lies immediately west of the Mississippi River entrance and offshore Barataria Bay, Louisiana. West Delta block 68 is midway between Southwest Pass and Grand Isle, Louisiana.	

On November 18, 2018, about 0200 local time, the liftboat *Ram XVIII* overturned in the Gulf of Mexico, in West Delta block 68, located about 15 miles south-southeast of Grand Isle, Louisiana. Five crewmembers and ten offshore workers abandoned the vessel and were rescued. Three personnel suffered minor injuries during the evacuation. An estimated 1,000 gallons of hydraulic oil were released. The vessel was declared a constructive total loss at an estimated $1,140,000.

The liftboat *Ram XVIII* elevated at a previous work site. (Source: Aries Marine)



Map of the accident location, identified by a red triangle, in the West Delta lease area of the Gulf of Mexico. (Background Source: Google Maps)

Background

The *Ram XVIII*, built in 2015, was the third of three similar vessels built by Halimar Shipyards in Morgan City, Louisiana, and outfitted at Marine Industrial Fabricators Inc. in New Iberia for Aries Marine, a Louisiana-based company that owned and operated supply vessels, including liftboats. Liftboats are typically three-legged, self-propelled, self-elevating vessels. They service offshore facilities, typically oil drilling platforms, by providing accommodations, cranes, deck space, and, occasionally, helideck services. They carry cargo and personnel offshore and, once on location, elevate or "jack up" out of the water to allow crews to work on adjacent fixed offshore platforms.

The *Ram XVIII* was capable of carrying 43 people and 559.2 tons of cargo while working in a maximum 175 feet of water.[1] The vessel had two preload tanks, each with a capacity of 450,000 pounds, used for testing the bottom-bearing soil for capacity and stability before jacking the vessel into position, and for testing the integrity of the legs, hull, and jacking system. The hull had a depth of 10 feet. All three legs had the same jacking equipment and operated at the same speed, a maximum 14 feet per minute.

[1] Tons throughout this report refer to long tons (2,240 pounds each).

Aries Marine used a Safety and Environmental Management System (SEMS)-compliant safety management system, which included procedures for transiting and jacking, competency assurance for crew, and checklists for voyage planning.[2] As required by US Coast Guard regulations, procedures for preloading and jacking were also found in Aries' *Health Safety and Environment (HSE) Manual* and in the vessel-specific operating manual. The procedure for jacking included elevating the vessel 5 feet above wave crests before filling preloading tanks and watching for heeling or sliding on the seafloor. Crewmembers used a formula to calculate the amount of weight to use for each leg and preload tank. To preload, the crew would jack up one side slightly, then fill the tank on that side with a calculated amount of seawater. The procedure would then be repeated on the other side. Both preloading tanks were required to be emptied before jacking to the required work height. Aries' procedures for jacking a vessel included checking the seabed for obstructions, bottom soil conditions, and slope.

Accident Events

The *Ram XVIII* got underway from Houma, Louisiana, at 0800 on Friday, November 16, after taking on a Fugro Chance surveyor and survey equipment, to service the WD-68-U platform. The vessel was carrying a total of 190 tons cargo, and the voyage took 2.5 hours. The WD-68-U platform in West Delta block 68 was leased by Genesis Energy and was part of the Independence Trail natural gas pipeline. The platform was located in 114 feet of water. Fugro Chance, a survey company contracted by the lease holder, maintained bathymetric data, including the location of can holes and other hazards on the seafloor. Can holes are impressions left in the seabed by previous jack-ups and pose a hazard to subsequent vessels landing in the vicinity. West Delta block 68 contained documented can holes from at least four jack-up mobile offshore drilling units (MODUs) and another liftboat over the previous 21 years.[3]

The *Ram XVIII* was crewed by a captain, a mate, two able seamen, and an ordinary seaman, and ten offshore workers were on board at the time of the accident.[4] The master had 42 years of experience and held a Coast Guard Merchant Mariner's Credential (MMC) endorsed as Master, limited to vessels not more than 500 gross register tons (GRT). He had worked for Aries for 34 years. The mate had 13.5 years of experience and held an MMC endorsed as Mate, limited to vessels of not more than 200 GRT, with 8 years of experience in this position, as well as an MMC endorsed as Master of vessels not more than 100 GRT. The two officers had been assigned to the *Ram XVIII* since its delivery 3 years ago and typically stood 12-hour watches.

