

July 10, 2024

MIR-24-18

Engine Room Fire aboard Towing Vessel *Desperado*

On February 17, 2023, about 1332 local time, an engine room fire occurred on the towing vessel *Desperado* while it was transiting Lake Salvador near mile 20 of the Gulf Intracoastal Waterway in Bayou Perot, Louisiana (see figure 1 and figure 2).¹ The three crewmembers aboard were unable to extinguish the fire with portable extinguishers. They secured ventilation and fuel to the engine room and then evacuated to a Good Samaritan vessel. When a responding fire boat arrived, the fire was out. No pollution or injuries were reported. Damage to the vessel totaled \$30,000.



Figure 1. The *Desperado* spudded down in Lake Salvador after the fire.
(Source: US Coast Guard)

¹ (a) In this report, all times are central standard time, and all miles are statute miles. (b) Visit [ntsb.gov](https://www.ntsb.gov) to find additional information in the [public docket](#) for this NTSB investigation (case no. DCA23FM018). Use the [CAROL Query](#) to search investigations.

Casualty Summary

Casualty type	Fire/Explosion
Location	Lake Salvador, Bayou Perot, Louisiana 29°45.41' N, 90°14.38' W
Date	February 17, 2023
Time	1332 central standard time (coordinated universal time -6 hrs)
Persons on board	3
Injuries	None
Property damage	\$30,000
Environmental damage	None
Weather	Visibility 10 mi, winds north-northwest 17 kts, seas 3-4 ft, air temperature 52°F, water temperature 64°F
Waterway information	Lake, average depth 6 ft



Figure 2. Area where the *Desperado* fire occurred, as indicated by a circled X. (Background source: Google Maps)

1 Factual Information

1.1 Background

The inland towing vessel (lugger tug) *Desperado* was constructed of welded steel by Lafayette Crewboats in 1982, in Delcambre, Louisiana.² Originally named *L-3*, the vessel had several owners before Paradise Equity Investment acquired it in August 2022.

The *Desperado* was a 59-foot-long, shallow-draft vessel with an aft wheelhouse, an open foredeck, and two aft spuds to stabilize and anchor it. The vessel moved various equipment and cargo to worksites, platforms, and construction sites. The *Desperado's* propulsion consisted of two Caterpillar model 3406, 6-cylinder, turbo-charged diesel engines, paired with Twin Disc model MG-509 transmissions to conventional shafts and fixed propellers. In addition to twin rudders, the vessel had two bow-mounted capstans and associated towing equipment and a forward-mounted articulating knuckle boom crane.

1.2 Event Sequence

On February 17, 2023, at 0915, after cargo was loaded, the captain of the *Desperado* completed his inspection, and then the partially loaded vessel departed from the Tidewater Dock in Larose, Louisiana, with a crew of three (captain and two deckhands). The vessel was en route to the Bayou Couba Oil Field Canal in St. Charles Parish, Louisiana, to offload cargo to a rig and perform barge tendering.

The captain, who was also the owner, had more than 30 years of maritime experience. Since 2010, he had served as captain on 21 inland towing vessels similar to the *Desperado*. The two deckhands (referenced in this report as deckhand 1 and deckhand 2) each had about 3 months of maritime experience, all on board the *Desperado* and under the tutelage of the captain. The captain and deckhands had worked together since the vessel entered into service in mid-November 2022.

After getting underway, the *Desperado* transited the Gulf Intracoastal Waterway, Lake Salvador, and Bayou Couba Oil Field Canal over the next 3.5 hours without

² *Lugger tugboats* are shallow-draft vessels that are specially adapted to serve inshore oil and gas rigs and other marine operations in shallow waters.

incident, at an average speed of 3.5 knots. The captain stated that the vessel ran well with no reported alarms or issues.

While underway, the deckhands took turns making hourly rounds of the machinery and engine room spaces. Deckhand rounds included visual inspections for seawater ingress, bilge levels, and hydraulic oil leaks. The deckhands also checked the sump oil level, oil pressure, and jacket water temperature of the generators and main propulsion engines, and they looked for engine exhaust leaks.

