



# National Transportation Safety Board

## Marine Accident Brief

### Capsizing and Sinking of Barge *Dredge200* and Loss of Workboat *R.E. Pierson 2* Pushed by Tugboat *Big Jake*

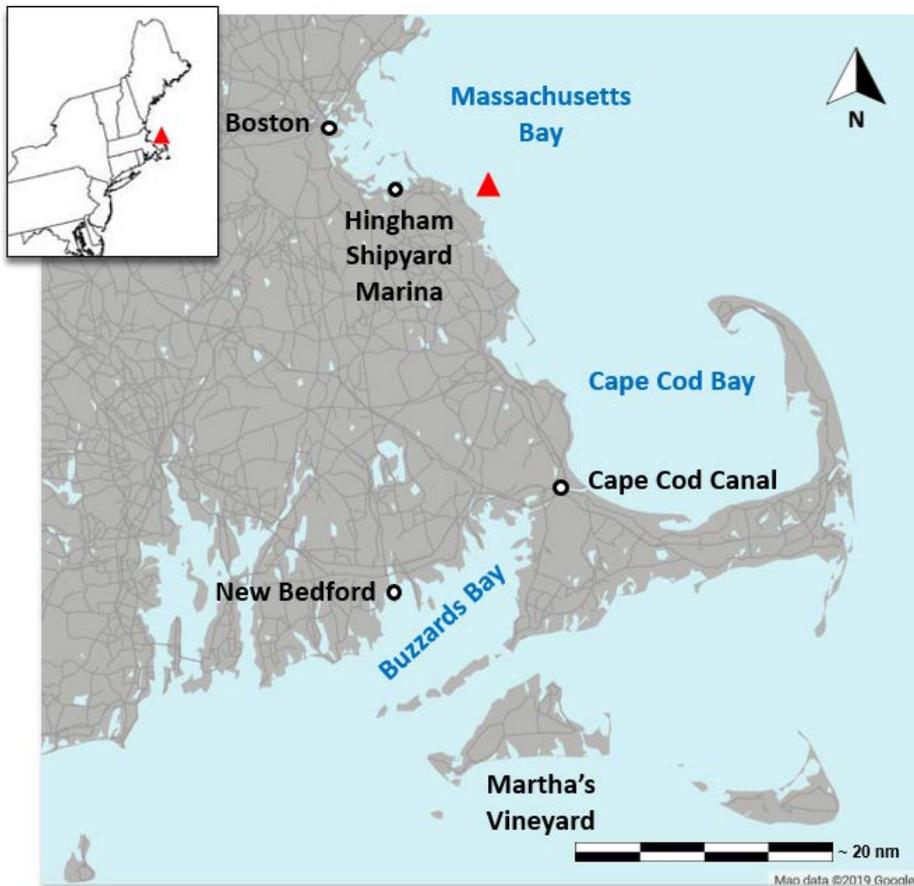
<b>Accident type</b>	Capsizing/Listing	No. DCA19FM009
<b>Vessel names</b>	<i>Big Jake, Dredge200, R.E. Pierson 2</i>	
<b>Location</b>	Massachusetts Bay, Massachusetts, 5 miles east of Minots Ledge Light <sup>1</sup> 42°16.06' N, 70°38.63' W	
<b>Date</b>	December 2, 2018	
<b>Time</b>	0930 eastern standard time (coordinated universal time – 5 hours)	
<b>Injuries</b>	2	
<b>Property damage</b>	\$1.98 million est. ( <i>Dredge200</i> \$1,150,000; Excavator \$685,000; and <i>R.E. Pierson 2</i> \$150,000)	
<b>Environmental damage</b>	500 gallons of diesel and 400 gallons of hydraulic oil (aboard <i>Dredge200</i> )	
<b>Weather</b>	Fog, light to moderate rain, visibility 1 mile, winds southeast 15–20 knots gusting to 30 knots, seas southeasterly 4–6 feet, air temperature 45°F, water temperature 48°F	
<b>Waterway information</b>	In the southwestern portion of Massachusetts Bay, the coastline is rocky with numerous detached islands.	

On December 2, 2018, about 0930 local time, the towing vessel *Big Jake* was under way in Massachusetts Bay towing five barges and two workboats when the tow broke apart. As a result of the breakaway, the barge *Dredge200* and the workboat *R.E. Pierson 2* both sank. Two crewmembers received minor injuries. Although both sunken vessels had fuel and lube oil on board, no visible oil sheen or pollution was reported. Estimated value of the *Dredge200* and *R.E. Pierson 2* totaled \$1.98 million.



