

Fire aboard Towing Vessel *Mary Dupre*

On June 26, 2022, about 0930 local time, a fire broke out in a stateroom on board the towing vessel *Mary Dupre*, which was pushing one barge of bio-diesel fuel (pyrolysis fuel oil) on the Gulf Intracoastal Waterway near Freeport, Texas.¹ Nearby Good Samaritan towing vessels retrieved the barge from the *Mary Dupre*, extinguished the fire, and evacuated the four crewmembers. There were no injuries, and no pollution was reported. The towing vessel was deemed a total constructive loss estimated at \$1 million.



Figure 1. *Mary Dupre* underway before the fire. (Source: Dupre Marine Transportation)

¹ (a) In this report, all times are central daylight time, and all miles are statute miles. (b) Visit [nts.gov](https://www.nts.gov) to find additional information in the [public docket](#) for this NTSB investigation (case no. DCA22FM026). Use the [CAROL Query](#) to search investigations.

Casualty type	Fire/Explosion
Location	Gulf Intracoastal Waterway (mile 408), Freeport, Texas 28°51.4' N, 095°29.36' W
Date	June 26, 2022
Time	About 0930 central daylight time (coordinated universal time -5 hrs)
Persons on board	4
Injuries	None
Property damage	\$1 million est.
Environmental damage	None
Weather	Clear skies, winds 5 mph from the west, visibility 10 mi, air temperature 92°F
Waterway information	Gulf Intracoastal Waterway, controlling depth 12 ft



Figure 2. Area where the fire aboard the *Mary Dupre* occurred, as indicated by a red X. (Background source: Google Maps)

1 Factual Information

1.1 Background

The *Mary Dupre* was a 67.3-foot-long towing vessel constructed of welded steel and built in Larose, Louisiana, in 1974 as the *Mary Delgrandile*. The vessel had several previous names and owners before it was acquired and renamed *Mary Dupre* by Dupre Marine Transportation in 2013. At the time of the fire, Dupre Marine Transportation operated 13 towing vessels from its facility in Houma, Louisiana.

The *Mary Dupre* had three decks within its superstructure: the main deck with the galley and crew staterooms, the second deck with two staterooms and a restroom, and a wheelhouse on the uppermost deck. The steel bulkheads and overheads of the interior accommodation spaces were outfitted with wooden paneling insulated with fire-retardant and heat-resistant insulation. Each of the wooden panels were affixed to wooden studs, which were bolted directly to the steel plates of the bulkheads and overheads.

1.2 Event Sequence

On June 25, 2022, about 1415, the *Mary Dupre* departed Port Comfort, Texas, en route to Houston, pushing a single barge, the *Kirby 28747*, loaded with bio-diesel fuel. The four-person crew consisted of a relief captain (referred to as the captain in this report), a pilot, and two deckhands.² The crewmembers stood rotating, two-person watches, changing at 0000, 0600, 1200, and 1800.

About 0930 on June 26, while the vessel was underway eastbound on the Gulf Intracoastal Waterway near mile marker 408, the off-watch pilot of the *Mary Dupre* was in his stateroom, which was located on the second deck (one deck below and aft of the wheelhouse) between the vessel's stacks—structures that contained the port and starboard engine exhaust mufflers and piping and allowed engine room ventilation air to exhaust to open atmosphere. He was awakened by a smoke alarm and the smell of smoke. About the same time, the captain, who was on watch in the wheelhouse, "heard a smoke detector beep" (but didn't smell smoke) in the wheelhouse, and the other sleeping deckhand woke up to "a burnt smell." The pilot and the deckhand went to the wheelhouse to notify the captain of the situation.

² The relief captain, a position designated by the company, served as the towing vessel's captain when the designated captain was off rotation; at the time of the casualty, the captain was off rotation and ashore.