At 1200, the *Desperado* arrived at the first rig in the Bayou Couba Oil Field Canal and offloaded cargo. At 1255, the vessel departed the rig to tender a barge along the canal. They next received a call from dispatch to return to the Tidewater Dock in Larose to pick up additional equipment for the rig that was to be loaded on a separate barge. The captain was at the helm (hand steering), while the two deckhands were in the galley cleaning up from lunch.

At 1305, the captain turned the vessel south, and they entered Lake Salvador. The captain said that the winds were behind them and the wave heights increased to 3-4 feet when they reached the middle of the lake. They had a straight trackline coming across the lake. The captain said both main propulsion engines were running at 1,200 rpm (65% engine load). The *Desperado* maintained an average speed of 6 knots as it transited across Lake Salvador.

About 1332, the fire alarm sounded in the wheelhouse, followed by the steering gear hydraulic tank low level alarm. The captain, who was in the wheelhouse, looked aft and saw smoke coming from the stern near the engine room centerline hatch. The two deckhands heard the alarm and reported to the wheelhouse. The captain hit the emergency stops for the two main propulsion engines, and the captain and deckhands ran down to the main deck to assess the situation. The captain saw thick black smoke coming out of the engine room centerline entrance door and determined there was an oil fire. He told the two deckhands to close the hatches and ventilation to the space.

The captain then removed the cover from a semi-portable, 50-pound dry chemical extinguisher, prepared it for use, and proceeded to the engine room door. He attempted to put out the fire by discharging the extinguisher. However, he was unable to enter the engine room or proceed down the ladder to get to the base of the fire (which he believed to be above the port main engine) because there were flames near the top of the space overhead and there was heat exiting the space. The captain then closed the engine room door.

Meanwhile, deckhand 2 closed the two starboard ventilation hatches (air intake and exhaust), while deckhand 1 closed the portside ventilation hatches (air intake and exhaust) to the engine room. The captain ordered the deckhands to secure the four

emergency fuel shut off valves and to grab a portable handheld radio from the wheelhouse. Deckhand 2 closed the two starboard-side emergency fuel shut off valves and ran back to the wheelhouse to retrieve the radio. Deckhand 1 secured the two portside emergency fuel shut off valves and verified that the starboard-side emergency fuel shut off valves had been secured. These actions closed the valves below to the port and starboard diesel fuel tanks that supplied the propulsion engines and diesel electrical generator, stopping any additional fuel flow into the engine room. Electrical power stopped soon after the valves had been secured.

The captain and deckhand 1 then opened the portside engine room ventilation hatch, and the captain discharged the semi-portable dry chemical extinguisher's contents into the port side of the engine room. He discharged the agent in a sweeping motion from the engine room door until its contents were exhausted. However, the fire continued to burn. The captain closed the engine room door to seal off the engine space.

With the fire still burning in the engine room unable to be extinguished, the captain determined that the crew should evacuate the vessel. After the captain verified that all hatches to the engine room were secure, he ran up to the wheelhouse and made a mayday call on VHF radio channels 13 and 16. US Coast Guard Sector New Orleans Command Center received and responded to the call. The captain relayed the *Desperado's* location, and the Coast Guard launched a helicopter. The nearby crew boat *Miss Jessica* also responded to the *Desperado's* distress call.

The captain instructed the deckhands to grab their life vests and personal items. The crew boat *Miss Jessica* pulled alongside the *Desperado* to retrieve the crew shortly after the captain's emergency call. All three crewmembers boarded the *Miss Jessica*, and the vessel moved upwind about a half mile away. They watched the *Desperado* as it drifted in a south-southwesterly direction due to the wind.

About 15-20 minutes later, after the *Desperado* was clear of some hazardous pipelines that were marked with pilings and markers, *Miss Jessica's* captain maneuvered back to the *Desperado*. The *Desperado* captain reboarded the vessel and dropped the port spud to anchor the vessel about 50 yards from some wetlands. At the time, no smoke was visible.

The *Desperado* captain returned to *Miss Jessica*; the vessel transited through the Intracoastal Waterway back to the Tidewater Dock in Larose. Shortly after the *Miss Jessica* returned to the dock, a fire boat crew from Larose arrived at the *Desperado's* location and determined that the fire aboard the *Desperado* was out.