At left, the *Dredge200* in the foreground with excavator boom extended aft. At right, the *Big Jake*, pier side before the accident. (Source: Riverside Marine Construction [left image], Safer Tug & Barge [right image])

<sup>1</sup> All miles in this report are nautical miles.



Area of the accident where the *Dredge200* and *R.E. Pierson 2* capsized and sank, as indicated by the red triangle. (Background source: Google Maps)

## Background

The *Big Jake* was a twin-propeller towing vessel powered by two EMD diesel engines, each rated at 3,000 horsepower, with Falk reduction gears. In addition to twin rudders, the vessel had two flanking rudders, and the towing equipment consisted of a bow-mounted capstan. Built in 1972 by Halter Marine Services, Inc. of Lockport, Louisiana, the vessel was originally named the *Nohab Express* and was acquired in 1988 by Reinauer Transportation Companies, LLC of Staten Island, New York, and operated out of Boston and New York until 2009. After several years of being laid up in Boston, the tugboat was purchased by Safer Tug and Barge LLC of Egg Harbor City, New Jersey, in 2015 and renamed.

The barge *Dredge200* was a 90-foot-long-by-40-foot-wide, single-skin, self-contained dredge barge. There was a machinery deckhouse located just forward of amidships, with a spud-control house atop, spud winches located on the deck forward of the deckhouse, and a walking spud slot centerline. Originally constructed in 1967, the dredge barge consisted of nine bolt-together pontoon sections. The dredge was modified in 1990 to have a one-piece hull with the addition of bulkheads. A Komatsu PC1250 LC7 excavator was carried on board. The excavator was secured to the deck by turnbuckles and wire.

The 25.5-foot long push boat, *R.E. Pierson 2* was built in 2008 by Progressive Industrial Inc. in Palmetto, Florida, for Richard E Pierson Construction Co. Inc., located in Pilesgrove, New Jersey. The tug was constructed to be transportable by a large truck. It had a deckhouse, pilothouse,

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and full bulwarks around the main deck with freeing ports. The vessel was equipped with twin engines, propellers, and rudders. The tug was sold to Custom Marine located in Dobbs Ferry, New York, in July 2018.

