

Fire On Board US Small Passenger Vessel *Island Lady*
Pithlachascotee River Near Port Richey, Florida
January 14, 2018



Accident Report

NTSB/MAR-18/02
PB2019-100203



**National
Transportation
Safety Board**

Marine Accident Report

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490 L'Enfant Plaza, SW
Washington, DC 20594

National Transportation Safety Board. 2018. *Fire On Board US Small Passenger Vessel Island Lady, Pithlachascotee River Near Port Richey, Florida, January 14, 2018. Report NTSB/MAR-18/02. Washington, DC.*

Abstract: This report discusses the fire that destroyed the small passenger vessel *Island Lady* on January 14, 2018, at the mouth of the Pithlachascotee River near Port Richey, Florida. The vessel, with 53 people on board, was on a scheduled transit to an offshore casino boat, the *Tropical Breeze I*, located about 9 miles offshore in the Gulf of Mexico.

Shortly before 1600, the *Island Lady* captain received a high-temperature alarm for the port engine's jacket-water system. He notified the vessel's operating company, Tropical Breeze Casino Cruz, and turned the *Island Lady* around to return to the dock. During the return trip, smoke began filling the lazarette, main deck spaces, and engine room. The captain deliberately beached the vessel close to shore in shallow water. All passengers, crewmembers, and company employees evacuated the vessel by entering the water and wading/crawling ashore. The Port Richey Police Department, Pasco County Sheriff's Office, Port Richey Fire Department, and US Coast Guard responded to the fire. The Florida Fish and Wildlife Conservation Commission, Tarpon Springs Police Department, Dunedin Police Department, and Pinellas County emergency services also provided aid. Fifteen people were injured and transported to local hospitals; one of them, a female passenger, died in the hospital hours after the fire. Drug and alcohol testing was conducted on the crewmembers; all results were negative. No pollution was reported. Damage was estimated to be less than \$500,000; therefore, a major marine casualty was not declared. The NTSB investigated the accident under Title 49 *United States Code* 1131 (a)(1)(f)(ii) as an accident of recurring character because of a similar fire on board another of the operating company's vessels, the *Express Shuttle II*, in 2004.

From its investigation of this accident, the NTSB identified safety issues in the following areas:

- Lack of company guidance regarding engine high-temperature alarms
- Lack of fire detection in unmanned spaces with exhaust tubing
- Insufficient preventive maintenance
- Insufficient crew training and documentation
- Inappropriate material and design of fuel tank level-indicator system

On the basis of its findings, the NTSB makes safety recommendations to Tropical Breeze Casino Cruz, LLC and the US Coast Guard.

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Acronyms and Abbreviations

<i>CFR</i>	<i>Code of Federal Regulations</i>
CO ₂	carbon dioxide
COI	certificate of inspection
GPS	global positioning system
MISLE	Marine Information for Safety and Law Enforcement (Coast Guard database)
MSIB	Marine Safety Information Bulletin
NVIC	Navigation and Vessel Inspection Circular
OCMI	Officer in Charge, Marine Inspection
SMS	safety management system
VHF	very high frequency

Executive Summary

About 1600 on the afternoon of January 14, 2018, a fire broke out in an unmanned space on the small passenger vessel *Island Lady* near Port Richey, Florida, during a scheduled transit to a casino boat located about 9 miles offshore in the Gulf of Mexico. Fifty-three people were on board the *Island Lady*.

After receiving a high-temperature alarm on the port engine, the captain turned the *Island Lady* around to return to the dock. During the return trip, smoke began filling the lazarette, main deck, and engine room. The captain deliberately beached the vessel in shallow water near shore to evacuate the passengers. All crewmembers, employees, and passengers evacuated the vessel by entering the water and wading/crawling ashore. Fifteen people were injured and transported to local hospitals; one passenger died in the hospital several hours after the fire. The *Island Lady*, valued at \$450,000, was declared a constructive total loss.

The National Transportation Safety Board (NTSB) determines that the probable cause of the fire on board small passenger vessel *Island Lady* was Tropical Breeze Casino Cruz's ineffective preventive maintenance program and insufficient guidance regarding the response to engine high-temperature conditions, which resulted in the captain's continued operation of an engine that was overheating due to a cooling water pump failure, leading to ignition of the exhaust tubing and surrounding structure. Contributing to the spread of the fire was the lack of fire detection in the vessel's lazarette, which was not required by regulations and which allowed the fire to take hold unbeknownst to the crew.

The NTSB identified the following safety issues:

Lack of company guidance regarding engine high-temperature alarms: After the captain received a high-temperature alarm for the port engine's jacket-water system, he did not shut down the engine but instead left it idling. Doing so allowed the overheating engine to continue to generate excessive heat, which in turn affected the exhaust tubes and ignited their surrounding structures. Tropical Breeze Casino Cruz did not provide specific guidance to its vessel captains about how to respond to high-temperature alarms.

Lack of fire detection in unmanned spaces with exhaust tubing: Although federal regulations require small passenger vessels to have fire detection and suppression systems in spaces containing propulsion machinery (such as engine rooms), the regulations do not require such systems in unmanned spaces with engine exhaust tubing. The fire on board the *Island Lady* most likely started in the lazarette—an unmanned space aft of the engine room—through which the exhaust tubes led toward the vessel's stern. Because there was no fire in the engine room initially, activating the vessel's fixed fire suppression system for that space would have served no purpose; further, activation would have caused the vessel to needlessly lose all available propulsion during the emergency.

