# National Transportation Safety Board

## Marine Accident Brief

### Fire aboard Sailing Vessel *Best Revenge 5*

| | |
|---|---|
| **Accident no.** | DCA17FM021 |
| **Vessel name** | *Best Revenge 5* |
| **Accident type** | Fire |
| **Location** | Falmouth Inner Harbor; Falmouth, Massachusetts<br>41°32.80' N, 70°36.19' W |
| **Date** | July 11, 2017 |
| **Time** | 0130 eastern daylight time (coordinated universal time – 4 hours) |
| **Injuries** | One crewmember suffered second and third-degree burns |
| **Property damage** | $1,508,000 est. |
| **Environmental damage** | Oil sheen observed but contained by floating boom |
| **Weather** | Overcast, visibility 10 miles, winds southwest at 5 knots, air temperature 68°F, water temperature about 72°F |
| **Waterway information** | The Falmouth Inner Harbor is a sheltered basin approximately 0.7 miles long and less than 0.1 miles wide, dredged to about 6 feet deep. Several marinas and small-craft anchorages line the harbor. |

At about 0130 on July 11, 2017, the uninspected sailing vessel *Best Revenge 5* caught fire while docked at a marina pier in Falmouth Inner Harbor in Falmouth, Massachusetts. The vessel's two crewmembers escaped the burning vessel and attempted to fight the fire but could not contain it, and local firefighters later extinguished it. One crewmember sustained second- and third-degree burns to the arms, hands, and feet. An oil sheen was observed in the immediate vicinity of the vessel after the fire but was contained by a floating boom. Damage to the *Best Revenge 5* (which was declared a constructive total loss), to a vessel docked next to it, and to the pier totaled an estimated $1,508,000.

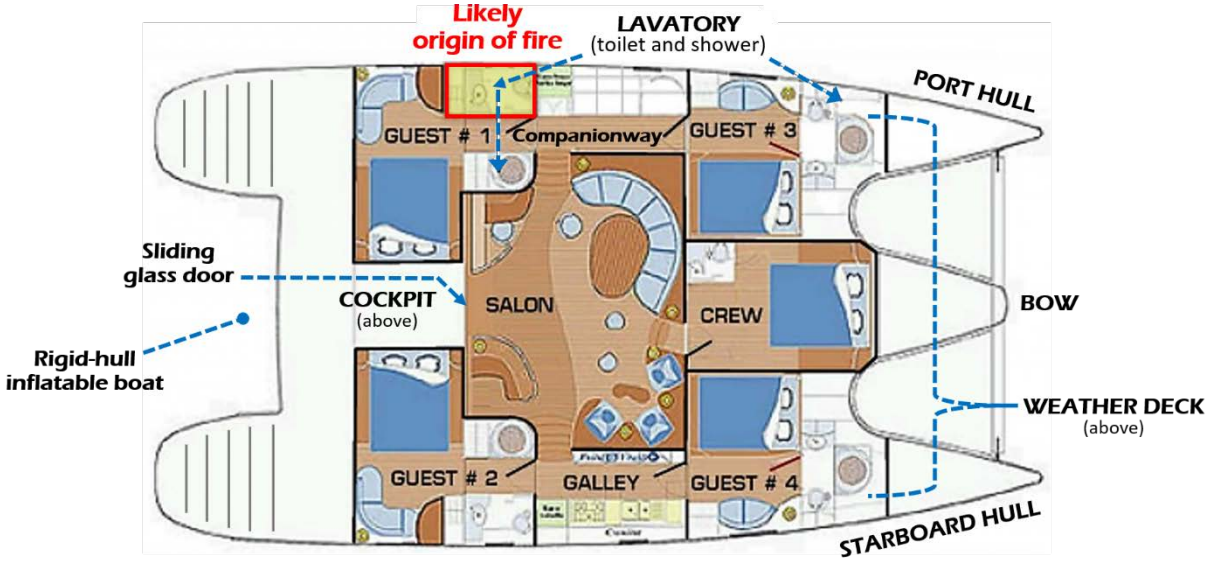

***Best Revenge 5* prior to the accident. (Photo courtesy of Sailing Directions®)**

*Unless otherwise noted, in this report all *miles* are nautical miles (1.15 statute miles).