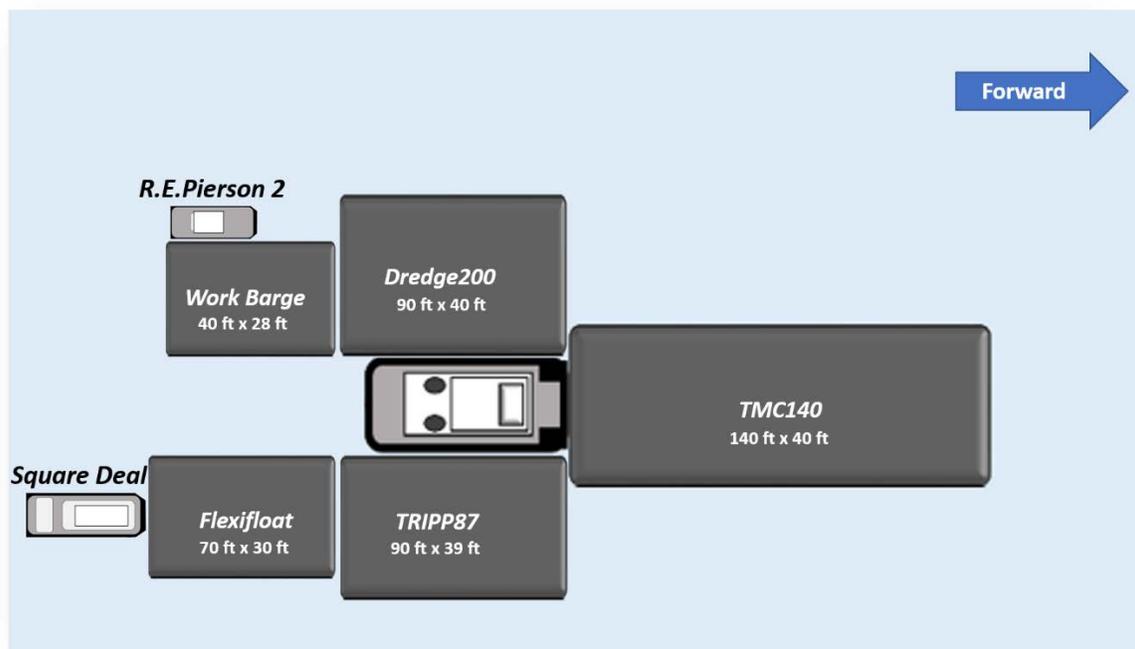
### Accident Events

Safer Tug and Barge LLC was hired by Northeast Dredge and Marine LLC to transport five barges (*TMC 140*, *TRIPP87*, *Dredge200*, a Flexifloat modular barge, and a work barge) and two small push boats (*R.E. Pierson 2*, *Square Deal*) from Riverside, Connecticut, to Hingham Bay, Massachusetts, for a maintenance dredging project at Hingham Shipyard Marinas. The contract was signed on September 21 and called for the dredging to begin in Hingham on November 1 and be completed by February 14.

In preparation for the job, Safer Tug and Barge and Northeast Dredge (hereafter referred to as the “the customer”) had to assemble the various barges, load equipment, and move the *Big Jake* to Connecticut from New York City. Delays in this preparation resulted in the owner not starting the contract for the *Big Jake*’s captain and mate until November 26. During the preparation, the captain and owner monitored the weather and noted that during the winter, weather could develop quickly and generate rough seas and strong winds along their route (Long Island Sound, Buzzards Bay, Cape Cod Canal, Cape Cod Bay, Massachusetts Bay) during the 40- to 45-hour transit. The captain, mate, and owner had reviewed the weather with the customer and delayed their departure for several days because of adverse weather conditions. The captain told investigators they were searching for a two-day window of favorable weather conditions. After all parties agreed that such a window was forecast, the *Big Jake* departed Riverside on the early morning of November 30 with its tow. The crew consisted of a captain, mate, crane operator, engineer, deckhand, and the vessel owner (assisting in various roles).

The *Big Jake* was faced up (connected) to barge *TMC140* (a split-hopper dump scow) and secured to *Big Jake*’s bow by face wires and winches. The *Dredge200* and an unnamed work barge were secured to *Big Jake*’s port side. Outboard of the work barge was the pusher tug, *R.E. Pierson 2*. On *Big Jake*’s starboard side was *TRIPP87* (a dredge/crane barge) and a Flexifloat modular barge. Aft of the Flexifloat was the *Square Deal*, a crew/work boat. All of the barges and work boats, except *TMC140*, were secured with a variety of wire rope and synthetic lines of various sizes.

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Representation (not to scale) of *Big Jake*'s tow arrangement of the five barges and two work boats during the majority of the voyage to Hingham Bay, Massachusetts.

During portions of the transit, the crew manned the workboats and detached the port and starboard barges into two separate tows that would follow the *Big Jake* while the vessel pushed the *TMC140*. The first tow consisted of the *R.E. Pierson 2* which was pushing the work barge, and the *Dredge200*, while the second tow consisted of the *Square Deal* pushing the *Flexifloat* and *TRIPP87* barges. No galleys, heads, or showers were on board either of the workboats, so the crew would return frequently to the *Big Jake*'s hip to allow the operators to eat, shower, and sleep.

Based on *Big Jake*'s tow configuration (more than two barges), the Cape Cod Canal Authority required the vessel to obtain approval prior to transiting the canal. About 1145 on November 30, the captain and owner contacted the Cape Cod Canal marine traffic controller to request passage permission for the canal. They estimated their time of arrival to be about noon on the following day (December 1). The on-duty canal manager granted approval around 1430 and issued a bulletin to all traffic controllers informing them of the anticipated "unusual" transit on December 1 and 2. The bulletin listed the following requirements for the transit: one-way canal traffic and fair tide only (current flowing in the direction of transit), and the *Square Deal* and the *R.E. Pierson 2* were to be manned with propulsion engines running for the entire transit. According to the local tide tables, the next fair tide at the Cape Cod Canal Railroad Bridge (western entrance to canal) was forecasted to start at 2248, and therefore, the controllers told the *Big Jake* crew that they could begin their passage at 2230.