Insufficient preventive maintenance: Although Tropical Breeze Casino Cruz stated that it implemented a preventive maintenance program after a previous fire on board a company vessel (the *Express Shuttle II*) in response to an NTSB safety recommendation, the quality of the program was insufficient. The US Coast Guard does not require small passenger vessels to have preventive maintenance programs and, importantly, even when such programs are voluntarily in place (such as in this case), the Coast Guard provides no enforcement oversight.

Insufficient crew training and documentation: The investigation revealed that the *Island Lady* crewmembers lacked sufficient understanding of firefighting principles and that their training drills were infrequent or not completed. In addition, records pertaining to crew training drills and daily maintenance checklists were kept only on board the vessel and were lost in the fire; no duplicate records were kept ashore.

Inappropriate material and design of fuel tank level-indicator system: Counter to Title 46 *Code of Federal Regulations* 182.440 (a)(7), the *Island Lady*'s fuel tanks were equipped with plastic hoses used as fuel level indicators; further, the system did not have automatic shutoff valves. As a result, during the fire, the plastic material melted and the release of diesel fuel exacerbated the fire.

Based on this investigation, the NTSB makes new safety recommendations to Tropical Breeze Casino Cruz and the US Coast Guard and also reiterates existing recommendations to the Coast Guard.

1. Factual Information

1.1 Background

The 72-foot-long small passenger vessel *Island Lady* (figure 1) was owned by A.B.K. Enterprises and operated by Tropical Breeze Casino Cruz, LLC.¹ The vessel operated out of a shoreside facility in Port Richey, located on the Pithlachascotee River in Pasco County, Florida (figure 2). The *Island Lady* shuttled passengers and company employees to and from the company's casino boat, the *Tropical Breeze I* (see figure 19), which, when in passenger service conducting gambling operations, was positioned 9 nautical miles offshore in the Gulf of Mexico.



Figure 1. The *Island Lady* before the accident. (Undated photo provided by previous owner)

¹ At the time of the accident, the *Island Lady* was operated by Tropical Breeze Casino Cruz, LLC. The operating company had previously been in business under other names: Port Richey Casino, SunCruz, and Paradise of Port Richey.

At the time of the accident, the state of Florida did not permit land-based casino gambling other than on Native American reservations, but did permit day cruises offering customers the opportunity to gamble offshore.² On Florida’s west coast, casino vessels would operate at least 9 nautical miles out into the Gulf of Mexico, beyond the Natural Resource Boundary. On Florida’s east coast, casino vessels were permitted to operate in the Atlantic Ocean beyond the Three-Nautical-Mile Line (the outer limit of Florida’s jurisdiction).³

