National Transportation Safety Board

Marine Accident Brief

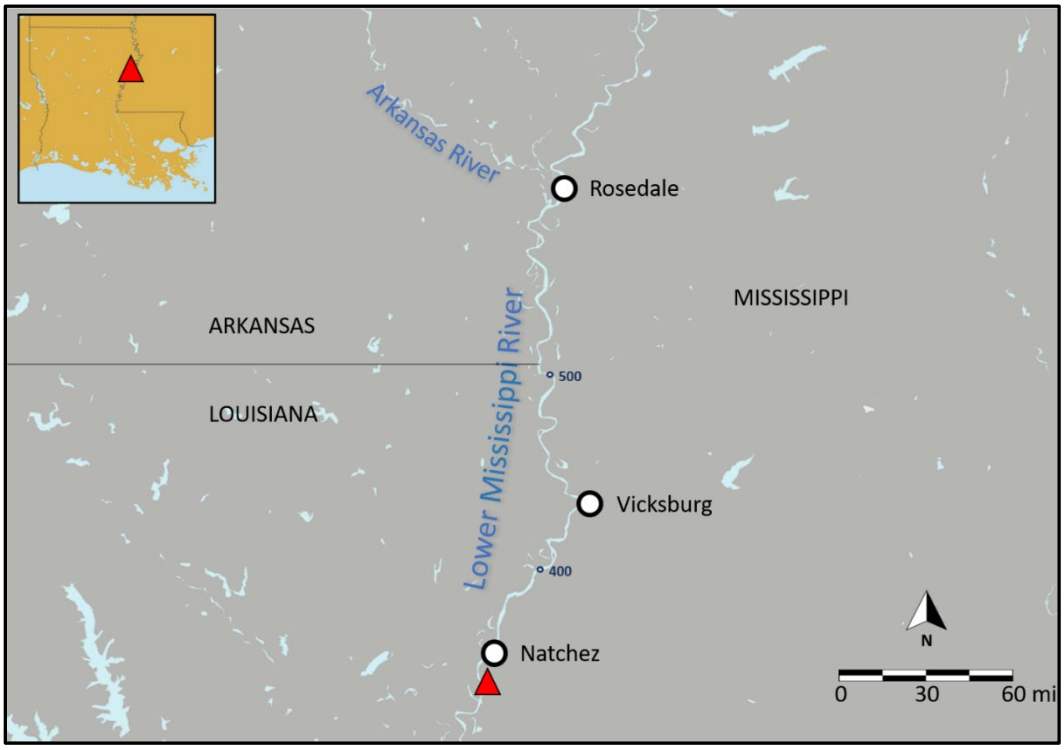
Engine Room Fire aboard Towing Vessel *City of Cleveland*

Accident type	Fire	**No.** DCA20FM014
Vessel name	*City of Cleveland*	
Location	Lower Mississippi River, mile 348, near Natchez, Mississippi[1] 31°24.43' N, 091°28.24' W	
Date	February 26, 2020	
Time	1600 central standard time (coordinated universal time – 6 hours)	
Injuries	None	
Property damage	$2 million est.	
Environmental damage	None	
Weather	Visibility 10 miles, mostly cloudy, winds 10 mph from northwest by north, gusts up to 18 mph, air temperature 49°F	
Waterway information	The Lower Mississippi River near mile 348 was 1.1 miles wide, and the current was estimated at 3 mph. The nearest river gage at Natchez, Mississippi (mile 363.3), read 58 feet, 10 feet above flood stage, and was rising.	

On February 26, 2020, about 1600 local time, the towing vessel *City of Cleveland* was pushing 18 dry cargo barges (15 loaded and 3 empty) upbound on the Lower Mississippi River, approximately 15 miles south of Natchez, Mississippi, when the vessel experienced a main engine failure followed by an engine room fire. All nine crewmembers safely evacuated to the barges and were rescued by nearby Good Samaritan vessels, which worked to extinguish the fire. The *City of Cleveland* was later towed to the operator's facility in Rosedale, Mississippi. No pollution or injuries were reported. Damage to the vessel was estimated at $2 million.