1.3 Additional Information

1.3.1 Damage and Repairs

On February 18, the day after the fire, at 0900, the captain and two deckhands returned to the *Desperado* to survey the damage. The vessel was in the same location where the captain had dropped the port spud the day before. When the crew opened the hatches to the engine room, they found heat damage in the area of the port main propulsion engine. Dark soot was present in the overhead and area directly above the port main propulsion engine and pathway leading up to the engine room centerline entrance. The port main engine electrical wiring harnesses for pressure and temperature sensors were damaged, along with jacket water cooling hoses and hydraulic lines (see figure 3). The starboard main propulsion engine and the generator were in good working condition. All navigation equipment and electronics were in good working condition. According to the captain, "Except the one [port] engine that was burnt, everything else was pretty much normal." Six gallons of hydraulic oil were lost from the steering gear system and consumed by the fire. The vessel sustained \$30,000 of damage.



Figure 3. Port main propulsion engine damage on the *Desperado* after the fire.

The captain told Coast Guard investigators that most of the fire damage was to the port main propulsion engine and portside steering pump manifold, actuator, and hydraulic storage tank. The rudder steering system components and tank were located outboard of the port engine. The steering pumps were driven from the power take-offs on the propulsion engines. He said he had found a ruptured hydraulic line on the portside steering pump directional manifold valve, which subsequently caused flammable hydraulic fluid to disperse onto the port main propulsion engine exhaust manifold and turbocharger and ignite (see figure 4). The line was 1/2 inch in diameter and about 16-and-1/2 inches long, and the rupture was found near the hose end crimped fitting. The single-braid hose was manufactured in Mexico on October 7, 2018; however, it is unknown when the hose was installed on the vessel.



Figure 4. The ruptured port steering pump hydraulic hose, after the fire.

The captain and deckhands removed the ruptured hydraulic line from the portside steering pump directional manifold valve and replaced the hose with an onboard spare (in-kind replacement) (see figure 5).



Figure 5. The replacement hydraulic hose, with the location of the rupture on the previous hose circled.

1.3.2 Other Postcasualty Events

On February 20, a marine surveyor attended the vessel where it remained spudded down to survey the damages and provide a report for the purpose of getting Coast Guard approval for a dead ship tow.

On February 21, Coast Guard Sector New Orleans issued a Captain of the Port Order approving the *Desperado's* transit to Larose. Later that day, the *Desperado* arrived under tow to the owner's dock in Larose.

1.3.3 Previous Overhaul

After purchasing the *Desperado* in August 2022, the captain and two deckhands performed a 4-month overhaul of the vessel to prepare it for service. They painted the hull and exterior house, upgraded navigation and electronics in the wheelhouse, and performed recommended maintenance on the main propulsion engines and auxiliary equipment. The captain performed several maintenance items

and trained the two deckhands along the way. The captain told investigators that he hired technicians to perform complex tasks.

One month later, on September 30, the captain obtained an estimate from a local vendor for an “air control and steering installation,” to ensure the systems were operational. Technicians completed and tested the work toward the end of October or early November, without issue. According to the captain and two deckhands, they did not alter the steering gear system after the technicians completed their work. There were no reported issues by the captain or deckhands, other than a few minor hydraulic leaks that required tightening of fittings or connections.

1.3.4 Manufacturer Instructions for Hydraulic Hoses

The manufacturer of the hydraulic hoses on board the *Desperado* issued a hydraulic maintenance and safety guide with general information about operation and care of hydraulically powered equipment. The guide stated that “improperly maintained assemblies can cause premature hose failure and blowouts, resulting in equipment downtime, possible equipment damage, personal injury, and even death.” The guide also stated that many assemblies fail because of improper routing.

The guide advised that, to minimize damage from excessive flexing or whipping, all replacement hose should be restrained, protected, or guided using clamps. The guide also said that protective armor, spring guards, or sleeves made of abrasion-, temperature-, or chemical-resistant material will help protect the hose from cuts, abrasions, corrosives, or hot components.

The guide also advised that, when routing a hose, operators must consider how the hose will move in the system. It warned that if any hose movement exceeded the minimum bend radius or caused stress at the crimp joint, the hose would fail.³

³ The *minimum bend radius* is the radius below which an object cannot (or should not) be bent.