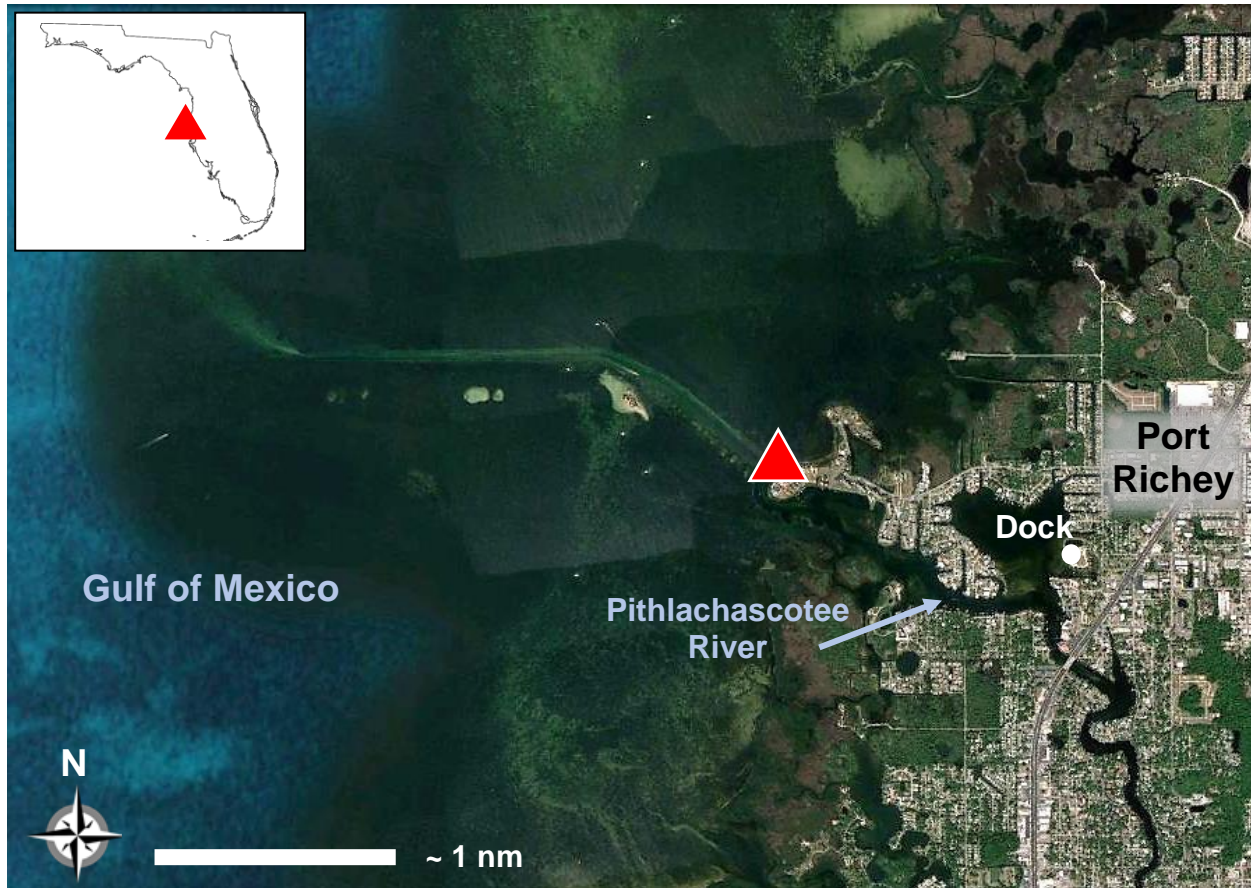


Figure 2. Satellite image of the accident area. A red triangle marks the approximate location where the captain beached the *Island Lady* and fire consumed the vessel. (Background by Google Earth; inset by World Atlas)

The *Island Lady*, which was advertised as a “hi-speed water taxi,” typically made three daily roundtrips to the *Tropical Breeze I*; the transit between shore and the casino boat took about 45 minutes. The *Tropical Breeze I* departed the dock in the morning, depending on the tide; spent the day beyond the Nine-Nautical-Mile line; and, once all passengers had disembarked for the evening, returned to the dock sometime after midnight, depending on the tide. (For more detail about the trip schedules, see section “1.14 Company Information; Day-to-Day Operations.”)

² According to the online American Casino Guide, in 2018, two Florida casino boat operators provided offshore gambling in three locations: Tropical Breeze Casino Cruz in Port Richey, and Victory Casino Cruises in Cape Canaveral and Jacksonville.

³ In accordance with the Submerged Lands Act of 1953, the state waters of most coastal states extend 3 nautical miles from the coastline, as do those on Florida’s east coast. For historical reasons, however, the state waters on Florida’s west coast extend 9 nautical miles (10.376 statute miles, or about 3 “leagues”) into the Gulf of Mexico.

1.2 Accident Narrative

On January 14, 2018, the day of the accident, the 1100 morning shuttle had been canceled due to a low passenger count. Before the subsequent 1530 departure, the captain arrived at the marina where the *Island Lady* was docked (referred to as “the sticks”). This was the location where the *Island Lady* was berthed each evening and received fuel twice a week. The captain told investigators that he estimated that about 750 gallons of fuel were on board the *Island Lady* on the day of the accident. He said the starboard engine started normally but that the port engine did not because of a loose wire connection on the starting batteries. He tightened the electrical connection on the battery post, and then the port engine started. After checking all engine monitoring gauges and the engine cooling water inlet sea strainers and confirming that everything seemed normal, he motored the vessel from the sticks to the passenger boarding dock about 500 feet away. Shortly thereafter, passengers and company employees were allowed to board.

About 1530, the *Island Lady* departed the dock with 36 passengers. The crew consisted of the captain and three deckhands (one senior deckhand, one deckhand [deckhand 1], and one “new-hire” in-training deckhand). In addition, two “pre-hire” employees (a deckhand and a member of the waitstaff department) were on board the *Island Lady* to become familiarized with operations. Eleven other employees, all employed by Tropical Breeze Casino Cruz, were being transported to work on board the casino boat. The senior deckhand was scheduled to transfer to and work on board the *Tropical Breeze I* on arrival; the new-hire deckhand was assigned to tend bar on board the *Island Lady*; and deckhand 1 was scheduled to work on board the *Island Lady* through the rest of the evening. Deckhand 1 told investigators that he made the safety announcement on the day of the accident, while the vessel was outbound.⁴

The *Island Lady* transited through the harbor at slow speed, as that section of the waterway was designated as a no-wake zone (figure 3). A nearby resident’s video surveillance camera, mounted on the second story of the home and aimed toward the northwest, recorded footage of the vessel seen through an opening between two waterfront houses (refer to upcoming figure 5) as the *Island Lady* was in the final section of the waterway’s “S-turn.” At this time, about 1545, the vessel appeared to be operating normally with no visible indications of smoke or fire; shortly thereafter, the *Island Lady* transited away from the camera’s view for about 6 minutes.

After passing through the S-turn, the captain increased the *Island Lady*’s speed and brought the vessel “up on plane.” About 15 seconds after the speed increase, a high-temperature alarm activated for the port engine’s jacket-water system. The captain said he looked at the closed-circuit television screen for the engine room and thought he saw a bit of steam in the camera view. The *Island Lady* was equipped with a fire detection system in the engine room, with a 190°F heat sensor mounted above each of the two propulsion engines. The control panel for the fire detection system was located in the wheelhouse, to the right of the wheel, and was designed to sound a beeping signal and illuminate an indicator light when activated. However, the captain told investigators that he did not hear an alarm from the fire detection system leading up to or during the fire.

⁴ Federal regulations at Title 46 *Code of Federal Regulations (CFR)* 185.506 require that, before getting under way on a voyage or as soon as practicable thereafter, the captain will ensure that “suitable public announcements are made informing all passengers” where emergency exits and lifejackets are located and how lifejackets should be donned.