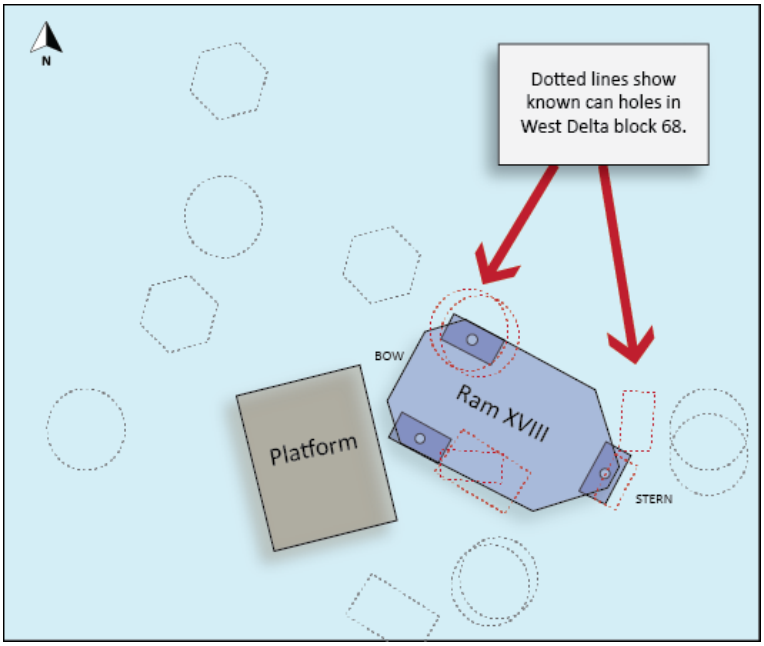
On arrival, about 1030, the liftboat received permission from the platform to approach. They were to work on the east side, with the bow to the platform. The master stated the plan was to place the starboard leg in a can hole, very close to where two previous vessels had jacked, and based on the surveyor's data, the *Ram XVIII* was positioned with both the starboard and aft legs in cans. The surveyor used sonar equipment to survey the bottom and confirmed the location of the

[2] The SEMS progam is a Bureau of Safety and Environmental Safety regulation applicable to offshore operators and their contractors. See Title 30 *Code of Federal Regulations* (CFR) 250.1900.

[3] A jack-up can refer to a liftboat or a bottom-bearing mobile offshore drilling unit (MODU). MODUs are substantially larger in size and weight than liftboats and spend more time at drilling locations.

[4] Offshore workers are individuals carried aboard offshore supply vessels, other than crew, who are employed in the offshore mineral or energy resources served by the vessel.

can holes. Prior to landing on the seabed, the surveyor provided a picture of "a clean bottom with no trash," and the surveyor verified the position of each leg using a Fugro satellite positioning reference system. The surveyor then went ashore by crew boat with his equipment.



The WD-68-U platform and surrounding seafloor, including outlines of documented can holes. The *Ram XVIII*'s position is shown in relation to the platform, with its starboard leg in a can hole.

Of the 190 tons carried on board, the *Ram XVIII* had an estimated 25 tons sitting on deck on arrival, including a compressor, grocery boxes, and sandblasting equipment. The mate loaded 400 tons of water in the preload tanks, filling them to the top. While jacking up the *Ram XVIII*, the starboard and stern legs penetrated the seabed, indicating they were in the can holes as planned. The master worked for about two hours, keeping the vessel level while slowly elevating it out of the water. As expected, the port leg did not penetrate very far, despite the master's effort to "lean" the vessel in that direction by jacking the starboard side to put more weight on the port leg. The mate relieved the master about 1700 and continued to "tweak" the legs until about 1930. The master then continued until 2230, when he let the ship settle. Satisfied that the legs were no longer moving, the master began dumping preload tank water at 0230 on Saturday morning. He then stripped the tanks to prevent any free surface effect. The mate told investigators there was a 15-foot difference in the height of the port leg and the other two legs after the preload and estimated the port leg had only penetrated 12 to 18 inches. Aries' management stated this 15-foot difference was not unusual.

On Saturday morning, after a 0600 safety meeting, the mate jacked the liftboat up to a 50-foot air gap to commence work. The crew worked throughout Saturday, cleaning, painting, and moving equipment by crane. About 0200 the following morning, the master was at his desk when he noticed a door swing open and the tilt alarm sound.[5] The inclinometer read 3-degrees to port when he reached the console. The master started the engines and engaged hydraulic power to level

[5] *Ram XVIII*'s alarm sounded at 1.5° and 2.5°.

the vessel. He attempted to jack the vessel to a level position but could not keep up with the increasing port list.