**The location in Falmouth Inner Harbor, Massachusetts, where the *Best Revenge 5* caught fire while docked at the pier. (Background maps from NOAA ENC® Viewer)**

The *Best Revenge 5* was a 58-foot-long catamaran sailboat built in 2003 by Alliaura Marine in France to an Alliaura Privilege 585 design. It had a single mast and, when not under sail, was propelled by two diesel engines. Electrical power was supplied by two diesel-fueled generators located in the aft section of the port and starboard hulls. A small rigid-hull inflatable boat powered by a gasoline outboard engine was carried on the vessel's stern. The accommodation spaces included a crew double-berth stateroom and four double-berth staterooms for up to eight guests; a seating and eating area called the "salon," and the galley for cooking. These areas were accessed through a sliding glass door aft of the salon. Also aft of the salon were the vessel's wheel and engine controls in the open cockpit. A permanent crew of two—a captain and a first mate/chef—lived aboard the vessel and each had over a decade of experience on the boat.

Flagged under the British Virgin Islands, the *Best Revenge 5* operated as both an uninspected passenger vessel and a recreational (uninspected) sailing vessel. Normally, in the winter it operated in Caribbean waters, carrying up to eight passengers on chartered sailing voyages from the British Virgin Islands; in the summer it would sail privately out of New England waters. However, in June 2017, the catamaran operated out of Bermuda, hosting spectators for the America's Cup sailing races. While there, the vessel was struck by lightning, which damaged several navigational components. No other damage was found when the captain examined the vessel, including an inspection of the grounding plates below the hull. The damaged navigation equipment was replaced by a technician soon afterward and the captain did not note any issues following the repairs.




**An annotated schematic of the *Best Revenge 5* identifies various accommodation spaces and where the fire likely originated in the lavatory on the port side. (Image courtesy of Sailing Directions®)**

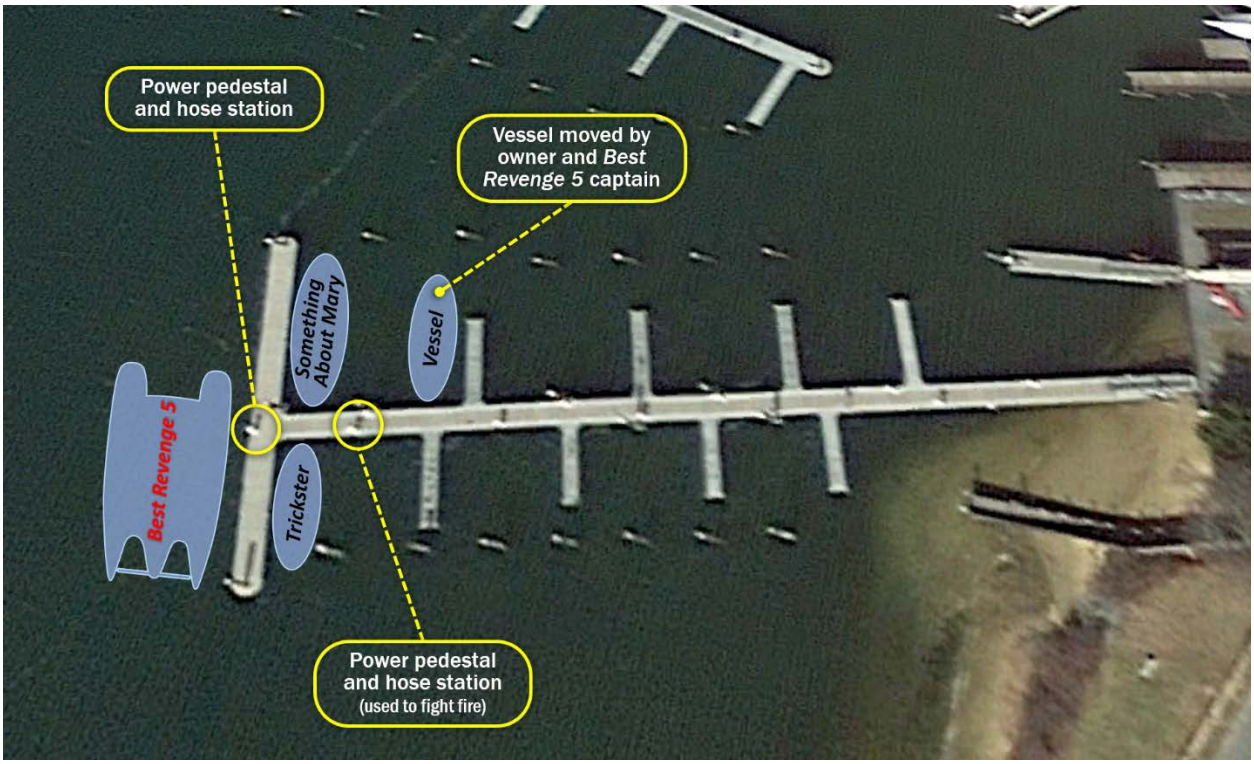
At the completion of the America's Cup races, the *Best Revenge 5* sailed to New England to commence its summer cruising routine. On the night of the accident, the vessel was docked at MacDougalls' Cape Cod Marine Services, Inc. in Falmouth, Massachusetts, where it had been docking for several years. The pier system at the marina had a T-shaped platform with perpendicular docks alongside the center dock. The *Best Revenge 5* was tied alone, portside-to the channel side of the 30-meter-long end dock, which was about 115 meters from shore. A small-stepped gangway was rigged near the stern for embarking and debarking the vessel. Only the two crewmembers were on board.