Figure 3. Close-up of the accident waterway, with an overlaid yellow trackline of the vessel's approximate route and labels marking key points in the transit. (Background by Google Earth)

About 1551, the *Island Lady* reappeared in the footage recorded by the shoreside video surveillance camera. Light gray steam/smoke was now emanating from the vessel's stern area. The captain took the port engine out of gear, shifted it to neutral, and reduced the speed to idle. He left the starboard engine in forward gear and reduced its speed to idle. The video surveillance camera captured the speed reduction. The captain radioed the captain on board the *Tropical Breeze I* and also telephoned a company representative (a person the company referred to as the "port captain"), informing them both that an engine was overheating and that he was returning the vessel to the dock. The port captain, who held a merchant mariner credential as master, told him to put the engine in reverse to clear any debris in case the vessel's seawater inlet was obstructed.⁵

The *Island Lady* had two decks for passengers: The top deck, which had outdoor passenger seating and also included the wheelhouse; and the enclosed main deck with indoor passenger seating, a bar area, and restrooms (figure 4). The captain told the crewmembers to get all the passengers to the top deck. He then directed the senior deckhand and deckhand 1 to go below and check the engine room. Deckhand 1 descended to the enclosed main deck where the two access hatches to the engine room were located (recessed in the deck). The forward hatch was located in the center of the main deck, and the aft hatch was located just forward of the bar.

⁵ The port captain was credentialed as master of self-propelled vessels, not including auxiliary sail, of less than 100-gross-register tons upon near coastal waters and had previously operated the *Island Lady*.

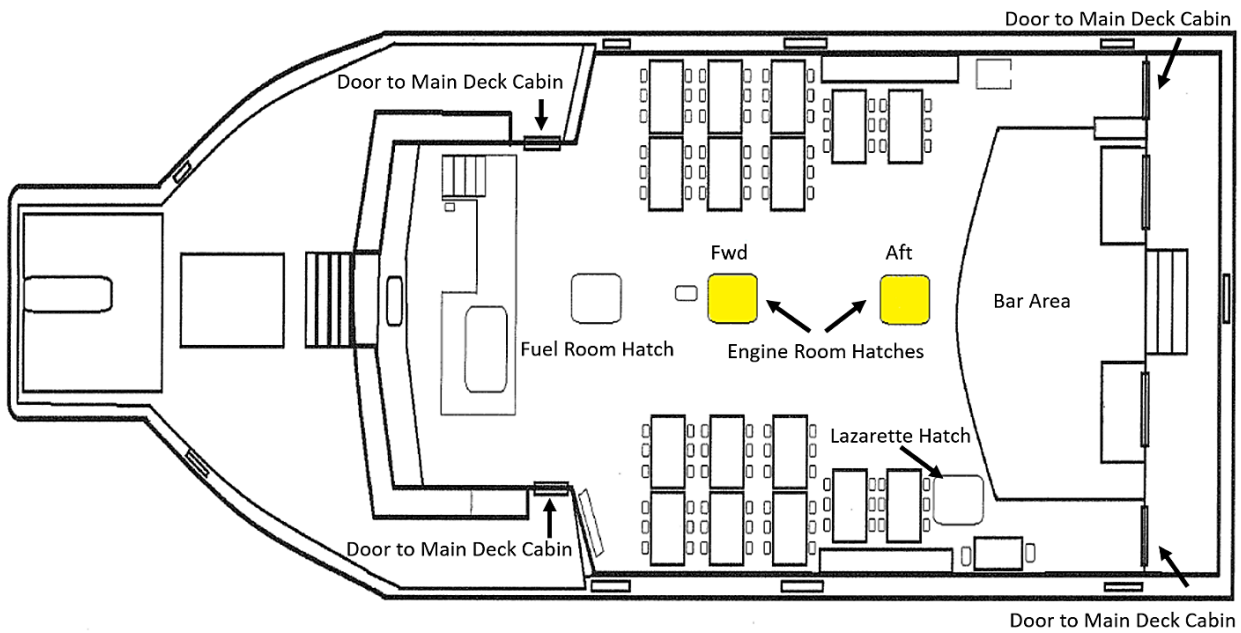
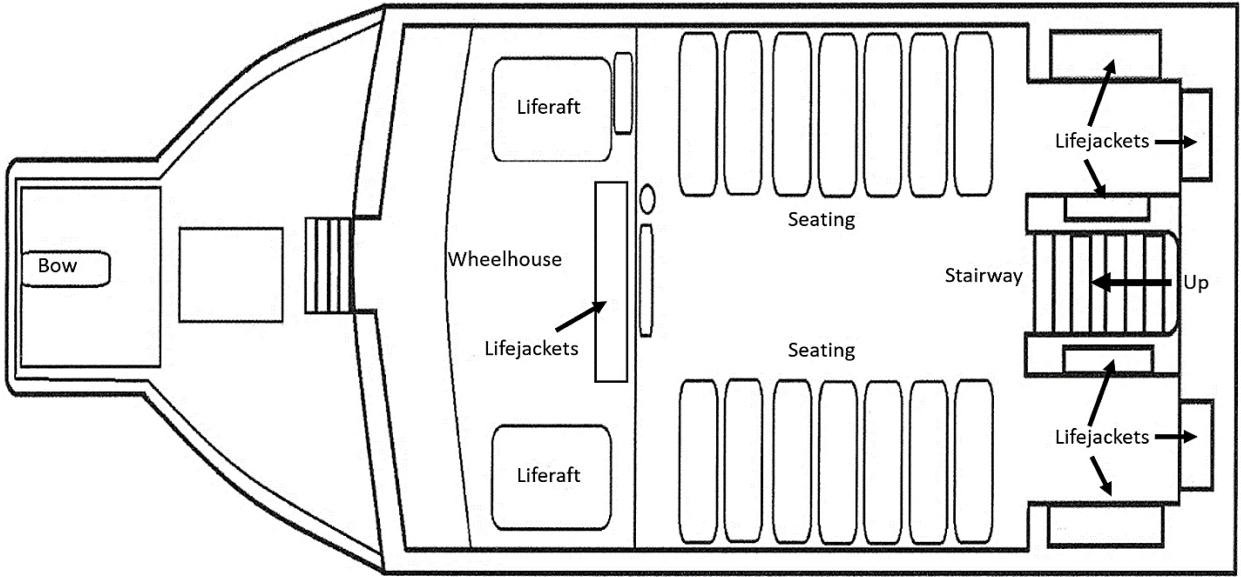