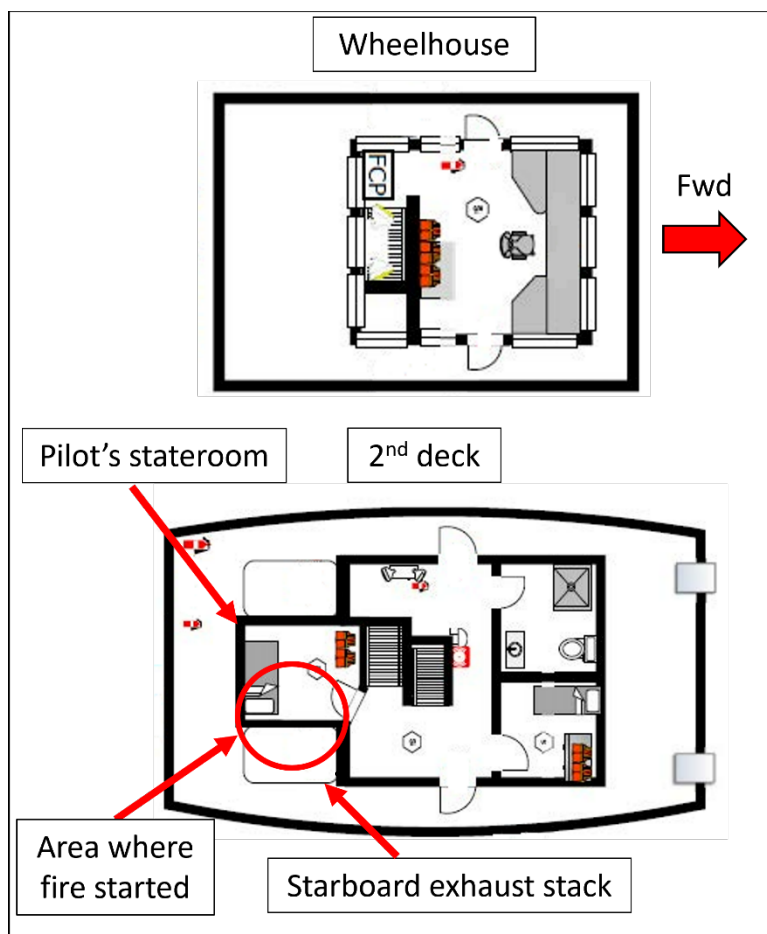


Figure 3. Layout of the *Mary Dupre* second deck and wheelhouse. The red circle identifies area where fire started. (Background source: Dupre Marine Transportation)

After notifying the captain of the smoke in his stateroom, the pilot returned to the stateroom with the two deckhands to look for the source of smoke. When they entered the stateroom, they observed smoke coming out from the overhead. According to the captain, the crewmembers believed the smoke was coming from an engine exhaust leak.

About 1000, they tore open a wooden panel from the overhead to further investigate, and, using their cell phones, recorded a video of the smoke in the overhead. After the wooden panel from the overhead was removed, the smoke intensified. The crewmembers stated that the wood was “charred” and “smoldering.” A deckhand looked into the open overhead and observed “small flames coming out [of] the walls,” and he discharged a dry chemical fire extinguisher into the opening in the overhead. The crew was unable to access the fire behind the wooden bulkhead of the stateroom, and additional interior spaces began to fill with smoke.

Continuing to search for the source of the fire, the crewmembers moved to the exterior of the vessel near the starboard stack. A crewmember recorded smoke

coming from the starboard stack's engine room ventilation air outlet that typically discharged clean engine room air. They also noticed blistering paint on the exterior surface of the stack.

The captain stated he shut down the starboard engine and generator about this time but could not recall if he shut down the port engine. Crewmembers started the fire pump and began cooling the exterior surface of the starboard stack using fire hoses. The captain also notified nearby vessels, the vessel's operating company, and the US Coast Guard of the emergency.