2 Analysis

On February 17, 2023, while the *Desperado* was transiting Lake Salvador on the Intracoastal Waterway in Bayou Perot, Louisiana, a fire occurred in the engine room that the crew was not able to extinguish, and the crew evacuated the vessel.

After the fire alarm sounded in the wheelhouse and the captain observed smoke, he immediately shut down the main propulsion engines, which stopped the hydraulic pumps that were mechanically driven off them, thereby stopping the spraying hydraulic oil from reaching the engines and fueling the fire. He then directed the deckhands to secure ventilation and the emergency fuel shut off valves—effectively stopping additional air and diesel fuel from entering the engine room. When inspecting the damage after the fire, the crew found damage was limited to the area of the port main propulsion engine, and, according to the captain, “Except the one [port] engine that was burnt, everything else was pretty much normal.” Therefore, the crew’s prompt actions to remove the fuel and oxygen sources for the fire helped limit the fire damage and extinguish the fire.

The captain told the Coast Guard that the cause of the fire was a ruptured hydraulic line on the portside steering pump, which subsequently caused flammable hydraulic oil to spray onto the hot port main propulsion engine exhaust manifold and turbocharger and ignite.

After the hydraulic steering system was refurbished in late 2022, there were no reported issues other than a few minor hydraulic leaks that required tightening of fittings or connections. The captain said that no alterations were made to the steering gear system after install. The hose that ruptured was manufactured on October 7, 2018. It is unknown when this hose was installed; however, based on the manufacture date being 4 years before the refurbishment work, it is unlikely that the older hose was installed during the 2022 refurbishment.

After reviewing photographs of the area where the fire occurred and where the replacement hydraulic hose was installed, investigators identified issues with how the hose had been installed. Contrary to manufacturer guidance, the hose appeared to exceed the bend radius; it was not guided with clamps, fittings, or adapters; and it did not have any protective cover (see figure 5). The manufacturer guidance warned that an improperly installed hose could fail. Given that the original hydraulic hose that ruptured was the same length and diameter as the replacement hose, it is likely that the same issues existed for the ruptured hose. Therefore, the lack of adherence to the hose manufacturer’s guidance on installation likely resulted in the hose exceeding its bend radius, rupturing, and spraying fuel, which led to the fire.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the towing vessel *Desperado* was a hydraulic hose that likely exceeded its bend radius, eventually causing the hose to rupture, resulting in hydraulic oil spraying onto a hot engine exhaust manifold and turbocharger and igniting.

3.2 Lessons Learned

Following Manufacturer Guidance for Hydraulic Hose Installation

Mariners and technicians who design, install, and maintain systems should follow the manufacturer's guidance on the minimum bend radius for a hydraulic hose. The minimum bend radius is the radius below which an object cannot (or should not) be bent. Bending or flexing a hose to a radius smaller than the minimum recommended, or subjecting a hose to tension or torque, can place excessive stress on the hose and severely reduce the ability of the hose to withstand pressure. Tight space constraints may cause a hose to bend severely around corners. A machine or cylinder extending and retracting can also bend a hose. Hoses attached to moving parts may bend more than a hose in or near a machine's stationary position. Actions to avoid hose damage or failure include clamping a hose in place to provide support, rerouting a hose assembly by installing fittings and adapters, and using a hose with more reinforcement (two braid instead of one braid).

Vessel Particulars

Vessel	<i>Desperado</i>
Type	Towing/Barge (Towing vessel)
Owner/Operator	Paradise Equity Investment LLC (Commercial)
Flag	United States
Port of registry	Galliano, Louisiana
Year built	1982
Official number (US)	64598
IMO number	N/A
Classification society	N/A
Length (overall)	58.5 ft (17.8 m)
Breadth (max.)	20.1 ft (6.1 m)
Draft (casualty)	5.7 ft (1.7 m)
Tonnage	59 GRT
Engine power; manufacturer	2 x 750 hp (559 kW); Caterpillar model 3406 diesel engines

NTSB investigators worked closely with our counterparts from **Coast Guard Sector New Orleans** 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 DCA23FM018. 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