Figure 4. Top: The *Island Lady's* top deck. Bottom: The *Island Lady's* main deck. (Not to scale; images from Tropical Breeze Casino Cruz's *Employee Emergency and Safety Manual*.)

Deckhand 1 told investigators that when he opened the forward hatch, steam or “transparent smoke” emanated from the engine room. He shut the hatch and instructed nearby passengers to take the stairways to the top deck. He then returned to the wheelhouse and told the captain that he believed the engine was overheating.

About 1552, the shoreside video surveillance camera recorded the vessel stopping its forward motion and slowly beginning to turn toward shore. Several people were seen assembling on the top deck.

The captain assigned an employee (a casino worker) to steer the vessel while he left the wheelhouse and went below to assess the situation. He approached the forward hatch to the engine room and felt it for heat with his hand before opening it slightly. He noticed steam coming out of the hatch. He instructed the new-hire deckhand to open the aft hatch to the engine room; a smaller amount of steam or white smoke rose from this hatch. The captain instructed the new-hire deckhand to open the doors leading into the enclosed main deck to air out the steam and smoke. The new-hire deckhand opened two doors.

The captain then climbed down the aft hatch into the engine room. He did not see any smoke or fire but saw about a 3-foot by 3-foot wet area on the port bulkhead outboard of the port engine. In a postaccident interview, the captain said that he “figured a line just blew off or something.” He left the engine room via the forward hatch and returned to the wheelhouse. He believed, based on the color and smell, that steam was filling the engine room; he said there was no smell of smoke. He told investigators that he instructed the deckhands to close the engine room hatches but said he was not sure if this order was carried out.

About 1553, the *Island Lady* was returning toward the harbor at a speed of about 8 knots. The captain was using the starboard engine for propulsion; the port engine remained in neutral, running at idle speed. The smoke was increasing, turning thicker and also brown/gray in color. After the vessel turned back toward the harbor and transited toward the east, the north winds blew the thickening smoke across the vessel’s beam, and the smoke billowed off the starboard side. As a result, the crewmembers were unable to pinpoint the precise location from where the smoke emanated. The shoreside video surveillance camera recorded the billowing smoke as well as flames emanating from the port exhaust opening on the stern (figure 5). At this point, no other flames were visible.



Figure 5. Still image from home surveillance video footage, with the stern of the *Island Lady* visible between two houses. Fire emanating from the port side of the stern is circled in yellow. (Video footage provided by witness)

The captain directed the senior deckhand to retrieve a fire extinguisher and look around the engine room. He also told deckhand 1 and the new-hire deckhand to follow the senior deckhand down below and assist with backup fire extinguishers. The senior deckhand retrieved a fire extinguisher and entered the engine room via the forward hatch on the main deck. As soon as he opened the hatch, he saw steam or light smoke coming out. He said that when he walked aft through the engine room toward the lazarette, he encountered smoke, which kept getting thicker.⁶ He tied a bandana around his face and prepared to use the fire extinguisher but was overcome by the smoke, which he said was becoming black. He yelled up to the other crewmembers to get the passengers off the boat, handed up the unused fire extinguisher, and exited the engine room via the aft hatch. He told investigators that he was not sure if the hatches were closed behind him.

After leaving the engine room, the senior deckhand walked to the stern and saw flames near the lifejacket storage area and “a big cloud of smoke” emanating from either the “side vents or the exhaust” on the stern. He ran up to the wheelhouse and informed the captain that conditions had worsened and that he needed to shut down the engine. As soon as the captain heard this update, he turned the wheel hard to port toward shore and gave as much power as possible from both engines. He managed to beach the *Island Lady* in shallow water about 150 feet from shore (see figure 6). The captain said he was lucky to get the vessel turned around and beached before the smoke “overwhelmed the engines and caused them both to shut down.”

Once the *Island Lady* was beached, the captain returned to the enclosed main deck, which was completely filled with black smoke. He closed the portside door that had been opened when smoke was filling the space.

1.3 Evacuation

Once the vessel was beached, the deckhands began assisting the passengers in moving toward the bow and preparing to jump into the water. According to witness videos, the smoke increased after the *Island Lady* was beached, but no flames were yet visible on deck. Many people were seen assembled on the top deck and at the bow of the main deck. None of the crewmembers recalled hearing announcements on the public-address system; they believed that orders were communicated by yelling instructions.

About 35 seconds after the captain beached the vessel, the first person jumped off the bow into the water. It is likely that this person was deckhand 1. He said in a postaccident interview that, because he saw that many people were frantic, he jumped off the bow to show them that the water was shallow and that the bottom was soft (several employees and passengers confirmed to investigators that the water depth by the bow was about waist-high; a bit deeper on the sides). Deckhand 1 then began helping people off the vessel. The passengers ranged in age from 18 to 76; half of them were age 60 or older. About 2.5 minutes after the vessel was beached, a deckhand removed the passenger-loading door on the port side of the bow to make it easier for people to exit. About 3 minutes and 20 seconds after the beaching, flames appeared in the aft part of the main deck. Within only about 30 seconds after that, the fire spread and engulfed the entire main deck. At 1604, dispatchers with Pasco County emergency services received the first 911 call about the accident—a resident reported a vessel on fire and people in the water.