Figure 4. Smoke in area of the removed overhead panel in the pilot's stateroom (*left*). Blistering white paint on steel bulkhead of starboard stack during the fire (*right*). (Source: *Mary Dupre* crewmembers)

About 1020, the passing towing vessel *Ave Maria* arrived and took control of the barge from the *Mary Dupre*. Once the *Mary Dupre*'s wheelhouse filled with smoke, the captain ordered the crew to abandon the vessel, and, at 1055, they abandoned the *Mary Dupre* using the onboard skiff. About 1130, the four crewmembers boarded the *Ave Maria*, where they observed that the *Mary Dupre*'s second deck and wheelhouse were engulfed with flames.



Figure 5. Fire aboard *Mary Dupre* minutes after crewmembers abandoned the vessel. (Source: Coast Guard)

Several nearby towing vessels arrived on scene and applied water to the *Mary Dupre*. At 1525, a salvage company vessel arrived and reported the fire was “smoldering.” A team from the salvage vessel boarded the *Mary Dupre* and used a fire hose from a towboat that was alongside the *Mary Dupre* to extinguish the fire. About 1900, another towing vessel began towing the *Mary Dupre* to a nearby shipyard, arriving about 2200.

1.3 Additional Information

1.3.1 Postcasualty Inspection

After the *Mary Dupre* was docked at the shipyard, a local fire marshal, Coast Guard investigators, and a National Transportation Safety Board (NTSB) investigator inspected the damaged vessel. Investigators observed fire and heat damage to all three decks of the superstructure. The degree of damage increased moving upward and forward on the vessel.



Figure 6. The *Mary Dupre* after the fire.

There was little to no fire and heat damage observed on the aft section of the main deck. In the engine room below the main deck, there was no damage to the main engines, generators, or other machinery. In both the wheelhouse and on the second deck, all wood framing, furniture, paneling, and joinery, as well as all paint and combustibles, were destroyed, completely consumed by fire and heat. On the main deck, combustible materials in the galley and crew quarters were partially burned. Due to the severity of the damage, the vessel was declared a constructive total loss and scrapped in October 2022.



Figure 7. Pilot's stateroom adjacent to the starboard stack where the fire started (*left*), and charred wooden framing attached to steel bulkhead (*right*).

1.3.2 Stacks

The *Mary Dupre* was powered by two Caterpillar diesel engines, port and starboard, each connected to a fixed-pitch propeller via a set of reduction gears. The exhaust gases from each engine were piped to the open atmosphere above the wheelhouse via steel pipes that ran from the exhaust manifold of the engines, through expansion joints, and through mufflers (also referred to as silencers) inside port and starboard stacks. The inboard bulkheads of the stacks were common with the outboard bulkheads of the pilot's stateroom. On the *Mary Dupre*, the cylindrical, vertically mounted mufflers' inlets and outlets were equipped with flanges that were bolted to flanges fitted to the exhaust piping. The mufflers measured about 6 feet high and about 3 feet wide and were wrapped with exhaust blankets, which were connected with securing wire on metal tabs. At their closest points, each muffler's outer diameter was positioned about 10 inches from the shared bulkheads of the pilot's stateroom. An engine room exhaust fan, mounted on the aft bulkhead of the stack, would draw air from the engine room below as well as through a louvered opening on the outboard bulkhead stack (a canvas cover could be temporarily affixed to each louver so the fans only drew air from the engine room).

There was no door for personnel to enter each stack; in order to access the muffler, the vent louver, measuring about 2 feet wide by 2 feet high, needed to be unbolted and removed. The space inside the stack was not large enough for a crewmember to fit inside.