The master notified nearby vessels on a VHF working frequency and made a mayday call on Channel 16. Crewmembers were awakened by either the engines starting, the tilt alarm sounding, or being thrown from their racks. Egress was hampered by the list, toilet water on deck, and darkness when the vessel lost power. Two crewmembers were trapped in their staterooms and had to be extricated using an axe. Investigators reviewed the Coast Guard's recording of radio traffic on Channel 16, which included the master's mayday call, in which a tilt alarm was heard in the background. At the time of the call, the master reported that the vessel "fell over" and that he had fifteen people onboard. Coast Guard Sector New Orleans logged the notification at 0216 and dispatched a helicopter and a small boat.[6]

Both generators failed about the time the port gunwale reached deck-edge immersion. The port generator room flooded through a vent, and the master recalled the starboard engine suffering "unbelievable" vibration before shutting down.[7] The master also recalled that the port side door to the superstructure was open due to frequent use.

The master accounted for everyone, and the crew attempted to launch a life float but were hindered by swells, which swept the life float back to the boat. After the sea painter became entangled in the stern leg, the master decided to stay with the liftboat as long as possible. He and the crew awaited rescue on the starboard side of the bridge, the highest point, with the emergency position-indicating radio beacon (EPIRB). The Eighth Coast Guard District received an EPIRB alert at 0220.

The *Ram XVIII* after the vessel was abandoned, showing a significant angle of inclination to port. (Source: Coast Guard)

[6] An Air Station New Orleans MH-65 helicopter, CG6576, and a Station Grand Isle 45-foot Response Boat-Medium, CG45687, responded.

[7] Liftboat generators are air-cooled because they are elevated out of the water.

All crewmembers and offshore workers were later retrieved from the stern by the 53-meter long crew boat *Starfleet Guardian* or by Coast Guard Station Grand Isle's small boat. Two offshore workers on the liftboat received minor injuries and were transported to a hospital. A *Ram XVIII* able seaman suffered bruises to his shoulder, elbow, and hip.

***Ram XVIII* six days after the accident, on November 24. Note the life float adrift astern of the vessel. (Source: Coast Guard)**

Efforts to salvage the vessel began immediately; however, further salvage of the vessel was hampered by winter weather, and the liftboat further inclined on November 24. Salvors completed the recovery of 12,300 gallons of diesel from two integral fuel tanks by December 12. The hull was later towed further offshore and scuttled in West Delta block 96, where it would not damage subsea pipelines or other structures, until a weather window would allow salvage. The *Ram XVIII* has yet to be salvaged as of the publication of this brief.

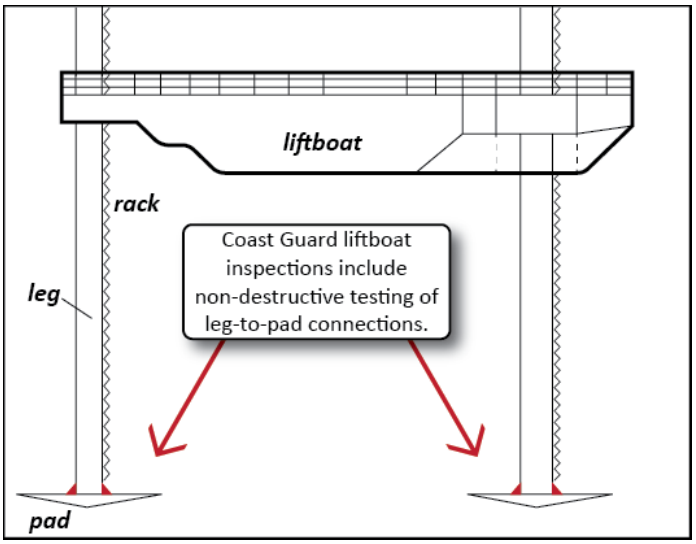
Additional information

Liftboats are inspected by the Coast Guard as offshore supply vessels (per Title 46 *Code of Federal Regulations* [CFR] Subchapter L). A 2008 Coast Guard policy letter provides additional guidance specific to liftboats, requiring non-destructive testing (NDT) of critical welds unique to liftboats, including 5-year testing of the leg-to-pad connections and rack end butts and 10-year testing of all leg butt welds.[8] Inspectors witnessed satisfactory NDT of critical welds during *Ram XVIII*'s construction in 2014, including pad connection welds.

The vessel completed annual Coast Guard inspections in 2016 and 2017 with no deficiencies, and the Coast Guard documented only minor repairs during the first and only drydock exam in 2017. The last documented visit by the Coast Guard was in February 2018 for an annual inspection, during which inspectors witnessed NDT of the can-to-pad welds at Aries' request to ensure repairs had been made. These welds bear the main load of the vessel when elevated, and

[8] U.S. Coast Guard. Guidance on the inspection, repair, and maintenance of liftboats. CG-543 Policy Letter 07-02, March 4, 2008.

they are subject to extreme stress when the legs are raised, since the pads can be embedded in silt and mud for months.



Representation of a liftboat. The leg-to-pad connections, which are critical welds unique to liftboats, are illustrated as red triangles.