The captain stated that residential-type, battery-powered smoke detectors were fitted in all staterooms. The vessel was connected to external electrical power through a pair of cables fed from shore power pedestals on the pier to the aft port side.[1] One cord was connected to an outlet on a pedestal located adjacent to the boat's guest lavatory, while the other ran to a pedestal further down the pier. Near the pedestals were freshwater supply stations equipped with garden-style type hoses.

## Accident Events

At about 0130 on July 11, the crew was asleep in the stateroom when the captain awoke to the smell of smoke. The captain went to investigate, climbing through a hatch above the head in the stateroom and out onto the forward weather deck. Looking aft through windows into the salon, he saw that the space was full of smoke and that there was "a red glow towards the lower part of the port side of the salon." He returned to the stateroom and woke up the first mate, instructing her to evacuate the vessel and to warn the person living aboard a boat docked nearby about the fire. After re-exiting through the hatch, the captain was neither able to reach the gangway aft due to the fire nor able to jump down onto the pier due to the distance, so he dove into the water from the bow and swam to the pier.

[1] Marinas have shore power pedestals located on piers to allow docked vessels to utilize shoreside electrically generated power while moored. The pedestals include an alternating current (AC) receptacle to which the vessel connects through an electrical cable for a secure waterproof connection.




***Best Revenge 5* docked at the pier end at MacDougalls' marina. On the opposite sides of the dock were the sailboat *Something About Mary,* the yacht *Trickster*, and the vessel where the owner was alerted by the first mate. (Background from Google Earth)**

Awakened by the captain, the first mate exited the stateroom aft to the salon and found it completely engulfed in smoke, which was obscuring her visibility. The first mate stated that she could smell melting fiberglass but did not see flames. She continued aft with her hands extended in front of her until she reached the aft sliding glass door. After opening the door, she continued to the gangway and then down onto the pier. The first mate ran to the nearby vessel to wake up the owner and tell him to call the fire department. She then proceeded back toward the *Best Revenge 5*.

The first mate told investigators that, as she approached the catamaran, she could see that the exterior of the boat was burning near the electrical power pedestal on the pier. The pedestal itself, she said, was also "smoldering, burning, and charred." At that point she grabbed a garden hose from further down the dock and began spraying fresh water on the fire; however, the flames continued to spread towards the stern. About this time, a portlight that was above the area of the flames fell inward into the fire and the hole in the port side of the *Best Revenge 5* began to widen.