While en route to the Cape Cod Canal, the *Big Jake* captain and owner were concerned with the Coastal Waters Forecast issued by the National Weather Service (NWS), which covered the area through which they would be transiting after passing through the canal. The captain, owner, and customer had previously discussed that the voyage would have to be completed with seas not exceeding 4 feet. However, the forecast on Saturday, December 1, at 0716 stated that there would be a small craft advisory in effect from late that evening through Sunday evening for

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Massachusetts Bay and Cape Cod Bay.<sup>2</sup> The forecast indicated that “frequent gusts between 22 and 33 knots and/or seas or waves greater than 4 ft are expected within 12 hours.” In addition, the forecast for Sunday, December 2 predicted “SE winds 15 to 20 knots with gusts up to 25 kt seas 4 to 6 ft” for Massachusetts Bay.

The tow arrived and spudded down in Buzzards Bay, Massachusetts, on December 1 at approximately 1230. The *Big Jake* detached from the tow and loaded 5,000 gallons of diesel at the New Bedford fuel dock.

The crew continued to monitor the weather, and at 1532, the NWS Coastal Waters Forecast for Sunday, December 2 for the Massachusetts Bay predicted “SE winds 15 to 20 knots with gusts up to 30 kt. Seas 5 to 6 ft. Patchy fog. Rain. Visibility 1 NM or less....”

The *Big Jake* returned and moved the tow to anchorage “C”, closer to the canal entrance, to await the approved transit time for the canal. The captain, mate, and owner contacted Cape Cod Canal marine traffic controllers on several occasions over the next six hours, voicing their concern about the incoming weather and requesting approval to proceed prior to their approved passage time, which marine traffic controllers denied/did not approve.



Aft view of the towing vessel *Big Jake* and barges transiting the Cape Cod Canal. (Source: US Army Corps of Engineers)

At 2252, the *Big Jake* and its tow proceeded from the anchorage and passed under the Cape Cod Canal Railroad Bridge. The canal transit took approximately an hour and forty minutes, with no reported issues from the captain or controller.

As *Big Jake* left the canal about 0043 on December 2 and sailed north in Cape Cod Bay, the winds and seas began to build. The pitching and rolling of the vessel woke the owner and deckhand around 0600. About 30 minutes later, the captain relieved the mate in the wheelhouse. The captain estimated the southeasterly seas to be 4–6 feet and strengthening. Sunrise occurred at 0655.

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<sup>2</sup> National Weather Service Boston MA, Coastal Waters Forecast, 716 AM EST Sat Dec 1 2018, ANZ251-020100-Massachusetts Bay and Ipswich Bay.

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At 0730, the owner entered the wheelhouse and told the captain he would be checking the lines and wires on the barges and push boats with the deckhand. The crane operator, who was sleeping on the *Dredge200*'s mobile camper, awoke shortly thereafter to the sound of one of the dredge's spuds swaying (knocking) in its stowed position because the spud wedges had worked their way loose due to the vessel movement. The crane operator assisted the owner and deckhand by checking and adding additional lines to the *Dredge200*, Flexifloat barge, *TRIPP87*, and workboats. The engineer made a round of the machinery spaces on board the tug and then proceeded to assist with adding additional lines. The owner went onto the *R.E. Pierson 2* to tighten the starboard-side face-up wire when the winch crank handle, under tension, released and made contact across the bridge of his nose. The wound bled profusely, impeding his sight. The crane operator and deckhand came to the owner's aid and escorted him back on board the *Big Jake*.



The *Big Jake*'s tow with the *Dredge200* in the foreground during the accident.

The owner made his way up to the wheelhouse to discuss the severity of the situation with the captain. The captain reduced the speed of the tow in an attempt to ease the tow's pitching and rolling movements. At approximately 0832, the captain slowed to bare steerage, and shortly thereafter, the port face cable snapped on *TMC140*. The captain asked the owner to wake up the mate to assist. As *TMC140* swung to the starboard side of the *Big Jake*, the captain directed the crew to release the starboard wire holding the *TMC140* to the tug. After the crew released the starboard wire, and as the captain maneuvered the *Big Jake* to recover the barge, the *Big Jake*'s steering system failed to respond, and the main rudders went hard-over. The owner checked on the steering and the captain instructed the mate to assist the crew with adding additional lines, nylon straps, and safety lines to the barges. As the mate proceeded down the forward ladder from the wheelhouse, he lost his grip on the handrail and fell down to the main deck, injuring his right shoulder, forearm, and back.