***City of Cleveland* under way before the accident. (Source: Jeff L. Yates)**

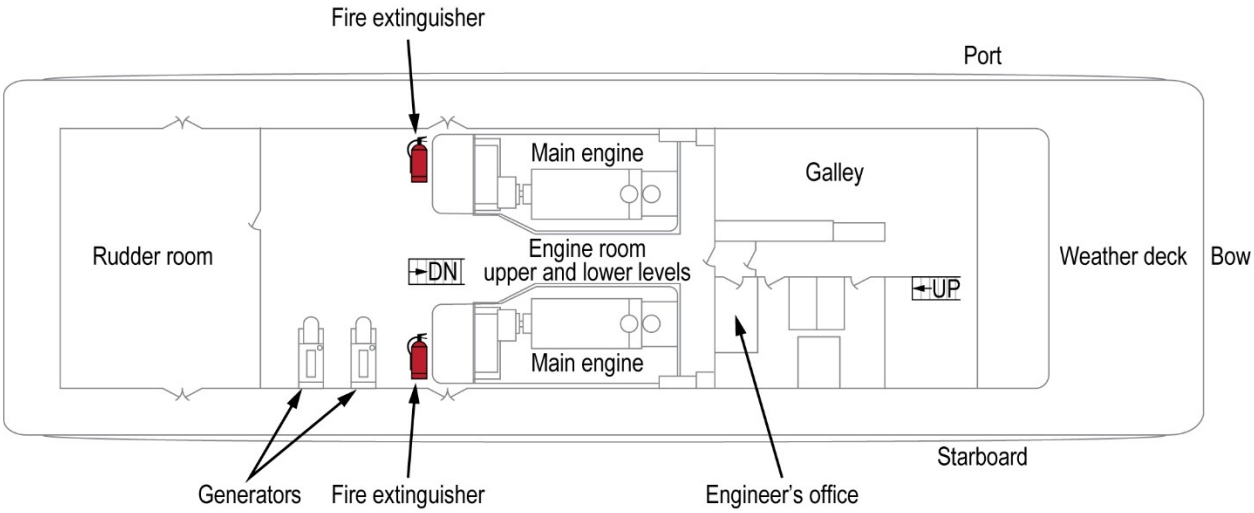
[1] All miles in this report are statute miles (0.87 nautical miles).



Area of accident where the *City of Cleveland* engine room fire occurred, as indicated by the red triangle. (Background source: Google Maps)

Background

The 140-foot-long towing vessel *City of Cleveland* was built by Dravo Corp. in Pittsburgh, Pennsylvania, in 1982 as the *Bronwynne Brent* for Brent Transportation Co. The vessel was acquired by Kirby Inland Transportation Inc. in 1998 and renamed by Jantran Inc. in 2004. Jantran, a wholly owned subsidiary of Bruce Oakley Inc., operated 21 towing vessels primarily from its Rosedale facility on the Arkansas River. Near Rosedale, barges were consolidated, and four of the company's larger vessels, including the *City of Cleveland*, took them to and from customers along the Lower Mississippi River.



***City of Cleveland* main deck arrangement.**

Accident Events

The *City of Cleveland* left New Orleans, Louisiana, on February 24, pushing 18 barges, including 15 loaded with cargoes of fertilizer and steel and 3 empty. The vessel was crewed by a captain, a pilot, a first mate, a chief engineer, four deckhands, and a cook. According to the crew, up until the time of the accident, the voyage was unremarkable.

On February 26, about 1600, crewmembers reported hearing a loud or strange noise, and the pilot stated, "It sounded—it felt like it was a log in the wheel." The captain stated that he normally ran the vessel's two main engines between 1,020 and 1,040 rotations per minute (rpm) and estimated that at the time of the accident, they were running at 1,035 rpm (the engine manufacturer's manual listed a maximum speed of 1,050 rpm). Right after the port main engine stopped, the pilot and first mate, who were in the wheelhouse, immediately saw flames from the open engine room ventilation housings on the second, or upper, deck. The engineer was in the galley at the time and proceeded to his office, which overlooked the upper and lower levels of the engine room through a window. When he arrived, he saw that the upper engine room was engulfed in fire. The running generator in the upper engine room, which drew combustion air from within the space, then stopped, and the vessel lost power. The starboard main engine continued to run (combustion air for the main engines was supplied through trunks that led to the upper deck and were fitted with air filters).

Per company policy, the doors from the weather deck to the engine room were closed since the *City of Cleveland* was under way, but the exterior windows were open, which a deckhand stated was for engine room ventilation. The crew was unable to close them due to heat and smoke from the fire. The steel door between the rudder room and the upper engine room was open, and fire spread aft to that space. Semi-portable fire extinguishers were located in the upper engine room, just inside the port and starboard doors from the weather deck. Crewmembers opened the starboard door to the engine room and attempted to activate the starboard extinguisher; however, the discharge hose ruptured proximate to the extinguisher, rendering the extinguisher ineffective. The crew could not reach the port extinguisher due to the fire.