While the first mate was attempting to fight the fire, the captain had been assisting the owner of the nearby boat in moving his vessel away from the area. Once the boat was moved, the captain joined the first mate near the *Best Revenge 5* in fighting the fire using the garden hose. He stated that the fire was around the aft guest lavatory located on the lower interior level of the port hull. At some point during the next several minutes, they heard a "whoosh" and then witnessed flames "[shooting] forcefully out" from the salon into the cockpit (through the sliding glass door) and from the hole in the side of the vessel.


***Best Revenge 5* on fire at the dock. (Photo courtesy of Satellite News Service; screen shot from video courtesy of Gayle Kiley via *Cape Cod Times*)**

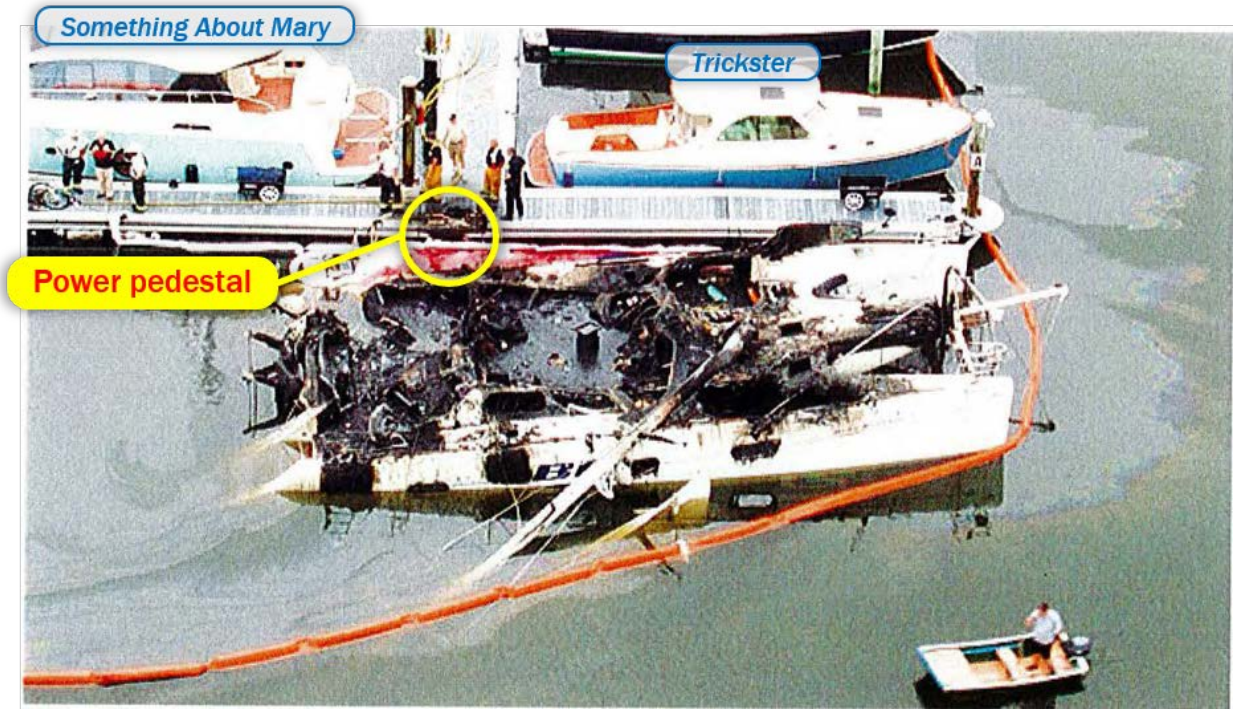
The captain determined that the risk to remain on the pier was too great; therefore, both crewmembers retreated toward the shore, where police, firefighters, and emergency medical technicians (EMTs) were beginning to arrive. The crewmembers were examined by EMTs and taken to a local hospital. The first mate was later helicoptered to a hospital in Boston for treatment of second- and third-degree burns on her arms and hands along with second-degree burns on her feet.