At the time of the steering failure, the 12-volt battery supplying power to the wheelhouse electronics also failed. The engineer and owner investigated and found that the steering system's hydraulic hose (return line) had ruptured and sprayed a fine mist of hydraulic fluid onto the batteries. They found the 12-volt battery's plastic top expelled, exposing the cells beneath; they told investigators that they believed the battery had exploded. The owner told the captain that only emergency steering was available and that he should minimize the use of the rudders. The crew saw that the VHF-FM radio's antenna was also damaged at this time, and most of the wheelhouse's electronics were deemed inoperable. The captain switched communications to a handheld VHF-FM radio.

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As the tow continued to rotate, now beam to the seas, *Dredge200* started to rock back and forth, striking the *Big Jake*'s port quarter. The crane operator and deckhand both stated that they believed this contact may have resulted in the *Big Jake*'s port quarter piercing the starboard-side shell plating of the *Dredge200*.

With steering lost, the captain maneuvered the tow with the twin screws so that the *TMC140* came to rest against the bow of *TRIPP87*. As the crew attached lines to the *TMC140*, lines started to part on the *TRIPP87* and the Flexifloat barge. The tow was now broadside to the seas, which increased the rolling and pitching of the vessel, causing the *Big Jake*'s navigational computer to slide across the wheelhouse and the GPS to be knocked offline temporarily.

The *Dredge200* started to take on water and was down by the bow. Over the course of about 30 minutes, the crew attempted to keep the barges and workboats together, to no avail. When the crew deemed it was unsafe to continue their efforts, the barges and workboats drifted away from *Big Jake*, with the exception of *TRIPP87*, which remained tethered to the *Big Jake*'s starboard side by a 5-inch towing hawser.

At approximately 0930, about an hour after the *TMC140* cable broke, the captain contacted the US Coast Guard by handheld VHF radio, requesting assistance. He indicated that four of five barges and both workboats that they were towing had broken free and were adrift. Crewmembers from Coast Guard Station Point Allerton and Coast Guard Cutter *Key Largo* responded to the scene along with the tugboats *Smith Predator*, *Justice*, and *Kendall J. Hebert*. The three tugboat crews located the *TMC140*, Flexifloat barge, work barge, and workboat *Square Deal* and brought them safely back to port. The crew of the *Key Largo* saw that the *Dredge200* had capsized but lost visual of the barge. The *Key Largo* remained in the area until about 1731, as darkness began to limit visibility.

On December 4, the *Dredge200* was found in Broad Sound approximately 2 miles southeast of Nahant, Massachusetts, about 15 miles from where it broke free. The barge was located with multi-beam sonar just north of the North Channel, the major shipping lane into Boston Harbor, in approximately 100 feet of water. A remotely operated underwater vehicle surveyed the site and found the *Dredge200*'s hull inverted with its main deck equipment imbedded into the seafloor. Investigators reviewed the underwater footage, but the survey did not cover the entire hull nor clearly show damage to the barge. The *Dredge200* was carrying approximately 500 gallons of diesel fuel and 400 gallons of hydraulic oil when it sank. At the time of this report, the barge has not been salvaged. The *R.E. Pierson 2* was not recovered and was assumed to have sunk.



The *R.E. Pierson 2* before the accident.

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### Additional Information

While the *Big Jake* was pier side in Hull, Massachusetts, investigators boarded the vessel and reviewed documentation, certificates, and records on board, and conducted a postaccident examination of the machinery spaces.

The crew, captain, mate, and owner told investigators that that the Cape Cod Canal marine traffic controller delayed their transit, which in turn caused the vessel to transit Cape Cod and Massachusetts Bays later than planned.

Coast Guard inspectors conducted a post-casualty inspection and identified numerous deficiencies relating to the accident transit: one related to the plan for the voyage, eight to navigation, five toward survival and lifesaving equipment, and 14 pertaining to maintenance, steering, and electrical power to navigation equipment.

The *Dredge200* operating company did not have a drug and alcohol testing program in place at the time of the accident. All crewmembers were subjected to the Coast Guard's field sobriety/blood alcohol content testing on the afternoon of December 2. All results were negative. All crewmembers' post-accident toxicological testing for illegal drugs also yielded negative results.

### Analysis

Although underwater imagery was reviewed, investigators could not definitively determine the extent of the damage to the hull or verify the condition and closure of the hatchways, ventilators, doors, scuttles, manholes, and other openings on board the *Dredge200*. However, based on crew statements, the source of flooding that led to the sinking of the *Dredge200* was likely hull damage from contact with the *Big Jake* when the tow broke apart.