Semi-portable extinguisher in starboard engine room following the fire.

With no electrical power available to run the towboat's fire pump, the vessel adrift in the river, and the fire spreading beyond the engine room, the captain ordered the crew to evacuate to the tow's barges. He also made a distress call over a portable VHF radio. The crew waited on the barges until the arrival of the nearby 6,000-horsepower (hp) Good Samaritan towing vessel *Susan K* about 1700. The *Susan K* pushed the *City of Cleveland* and its tow into the left descending bank. Another Good Samaritan towing vessel, the 3,400-hp *Jackson Platte*, arrived at 1745. The *City of Cleveland* crew boarded the *Jackson Platte*, and the two crews together fought the fire with hoses from the *Jackson Platte* while the *Susan K* held the tow in position on the bank.

The *City of Cleveland*'s starboard main engine remained running, so the chief engineer reboarded the vessel and pulled the engine's remote fuel shutoff, which was located at the starboard weather deck door. The shutoff failed to stop the starboard engine (the ball valve in the fuel line connected to the remote shutoff cable was later found to have been pulled past its closed position), so the chief engineers from the *City of Cleveland* and the *Jackson Platte* secured the engine by using a pole to reach the shutoff on the governor. Crews directed hose streams through the engine room and rudder room windows. Crewmembers told investigators that the fire in the rudder room proved challenging to fight, as steering gear hydraulic oil, having spilled from burnt hoses, was burning while floating on the firefighting water and was spreading further by the hose streams.

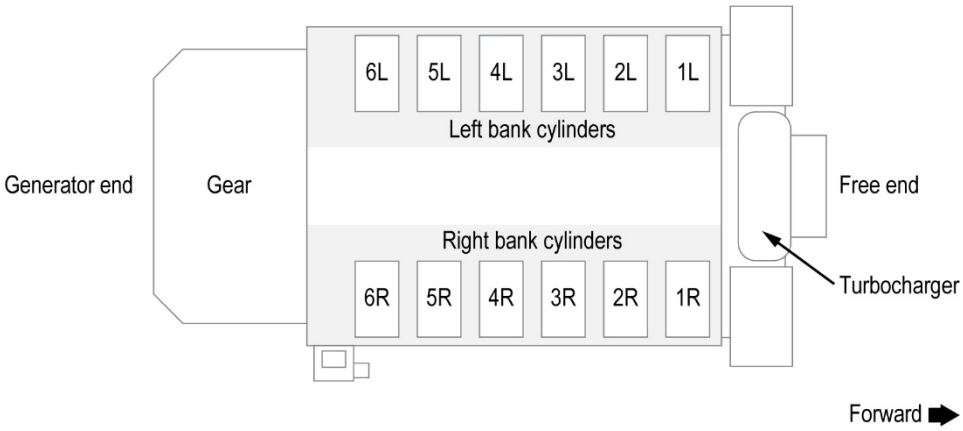
Flames coming from the starboard rudder room door. (Source: US Coast Guard)

The fire was extinguished by 1900, and the *City of Cleveland* crew was taken ashore by the *Jackson Platte.* The *City of Cleveland* was then towed to the Jantran facility in Rosedale, Mississippi.