⁶ A vessel’s lazarette is its aftermost compartment below the main deck, typically accessed by a deck hatch.



Figure 6. Passengers and crew evacuating the *Island Lady*. (Photo provided by Christine Robson)

After exiting the burning vessel, passengers and crew waded and/or crawled ashore. Many recalled that the bottom was muddy (“quicksand-like”), which made walking difficult. Nearby residents who witnessed the fire assisted in getting the passengers out of the water. Once ashore, the group assembled in residential garages, where homeowners and neighbors supplied blankets, towels, and dry clothes.

The senior deckhand and the captain conducted a sweep of the *Island Lady* to ensure that they were the last people to exit the burning vessel. In postaccident interviews, crewmembers said that the entire event took place too quickly for lifejackets to be distributed.

1.4 Shoreside Emergency Response

After the initial 911 call at 1604, Pasco County emergency services dispatchers received two additional calls in quick succession, with both callers stating that they believed all people on board the vessel had been evacuated. A total of nine calls were made to emergency services about the emergency.

Two patrol officers and a detective from the Port Richey Police Department were the first responders to arrive on scene about 1615. Pasco County Fire Department units began arriving about 1619. Additional fire, medical, and police units from Pasco County—including marine and air

units—were dispatched to the scene. Fireboats pumped water onto remaining hot spots on the *Island Lady*. The Florida Fish and Wildlife Conservation Commission, the Coast Guard, the Tarpon Springs Police Department, the Dunedin Police Department, and Pinellas County emergency services also responded.

1.5 Injuries

Fifteen passengers and company employees received medical treatment for injuries such as fractured bones; sprains; back, neck, hip, and shoulder pain; respiratory injuries; and smoke inhalation. According to initial dispatch logs, 11 of the injuries required basic life support and 4 required advanced life support; no life-threatening injuries were reported at first. However, after coming ashore, a female passenger said that her tongue was swelling. She took a 50-mg tablet of diphenhydramine, an antihistamine commonly marketed as Benadryl. The decision was made to transport her to a local hospital. In the ambulance, medical personnel gave her another 50 mg of the antihistamine and also provided intravenous fluids and oxygen. The affected passenger arrived at the hospital at 1705. She told the hospital staff that she had previously experienced a similar reaction to an unrelated stressful situation. Despite the hospital staff’s efforts, her condition worsened. At 2242, nearly 7 hours after the accident, the passenger was pronounced dead. The cause of death was reported as angioedema, which is swelling of deeper skin layers, such as the dermis and subcutaneous tissue.

Type of Injury	Crew	Passengers / Employees	Total
Fatal	0	1	1
Serious	0	4	4
Minor	0	10	10
None	5	33	38
Total	5	48	53

NOTE: Title 49 *CFR* 830.2 defines a fatal injury as any injury that results in death within 30 days of an accident. It defines serious injury as that which requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; results in a fracture of any bone (except simple fractures of fingers, toes, or nose); causes severe hemorrhages, nerve, muscle, or tendon damage; involves any internal organ; or involves second- or third- degree burns, or any burn affecting more than 5 percent of the body surface.

Table 1. Injuries sustained in the *Island Lady* fire.

1.6 Toxicological Testing

After the accident, the crewmembers submitted to drug and alcohol testing.⁷ All results were negative.

⁷ The Coast Guard requires toxicological testing after a serious marine incident, defined at Title 46 *CFR* 4.03-2 as (a) a marine casualty or accident that results in any of the following: (1) one or more deaths, (2) injury that requires medical treatment beyond first aid and renders the individual unfit to perform routine duties, (3) property damage exceeding \$100,000, (4) actual or constructive total loss of an inspected vessel, or (5) actual or constructive total loss of any uninspected vessel that exceeds 100 gross tons; (b) discharge of 10,000 or more gallons of oil into US waters; or (c) release of a reportable substance into the environment of the United States. Because the *Island Lady* fire resulted in one death, the total loss of the vessel, and property damage exceeding \$100,000, the accident qualified as a serious marine incident.

1.7 Damage

The *Island Lady*, insured for \$450,000, was declared a constructive total loss, as everything above the waterline was destroyed (figures 7 and 8). The only remains were the two fire-damaged engines, two damaged generators, remnants of various piping systems and valves, railings around the vessel, deck chairs, and three cylindrical fuel tanks.