The contracted date for dredging to begin at the Hingham shipyard was November 1. The *Big Jake* and its tow departed over a month behind schedule on November 30 due to delays in obtaining equipment for and assembling and preparing to move the tow. The opportunity for a favorable weather window diminished with the onset of winter, which would have factored in the decision of the owner and captain to continue their transit despite an unfavorable weather forecast.

The *Big Jake*'s crew stated that the Cape Cod Canal traffic controller delayed their transit through the canal which resulted in them getting caught in bad weather on the other side. However, it appears that that the agency followed their standard protocols and processes to ensure safe passage of vessels when assigning the transit time. According to the controller, they would typically restrict the canal to one-way traffic for a tow of this size/configuration. Additionally, when restricting to one-way traffic, they would time the passage to a fair tide to minimize the disruption to other canal traffic. Further, the captain and owner waited for hours for their opening in the canal and had ample time to evaluate the weather forecast for the rest of their voyage.

Although the captain and owner had a discussion regarding a plan for the tow configuration and set a limit of 4-foot seas for the voyage, they proceeded through the canal and into Cape Cod Bay despite knowing that the weather forecast called for seas that exceeded the limits they established for the voyage. The pre-planning phase carried out by the captain, owner, and customer

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proved to be ineffective. In particular, there were no safe harbors or alternate routes identified in case heavy weather should be forecasted during the voyage. Once the captain and owner decided to continue their transit after departing the Cape Cod Canal, they had to travel about 43 miles (about 8 hours at the transit average of 4–5 knots) through the relatively unprotected waters of Cape Cod Bay and Massachusetts Bay, with limited safe harbors should the forecast weather overwhelm the tow before their destination in Hingham.

### **Probable Cause**

The National Transportation Safety Board determines that the probable cause of the capsizing and sinking of the *Dredge200* and the *R.E. Pierson 2* was the decision by the tow captain and owner to attempt a transit in forecasted wind and waves that exceeded their original plan for the voyage.

#### **Voyage Plans for Prevailing Weather Conditions**

Owners and operators should develop voyage plans that assess prevailing weather conditions and anticipate changes along the intended route. Regardless of requirements, planning and preparation before a tow commences is critically important, including the identification of safe harbors along the route and adherence to operational limits.

## Vessel Particulars

Vessel	<i>Big Jake</i>	<i>Dredge200</i>	<i>RE Pierson 2</i>
<b>Owner/operator</b>	Safer Tug & Barge LLC	Riverside Marine Construction /US Northeast Dredge and Marine LLC	Custom Marine /US Northeast Dredge and Marine LLC
<b>Port of registry</b>	New York, New York	Portsmouth, New Hampshire	Pilesgrove, New Jersey
<b>Flag</b>	United States	United States	United States
<b>Type</b>	Towing vessel	Dredge excavator	Workboat
<b>Year built</b>	1972	1967 (Refurbished 1990)	2008
<b>Official number (US)</b>	544911	534543	1210142
<b>IMO number</b>	8851170	N/A	N/A
<b>Classification society</b>	N/A	N/A	N/A
<b>Construction</b>	Welded steel	Welded aluminum	Welded steel
<b>Length</b>	86.5 ft (37.8 m)	82.8 ft (13.1 m)	25.5 ft (7.8 m)
<b>Draft</b>	10.6 ft (3.2m)	7.6 ft (0.9 m)	6 ft (1.8 m)
<b>Beam/width</b>	34 ft (10.4 m)	39.9 ft (4.4 m)	14 ft (4.3 m)
<b>Tonnage</b>	242 GRT	260 GRT	17 GRT
<b>Engine power; manufacturer</b>	Twin EMD 12 645 E6 diesel engines (3,000 hp, 2685 kw)	Non-self-propelled	Twin Cummins diesel engines (480 hp, 358 kw)
<b>Persons on board</b>	5	1	0

**NTSB investigators worked closely with our counterparts from Coast Guard Sector Boston throughout this investigation.**

For more details about this accident, visit [www.nts.gov](http://www.nts.gov) and search for NTSB accident ID DCA19FM009.

**Issued: December 20, 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 of the *United States Code*, Section 1131(b)(1). 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 of the *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 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 of the *United States Code*, Section 1154(b).