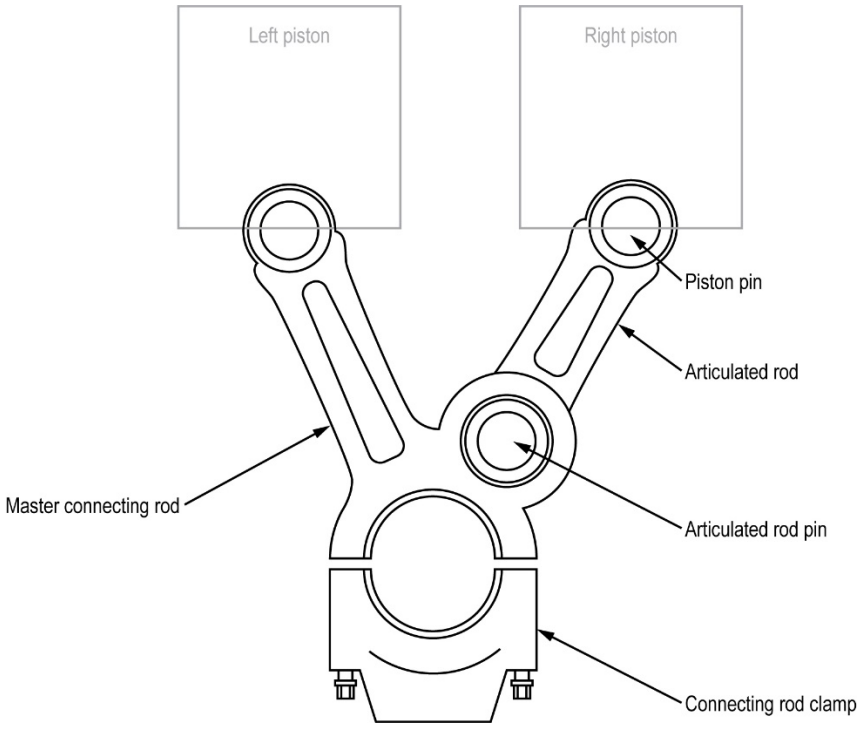
Additional Information

Damage. After the accident, investigators found extensive fire damage to the engine room, rudder room, and weather deck above. The entire upper engine room, the entire rudder room, and much of the equipment on the lower port engine room were destroyed. The lower starboard engine room and main deck spaces immediately forward of the engine room suffered smoke and water damage. The remainder of the superstructure forward of the engine room was largely unscathed.

The *City of Cleveland*'s propulsion system included twin General Electric 7FDL12, 12-cylinder, 4-stroke diesel engines.[2] These engines consisted of two banks of six cylinders and rods, left and right, with the cylinders numbered forward to aft. Each connecting rod assembly included a master connecting rod on the left bank, as viewed from aft, fastened around the crankshaft with a connecting rod clamp. Articulating connecting rods on the right bank connected at a 45-degree angle to a pin in the master connecting rod.



Simplified General Electric 7FDL12 main engine arrangement. (Source: General Electric)



Connecting rod assembly, viewed from aft (Source: GE Transportation)

A postaccident examination of the port engine showed extensive damage: the no. 4 right cylinder crankcase inspection cover had been knocked off, and the no. 4 right piston head was found on the deck along with the connecting rod clamp, inboard (to starboard) of the engine. A

[2] The maritime version of this engine was redesignated as the 7FDM about 2005 and as the V228 in 2010. GE Transportation was acquired by Wabtech in 2019.

large hole was found in the crankcase at the no. 4 left cylinder crankcase inspection cover. The no. 4 left master connecting rod was lying on the deck with the piston pin bolt missing, outboard (to port) of the engine with the bent no. 4 right articulating arm still attached to it.

Holed crankcase at no. 4 left cylinder inspection cover (*left*), no.4 left and no. 4 right connecting rods (*middle*), and connecting rod clamp (*right*).

Firefighting. The captain typically held fire drills with the crew on board the *City of Cleveland* once a month (usually during the third week of their four weeks on board). In the event of an engine room fire, the crew's plan was to drop the semi-portable extinguisher hoses and nozzles, stowed just inside the weather deck doors, to the lower engine room and release the 125 pounds of dry chemical from each extinguisher. At the time of the accident, the crew had not yet completed a fire drill for this trip.

The *City of Cleveland*'s single fixed electric fire pump was located outboard, in the lower starboard engine room. However, due to the loss of electrical power, the fire pump was unavailable to provide water to fight the fire. The towboat did carry gasoline-powered dewatering pumps for use on the barges; however, these pumps were not designated fire pumps and did not have adapters on the discharge side for firehoses. There was no fixed fire-extinguishing system in the engine room, nor did existing regulations require one. After the accident, Jantran moved the semi-portable extinguishers on their vessels up one deck, to the exterior upper deck, just above the engine room doors, and added a third semi-portable extinguisher in the upper engine room.

Vessel Maintenance. Investigators reviewed computer-based maintenance records and found no overdue work orders, although the company had suffered a cyber-attack about the time of the fire, and many logs and maintenance records were unavailable.[3]

The crew and shore staff engineers had replaced the master connecting and articulating rods on the port main engine at no. 1 right and left cylinders on February 15, eleven days before the accident, due to the complaint of a knocking sound in the vicinity of the no. 1 right cylinder. Engineers discovered the no. 1 right connecting rod was loose at the crankshaft, which resulted in "possible damage to rod on 1 left." In addition to the replacement of rods, the maintenance repair report stated that attending engineers "checked torque on all rods at the crankshaft" during the repair.