Figure 7. Remnants of the *Island Lady* seen from above. (Photo by Titan Marine & Environmental)

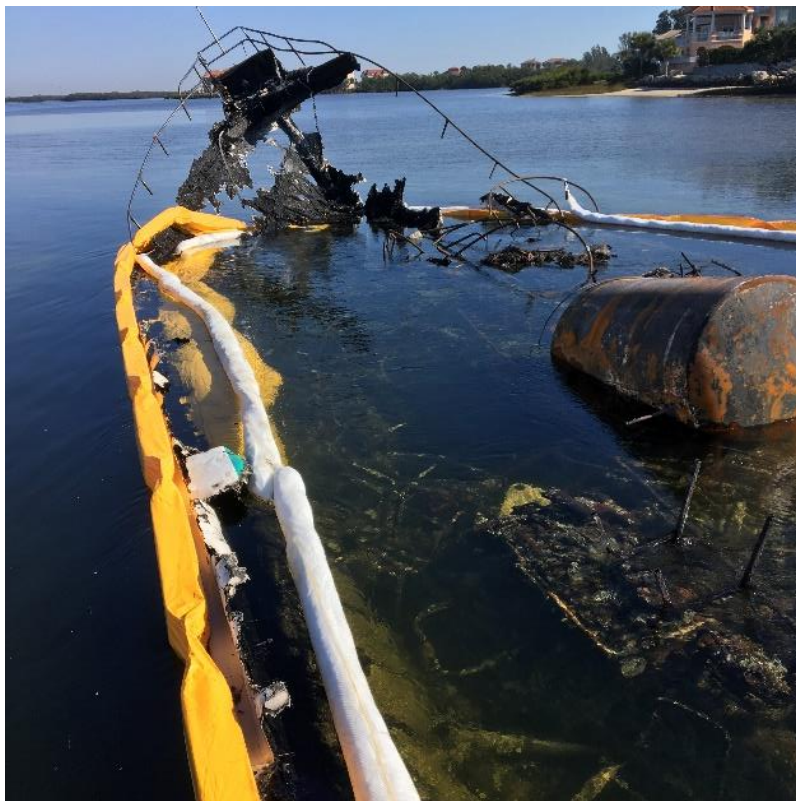


Figure 8. Looking toward the *Island Lady*'s destroyed bow.

In February 2018, a salvage team recovered the remnants of the *Island Lady*. The components were transported to a secure facility, where investigators examined them in May 2018 (figure 9). After examining the salvaged engines, investigators determined that almost all of the aluminum, bronze, copper, and brass engine components—which included the heat exchanger body, aftercooler housings, front gear covers, flywheel hosing, raw-water pump housings, base and valve covers, oil pans, and other smaller housings—were missing due to the extreme heat generated during the fire.



Figure 9. Port and starboard engines at storage facility after removal from the *Island Lady*.

A service technician and a service manager from Ring Power—an authorized service company for Caterpillar—disassembled the port engine. A crack was discovered between the 4th and 5th cylinder on the port engine’s inboard side (figure 10). The crack was visible starting at the

no. 5 cylinder's liner through the cooling water passage and about 8 inches down the side of the block.⁸