The incident report from the Falmouth Fire Rescue Department noted that the fire was reported by phone at 0143 and firefighters arrived by 0148 to find the catamaran "fully involved" with the "vessel sail and mast also…burning." The report stated that two additional vessels were docked parallel to the burning boat about 3–5 feet away and were "without direct flame impingement but exposed to radiant heat." While firefighters prepared to attack the fire, the vessel's mast collapsed onto its starboard side. Firefighting efforts eventually included assistance from other fire departments nearby and four hose lines drawing water from the harbor. Diesel fuel from the 350 gallons on board was observed leaking from the vessel's port side around 0430. To contain the oil spill, absorbent pads and a containment boom were placed around the sheen area. The fire was reported extinguished at 0647.

The *Best Revenge 5* was declared a constructive total loss, the dock was damaged in the area of the fire, and exterior equipment on the two adjacent docked vessels sustained some melting and warping damage, according to the fire department report. The following day, on July 12, the *Best Revenge 5* was dewatered, lifted onto a barge, and towed to the Port of New Bedford, Massachusetts. The total damage was estimated at $1,385,000 for the *Best Revenge 5*; $48,000 for the adjacent vessel *Something About Mary*; and $75,000 for the dock.

## Analysis

The captain of the *Best Revenge 5* told investigators that he was initially awakened by the smell of smoke in the crew stateroom, not from an installed smoke alarm. He also stated that he saw the glow of a fire by the stairs below the salon in the port hull, in an area known as the companionway. From his viewing position forward on the vessel's centerline, his line-of-site indicated that the glow could have been emanating from the guest aft lavatory. However, he did not view what was burning and could not provide the ignition source.




***Best Revenge 5* partially submerged at dock postaccident. (Photo courtesy of Coast Guard)**

An examination of the vessel was first conducted on July 14, 2017, by fire investigators representing various interested parties. Because the vessel was partially submerged from firefighting efforts, the fire department could not complete a fire origin and cause investigation. A second multiparty examination of the vessel was conducted on August 9 and 10, 2017, by fire investigators, representatives of involved vessels and the marina, the Coast Guard, and the National Transportation Safety Board.

At that time, a fire origin and cause examination was conducted with the *Best Revenge 5* out of the water and on a barge in New Bedford. The investigation was led by S-E-A, a contractor, whose overall procedures and ongoing steps related to debris removal, examination, and testing (that is, an x-ray of the shore pedestal) was agreed upon by on-scene parties. The investigation attempted to determine several factors about the accident: the fire's origin, the available combustible materials and fuel, the status of electrical components and breakers, potential ignition sources, and ultimately the cause of the fire. S-E-A's examination report stated that "no manufacturing or design defects associated with the vessel" were found.[2] The report included an

[2] "Vessel Fire Examination Origin and Cause Analysis," Best Revenge 5, S-E-A Matter No. 07.079002, October 3, 2017.

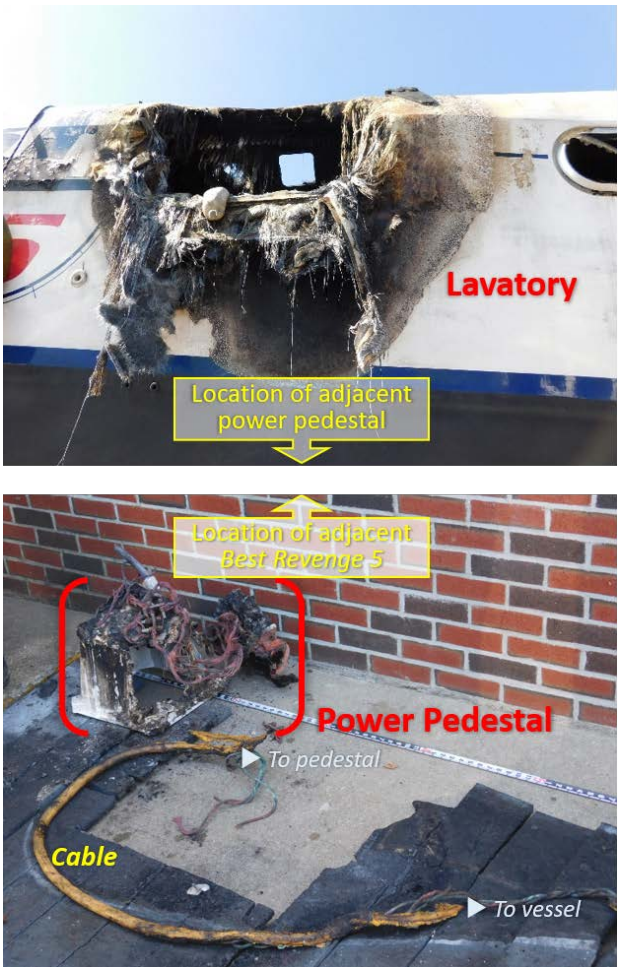
electrical evaluation with an x-ray image of the shore power pedestal remains, which showed arcing and shorting. The evaluation noted that, after the fire, marina personnel reported that the circuit breaker powering the dock pedestal from shore was in the "tripped" position (electrically disconnected as a protection measure) and that the two shore power circuit breakers on board the *Best Revenge 5* (fed by cables from the pedestal) were undamaged and tripped to the "off" position as well. They concluded that the vessel "may have been [electrically] powered at the time of the fire."