[3] Jantran used Helm CONNECT software. See https://www.helmoperations.com/helm-connect-overview/maintenance/.

Related Accident. In February 2018, another Jantran towing vessel, the *Leland Speakes*, also experienced a main engine casualty and catastrophic engine room fire (the vessel had twin Electro Motive Drive [EMD] main engines). The NTSB found that the probable cause of the accident was a "failure of the caps that secured two piston connecting rods to the crankshaft." The NTSB also attributed the severity of the fire to "the vessel's lack of a fixed fire-extinguishing system for the engine room and lack of redundant fire pumps."[4]

Analysis

During a postaccident examination of the wreckage, the no. 4 left and right cylinder master connecting and articulating rods were found still attached to each other outside the crankcase, and the piston pin and connecting rod clamp were missing. Therefore, the initial failure was likely with the connecting rod clamp or the bolt that held the piston pin. Regardless, the force of the driven loose connecting rods inside the engine was enough to puncture a hole in the side of the crankcase on the port side and eject the piston head through the no. 4 right cover on the starboard side.

The failure of the connecting rod and subsequent catastrophic damage to the crankcase likely allowed hot pressurized fuel and oil to spread to the lower engine room and thereby ignite. The significant heat and smoke damage to the upper engine room indicated that the fire spread up the port side of the engine room, then aft in the upper engine room, and eventually to the rudder room. Although the doors to the engine room were closed, the exterior windows in the upper engine room were open, and there were no means for the crew to close them from outside of the engine room. The air drawn through the open windows likely further exacerbated the fire's spread.

The vessel's firehoses were accessible, but the crew could not use them because the running generator in the upper engine room was starved of combustion air and shut down, and the vessel lost electrical power, rendering the single fire pump inoperable. Therefore, the two semi-portable extinguishers, stowed on each side of the upper engine room, were the only means for the crew to fight the conflagration. The crew had previously performed fire drills aboard the *City of Cleveland* and planned to fight a possible engine fire by dropping the semi-portable extinguisher hoses and nozzles to the lower engine room and releasing the extinguishers' dry chemical. However, the portside extinguisher was inaccessible due to the flames, and the hose on the starboard extinguisher failed proximate to the extinguisher. Additionally, given that the fire was largely fueled by flammable liquids, initially outboard of the port engine and well forward of where the extinguishers were stowed, it is unlikely the crew's initial plan to use the extinguishers would have succeeded.

The engine room was not equipped with a fixed fire-extinguishing system, nor was it required to be by existing regulations. If the *City of Cleveland* had a fixed fire-extinguishing system in the engine room, as well as a means to close the ventilation and open windows in the engine room from the outside, the fire may have been able to be extinguished. Without an effective means to fight the fire, the crew was forced to evacuate to their tow before being picked up and rescued by a nearby Good Samaritan vessel.

[4] *Engine Room Fire on Board Towing Vessel* Leland Speakes*, May 15, 2019*. MAB-19/10. Washington, DC: NTSB.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the towing vessel *City of Cleveland* was the catastrophic failure and crankcase breach of the port main engine resulting from the failure of a connecting rod assembly. Contributing to the severity of damage to the vessel was the lack of a fixed fire-extinguishing system for the engine room, as well as the loss of electrical power to the single fire pump.

Engine Room Fires

Engine rooms contain multiple fuel and ignition sources, making the spaces especially vulnerable to rapidly spreading fires. Designers and operators of towing vessels should evaluate fire hazards and provide effective means to mitigate them. Operators should have equipment and procedures in place to quickly contain and suppress engine room fires before they can spread to other spaces and/or cause a loss of propulsion and electrical power.

Vessel Particulars

Vessel	*City of Cleveland*
Owner/operator	Jantran Inc.
Port of registry	Rosedale, Mississippi
Flag	United States
Type	Towing vessel
Year built	1983
Official number (US)	664963
IMO number	None
Classification society	None
Construction	Welded steel
Length	140 ft (46.2 m)
Beam	42 ft (13.0 m)
Draft	11 ft (3.4 m)
Tonnage	783 GRT
Engine power; manufacturer	2 x 3,000 hp (2237 kW); GE 7FDL12 diesel engines
Persons on board	9

NTSB investigators worked closely with our counterparts from Coast Guard Marine Safety Detachment Vicksburg, Mississippi, throughout this investigation.

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA20FM014.

Issued: January 27, 2021