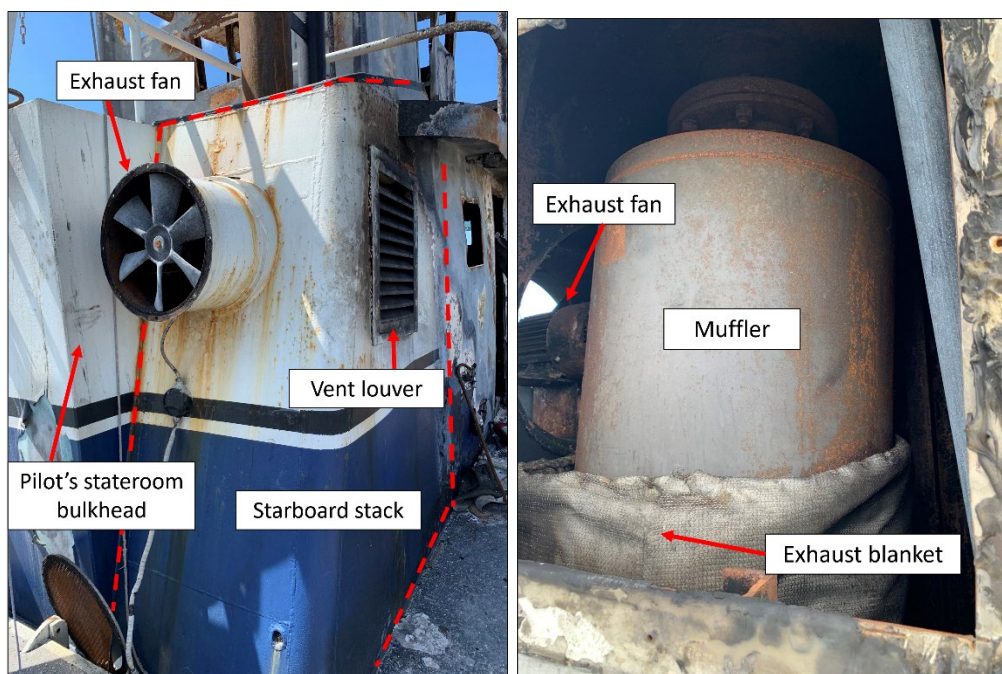


Figure 8. Exterior view of the starboard stack (outlined in red dashes) after the fire (*left*). The starboard muffler's outboard side, as seen through the removed vent louver, and upper exhaust blanket removed after the fire (*right*).

After the casualty, investigators found cracks in the welds on the upper section of the starboard engine muffler (inside the starboard stack) under the outlet flange around more than half of its circumference. Additionally, an exhaust blanket was found disconnected on the inboard side of the muffler in the direction of the pilot's stateroom, exposing the bare steel of the muffler towards the common steel bulkhead whose inboard side had wooden framing with attached paneling bolted directly to it.



Figure 9. Crack in weld below the upper (outlet) flange of the starboard muffler aboard the *Mary Dupre*.

Investigators also reviewed the crewmember's video recorded during the fire, which showed blistering paint on the exterior steel surface of the starboard stack. The manufacturer's data sheet for the paint indicated the paint's maximum temperature resistance rating was 750° F.

1.3.3 Fire Report

The Freeport Fire Marshal investigated the fire and completed a cause and origin report. The fire marshal excluded discarded smoking materials and electrical charging devices, such as phone and batteries, as possible ignition sources.

The fire marshal's report stated,

multiple fire patterns produced by both the movement and intensity of the fire indicate that the fire originated in the aft crew sleeping quarters on the second deck. This area presented with a V pattern on the aft wall

(bulkhead) within the insulation material that was located between the steel hull and wooden interior paneling. This area presented with the only area of low burning and the highest degree of thermal damage.

The report concluded:

The most probable cause of the fire was due to heating from operating equipment. The lack of insulation around the exhaust piping caused a heat buildup in the pipe chase (stack area), this caused an ignition of combustible materials on an adjoining wall. Upon reviewing the provided cellphone footage, it was apparent the heat source was produced from the operating exhaust with a high heat build-up in the exhaust chase.

1.3.4 Vessel Records

According to the operating company, the crew was required to complete a daily inspection checklist that included a fire safety section. The checklist required the crew to walk throughout the vessel, inspect it for potential fire hazards, and ensure all combustibles were stored in proper locations and exhaust wrapping was cinched tightly and in good condition. The vessel owner stated that the exhaust wrapping inspection was limited to the visible sections in the engine room. The company reported that, on the morning of the fire, this inspection was completed at 0404.