Inspectors also witnessed an abandon ship drill during this visit, noting the crew "responded quickly" and "gathered at the designated muster station with adequate lifesaving equipment and supplies." During the inspection, the crew successfully "demonstrated lowering one life float from the second deck to the main deck."

The mate, master, and Aries' Operations Manager all described the West Delta area of the Gulf of Mexico as a "bad area" to work due to the soft bottom, and the master stated that can penetration was up to 17 feet. Previously in his career, the master had refused to work at locations due to can holes, losing his job at least once due to this. He told investigators that he had placed legs in a can hole only two other times in his 34-year career. Despite his experience, and although he had never been to this platform before, he "felt good" about the location. He also stated the can hole nearest the port leg was far away, and "…there's no way that leg slid into the can." The weather was "slick calm" with no wind, and the elevated vessel was not rocking or swaying before the accident.

Aries' and Fugro management told investigators that can holes can fill in after twenty years or so, depending on soil and proximity to rivers. Fugro maintained this data on behalf of the block lease holder. Fugro proposed a landing location and asked for Aries' input, but the final location was at the master's discretion.

According to the master, jack-up MODUs, which are much larger than liftboats, get core sample and soil data with predicted penetration before they preload, which allows them to calculate the depth at which the legs should penetrate the seabed. According to Fugro, this information is sometimes required by the Bureau of Safety and Environmental Safety and/or insurance contracts but was unavailable to the *Ram XVIII* as a liftboat.

Analysis

Survivability in foundering situations is dependent on adequate time to make a distress call and to evacuate the vessel. After the liftboat fell to port and the vessel began flooding, the master's quick VHF call to both nearby boats on a working channel and to search and rescue authorities on Channel 16 facilitated a rapid rescue. Although not without injury, all fifteen people onboard were able to evacuate the vessel despite the darkness, list, wet decks, and at least one jammed interior door.

Ram XVIII was equipped with life floats for primary lifesaving equipment. Due to the height of the liftboat and swells, launching the life floats proved challenging for the crew, despite successfully demonstrating this procedure for the Coast Guard in a recent drill. Fortunately, the crew was able to remain on the listing deck in this accident until rescued, and the life floats were not used.

Investigators have been unable to board the vessel to inspect the jacking system and legs, since the vessel has yet to be salvaged; however, there is no evidence to suggest a structural failure of the port leg or inadequate maintenance, design, or manufacturing of the legs or pads. Given the age of the vessel and recent maintenance periods, it is unlikely the material condition of the vessel or systems contributed to the overturning.

The master had extensive experience with liftboats, and the final positioning of the liftboat before jacking was at his discretion. Factors in the positioning included the reach of the crane and gangway to the client's platform, seafloor composition, pipelines and other obstructions, proximity to can holes, and bathymetry. The lease holder provided high-precision Global Navigation Satellite System positioning and historical data showing location of previous landing impressions or can holes. However, the lease holder did not provide core samples, past penetration depths, or historical preloading times for this block to the *Ram XVIII*. It is likely that the liftboat overturned because the port leg became unstable, but it is unknown whether the sea bottom washed away, the leg settled very quickly in what is known as a "punch-through" in the industry, or the edge of the nearest can hole collapsed. Over time, the number of can holes increases and creates a greater challenge for liftboats jacking up to service platforms.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the overturning of the elevated liftboat *Ram XVIII* was the industry practice of not regularly providing liftboat operators with adequate information about the seafloor composition, which resulted in the instability of the port leg due to unidentified conditions/hazards in seabed composition near the port leg landing site.

Seafloor Hazards in Liftboat Operations

Seafloor conditions, including can holes; bottom changes due to storm passages; proximity to major rivers; and soil composition can pose significant hazards to safe liftboat operations. Operators should use all available information in selecting sites to land out legs. Leaseholders should provide and liftboat operators should request all necessary information for safe operations, including, but not limited to, soil analysis, penetration history for the site, and/or core samples, before commencing jack up operations.

Vessel Particulars

Vessel	*Vessel Name*
Owner / operator	Aries Marine Corporation
Port of registry	Port of New Iberia, Louisiana
Flag	United States
Type	Offshore supply vessel
Year built	2015
Official number (US)	1258678
IMO number	9769453
Classification Society	None
Construction	Welded steel
Length	128.6 ft (39.0 m)
Draft	7.5 ft (2.4 m)
Beam/width	78.0 ft (27.8 m)
Gross / Net tonnage	820 / 246 ITC
Engine power; manufacturer	2000 hp (1491.4 kW), Caterpillar C32
Persons on board	15

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

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA19FM007.

Issued: October 17, 2019

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 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*, 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).