The S-E-A report concluded that the fire's origin, ignition sources, and available fuels were as follows:

> … the fire originated on the port side of the vessel; specifically, in the area between the port side lavatory, aft stateroom closet, and port side hull, in the area of the shore power pedestal. The only potential ignition sources identified within the area of origin were the shore power pedestal, electrical conductors/ components in the lavatory, aft-port stateroom closet, and area above the aft port lavatory/shower area. The only fuels identified were the fiberglass hull, insulation, and ordinary combustibles within the area of origin.

The report noted that both equipment and conductors that may have been affected by the lightning strike (which occurred a month earlier in Bermuda) were "located in the general origin area of the fire." The report concluded that—without more specific information regarding post-strike repairs—equipment or conductor failure "due to lightning damage cannot be eliminated as a possible cause of the fire." Similarly, the shore power pedestal "cannot be eliminated as a cause of the fire" due to several missing components that were unable to be examined. Ultimately, a specific cause of the fire could not be identified "due to multiple ignition scenarios that cannot be eliminated."


**Lavatory where fire likely originated next to portside companionway between guest staterooms while looking aft to stateroom.**




**At top, the hole resulting from the fire on the port side at the aft guest lavatory. At bottom, the shore power pedestal, cable, and portions of the dock planking where the pedestal caught fire, which was re-created for examination.**

If the shore power pedestal was the source of the fire, it would have had to first have an electrical fault resulting in ignition of the pedestal's wire insulation and plastic casing. The ensuing pedestal fire would have had to reach a sufficient intensity to ignite the vessel's paint, fiberglass, and resin on the portside hull through direct flame impingement or radiant heat. Burn marks on the dock around the power pedestal, however, did not indicate that the pedestal was fully engulfed in fire on all sides. Additionally, the damaged remnants of the power pedestal indicated an uneven burn with the areas farthest away from the boat less affected by the fire. Therefore, considering the size of the fire that would have been required to ignite the adjacent vessel, the burn pattern around the pedestal, and the asymmetric pedestal remains, along with witness statements, it is less likely that the fire damage to the dock and pedestal was the result of a fire originating within the pedestal but rather more likely from the radiant heat from a fire located on the vessel.

## Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the uninspected sailing vessel *Best Revenge 5* and on its pier was an electrical fault in an accommodation space on the vessel.

## Vessel Particulars

| Vessel | *Best Revenge 5* |
|---|---|
| **Owners** | BestRev LTD |
| **Managing Owner** | N/A |
| **Port of registry** | Road Harbor, BVI |
| **Flag** | Virgin Islands, British |
| **Type** | Sailing vessel (uninspected) |
| **Year built** | 2003 |
| **Official number (Foreign) / Primary VIN** | 736695 / 736695 |
| **IMO number** | NA |
| **Construction** | Fiberglass-reinforced plastic |
| **Length (overall)** | 58 ft (17.7 m) |
| **Draft (design)** | 6 ft (1.8 m) |
| **Beam (maximum)** | 30 ft (9.1 m) |
| **Gross tonnage (GRT / ITC)** | NA / NA |
| **Engine power; manufacturer** | 2 x 152 hp (113 kW) Yanmar diesel engines |
| **Persons on board** | 2 |

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

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA17FM021.

## Issued: June 28, 2018