All the vessel's maintenance records and logbooks were destroyed in the fire. There were no records available to indicate any inspections or maintenance were performed on the mufflers aboard the *Mary Dupre*. The vessel manager believed the starboard muffler had been installed about 5 or 6 years before the fire. There were no purchase orders or part numbers associated with the muffler.

1.3.5 Postcasualty Actions

After the fire, the operating company completed an investigation report, developed lessons learned, and instituted corrective actions. The company emailed the lessons learned to all vessels in their fleet and discussed them during management visits to the vessels. The items for discussion included a description of the event aboard the *Mary Dupre*, fire prevention methods, a review of Dupre Marine Transportation's fire response procedures, and procedures for testing smoke detectors. Managers from the company stated that they did not have any other vessels that had staterooms adjacent to stacks similar to the *Mary Dupre* but their drydocking procedures for any vessel they acquired with a similar arrangement would be revised to include muffler inspections within the stack spaces.

1.3.6 Related Casualties

The NTSB has investigated previous casualties involving fires aboard vessels constructed with substantial use of combustible materials in interior spaces and/or without structural fire protection.

1.3.6.1 Jaxon Aaron

On August 13, 2016, a fire erupted in the engine room on board the uninspected towing vessel *Jaxon Aaron* while pushing a tow upbound on the Lower Mississippi River.³ The NTSB determined that the substantial use of combustible materials in the interior spaces contributed to the extent of the fire damage.

1.3.6.2 Juno

On December 28, 2013, the fish processing vessel *Juno* caught fire while moored at a pier in Westport, Washington.⁴ The NTSB determined that the vessel's lack of structural fire protection and use of combustible materials in interior finishes contributed to the fire.

³ *Fire aboard Towing Vessel Jaxon Aaron*, Marine Accident Brief [NTSB/MAB-17/19](#), Washington, DC: NTSB.

⁴ *Fire On Board Fish Processing Vessel Juno*, Marine Accident Brief [NTSB/MAB-15/05](#), Washington, DC: NTSB.

2 Analysis

While the towing vessel *Mary Dupre* was underway on the Gulf Intracoastal Waterway near Freeport, Texas, a fire started behind the wood-paneled bulkheads in the pilot's stateroom. The pilot's stateroom was located between the vessel's two stacks, which contained engine exhaust mufflers and piping. After the casualty, investigators identified cracks in the welds on the upper section of the starboard muffler located inside the starboard stack. Although the cause of the cracks is unknown, they may have been caused by a latent issue, such as a defect in the muffler during construction or the exhaust system design's allowance for thermal expansion and contraction of exhaust piping above the muffler outlet. Vibration and movement during vessel operation over the years also may have caused or exacerbated the cracks.

The cracks in the exhaust muffler outlet allowed the hot exhaust gases from the operating starboard engine to escape into the stack area and increase the temperature of the space and its bulkheads. Additionally, after the casualty, investigators found the muffler's exhaust blanket was disconnected and not fully wrapped around its entire circumference (although investigators could not determine how long the exhaust blanket had been disconnected). The disconnected blanket left a section of the muffler uninsulated, allowing heat to radiate into the stack area. Because the inboard steel bulkhead of the starboard stack was common with the wooden outboard bulkhead of the pilot's stateroom (which displayed the "highest degree of thermal damage" according to the postcasualty fire report) and was just 10 inches from the uninsulated part of the muffler radiating heat, the elevated temperature of the stack's steel bulkhead increased the temperature of the wooden studs bolted directly to the shared bulkhead above 480°F—the temperature required to ignite wood by short term heating—causing the studs to smolder and ignite.⁵ In fact, the temperatures within the stack were likely much greater. Video recorded on crewmembers' cell phones showed that the paint on the exterior bulkhead of the starboard stack began to blister, indicating that the leaking exhaust gases from the crack in the muffler and the radiated heat from the uninsulated portion of the muffler raised the temperature in the stack above the maximum temperature resistance of the exterior paint, which the manufacturer stated was 750°F.

None of the crew were aware of the cracks or disconnected blanket. On the day of the casualty, they had inspected the vessel for fire hazards and completed a daily inspection form, as was required by the company. However, the visual inspection did not include the exhaust muffler because the size of the stack space did not allow for personnel to enter the space, and it was only partially accessible after unbolting a vent louver, making it impractical for the crew to inspect it during the

⁵ National Fire Protection Association, NFPA 921: Guide for Fire and Explosion Investigations, section 5.7.4.1.3.9.

daily safety inspection. Therefore, they were unable to identify the existence of the cracks and take steps to repair them. Additionally, none of the crewmembers reported seeing exhaust gases exiting the stack or smelling exhaust fumes—the only other indications they would have had that the exhaust was leaking—before the day of the casualty.

The NTSB has previously investigated fires aboard vessels wherein the substantial use of combustibile materials in interior spaces and finishes, as well as the lack of structural fire protection, contributed to the extent of the damage each vessel sustained. Structural fire protection is a component of an overall vessel fire-protection strategy that uses passive design features in a vessel's structure to slow the expansion of a fire from one compartment to another. Structural fire protection uses fire-resistant materials and insulation installed on the horizontal and vertical surfaces of a compartment, on doors/hatches, and in pipe and cable openings to slow the transfer of heat and smoke, thus providing additional time for evacuation and firefighting to contain and extinguish a fire. Towing vessels are inspected under the regulations in Title 46 *Code of Federal Regulations* Subchapter M; however, these regulations currently do not require vessel owners to incorporate structural fire protection on their vessels.

The significant combustibile load in the *Mary Dupre's* interior areas, including wooden framing, joinery, paneling, and other outfitting materials, indicates that the vessel was not designed with structural fire protection. As such, these materials served as both the ignition source and a fuel source for the fire. Once the wooden framing in the pilot's stateroom ignited, the fire spread to the attached wooden paneling on the bulkheads and overheads, then spread quickly throughout the vessel.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the towing vessel *Mary Dupre* was undetected cracks in the starboard muffler that allowed exhaust gases from an operating engine to escape and ignite wooden structures affixed to the common bulkhead of an accommodation space. Contributing to the extent of the fire damage was the substantial use of combustible materials in the joinery, outfitting, and furnishings in the accommodation spaces.

3.2 Lessons Learned

Inspection of Exhaust Systems

Engine and other machinery exhaust systems generate heat—which can radiate from exhaust components—and are potential ignition sources. These systems often run through tight spaces that are difficult to access and inspect and are often located near materials or equipment that obstruct entry and direct observation. It is good practice to include these areas in periodic fire safety inspections. When conducting inspections of these systems, vessel owners and operators should consider using handheld equipment—such as inspection mirrors, video equipment, or thermal imaging equipment—to detect deficiencies.

Vessel	<i>Mary Dupre</i>
Type	Towing/Barge (Towing vessel)
Owner/Operator	PAC Marine LLC / Dupre Marine Transportation (Commercial)
Flag	United States
Port of registry	Houma, Louisiana
Year built	1974
Official number (US)	557739
IMO number	N/A
Classification society	N/A
Length (overall)	67.3 ft (20.5 m)
Breadth (max.)	24.1 ft (7.3 m)
Draft (casualty)	9.2 ft (2.8 m)
Tonnage	99 GRT
Engine power; manufacturer	2 x 725 hp (533 kW); Caterpillar 3512 diesel engines

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

Established in 1967, the National Transportation Safety Board (NTSB) is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space; determine the probable causes of these accidents and events; issue safety recommendations; conduct transportation research; and offer information and other assistance to family members and survivors for any accident investigated by the agency. The NTSB makes public its actions and decisions through investigation reports, safety research reports, and statistical reviews.

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For more detailed background information on this report, visit the NTSB investigations website and search for NTSB accident ID DCA22FM026. 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—

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