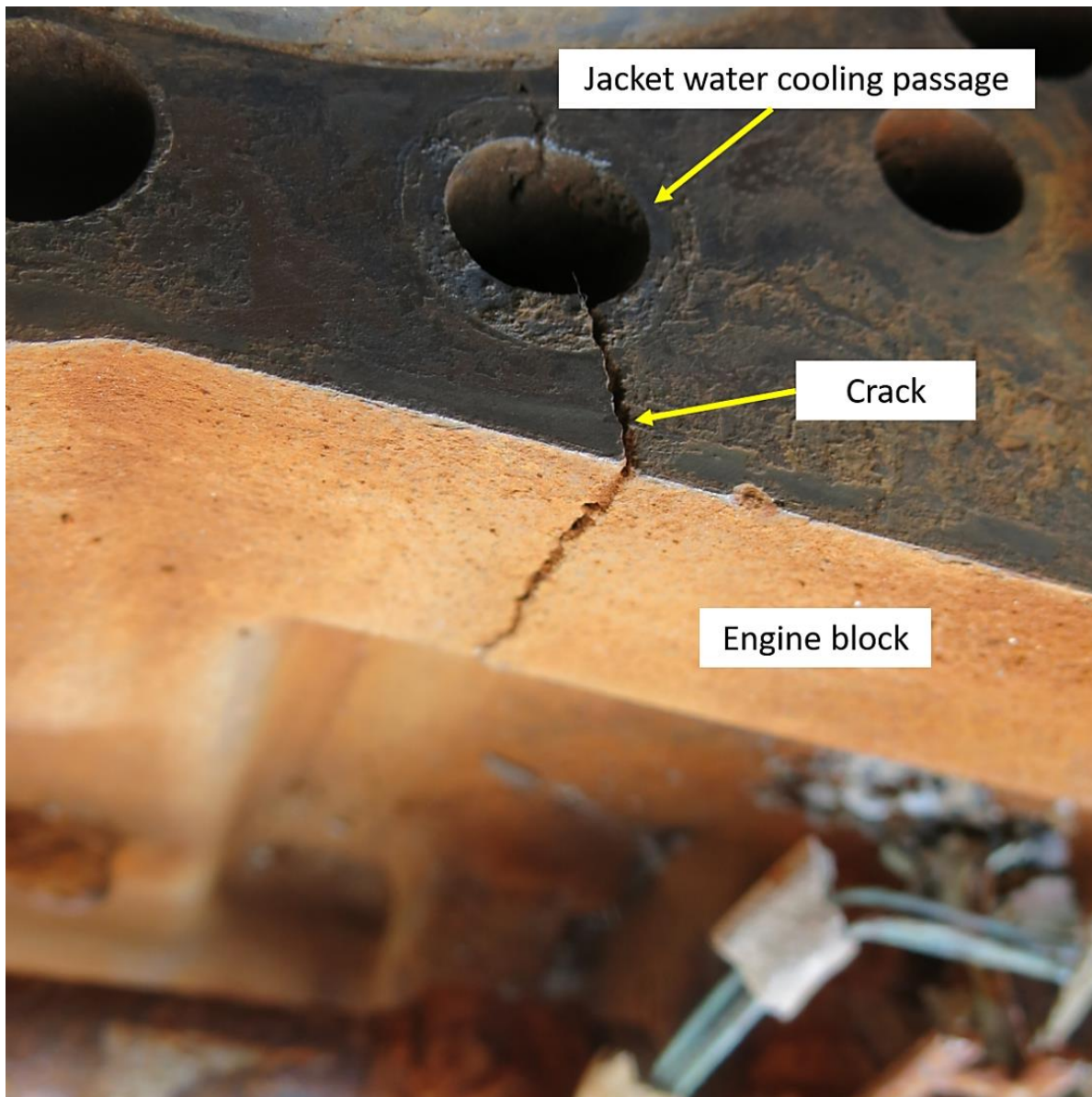


Figure 10. Close-up of postaccident crack in the block between cylinders 4 and 5 on the *Island Lady's* port main engine.

1.8 Meteorological Information

Weather data on the day of the accident, recorded at Tampa International Airport (26 miles southeast of Port Richey), showed partly cloudy skies, 10-mile visibility, north-northeast winds at 11.5 mph, and an air temperature of about 61°F. The sea temperature was about 56°F, according to data recorded by a responding Coast Guard vessel during the fire.

⁸ An engine block is a casing that contains the internal engine components such as pistons, cylinders, intake, exhaust, and cooling passages, as well as the crankcase.

1.9 Personnel Information

Small passenger vessels carrying more than six passengers for hire may not operate without a valid certificate of inspection (COI), which is issued by the Coast Guard Officer in Charge, Marine Inspection (OCMI) for a given marine inspection zone—in this case, Sector St. Petersburg, Florida. The COI stipulates a number of operating requirements, including minimum crew size and qualifications.

When determining the number and competencies of crewmembers, the OCMI considers, among other things, the size of the vessel, its route, the type and horsepower of the vessel's propulsion machinery, the number of passengers the vessel will carry, the type and location of lifesaving equipment installed on the vessel, and the hazards associated with the route and service. According to its COI, the *Island Lady* was required to carry a crew of three, consisting of one captain and two deckhands.

Captain

The captain, age 37, had worked on various boats since he was 15 years old, starting on mullet boats and then shrimp boats for about 15 years. He then obtained his merchant mariner credential (as master of self-propelled vessels, not including auxiliary sail, of less than 100-gross-register tons upon near coastal waters) and started running boats professionally. He told investigators that he had been employed by Tropical Breeze Casino Cruz for almost 2 years, during which time he served as captain on both the *Island Lady* and the *Tropical Breeze I* (he said he worked 4 days on the *Island Lady* and 3 days on the *Tropical Breeze I* each work week). The captain said he had completed basic firefighting training before obtaining his mariner credential at sea school. According to timesheets provided by the company, in the days before the accident, the captain worked 8 hours on January 10, 8.5 hours on January 11, and 8 hours on January 13 (the day before the accident). He had no reported work hours on January 12 because no shuttle trips were scheduled that day. On the morning of the fire, the captain reported to work at 1000.

Senior Deckhand

The senior deckhand (also referred to as the senior mate), age 30, had worked for Tropical Breeze Casino Cruz previously and, about a year before the accident, reestablished employment. He did not hold and was not required by federal regulations to hold any Coast Guard credentials. He had no formal maritime training; his most recent job was as a sign-holder in front of stores, after working in a warehouse for about 4 years. He told investigators that his job duties on board the vessels included cleaning, maintenance, handling lines, stocking supplies, and working as security. As senior deckhand, he was given on-the-job training at drills for emergency situations. According to timesheets provided by the company, the senior deckhand had not worked on board the *Island Lady* since January 6, about a week before the accident.

Deckhand 1

Deckhand 1, age 24, had been rehired by Tropical Breeze Casino Cruz about a week before the accident; he last worked for the company about a year earlier. Before his employment with Tropical Breeze Casino Cruz, he had worked at a grocery store, an internet security company, and a recording studio. He did not hold nor was he required by federal regulations to hold any Coast Guard credentials. He stated that he had received no formal maritime training before joining the company and that he trained as a deckhand on the job. Deckhand 1 told investigators that he was unaware of the location of the fuel shutoffs and had no knowledge of or familiarity with the

onboard fixed fire suppression system. According to timesheets provided by the company, on the day of the accident, deckhand 1 reported to work at 1400. On January 8, he had worked 2 hours; on January 10, he had worked 7.5 hours.

Deckhand (New-Hire)

The new-hire deckhand, age 29, had worked for Tropical Breeze Casino Cruz for about 5 and a half months. He did not hold nor was he required by federal regulations to hold any Coast Guard credentials. He had no formal maritime training; his most recent job was with a cleaning company. On the day of the accident, the new-hire deckhand was tending bar when the *Island Lady* left the dock. According to timesheets provided by the company, he reported for work at 1400. On January 10 he had worked 7.5 hours; on January 11 he had worked 5.5 hours; and on the day before the accident, he had worked 7.5 hours.

Deckhand (Pre-Hire)

The pre-hire deckhand, age 35, had joined the *Island Lady* only a few minutes before departure for his first trip on the vessel. About 10 years earlier, he had worked on board the casino boat *Royal Casino I* for about 8 months, starting as deckhand, then senior deckhand, and then working his way up to overnight engineer. He did not hold nor was he required by federal regulations to hold any Coast Guard credentials. He had no formal maritime training; his most recent job was in construction.

1.10 Personnel Training

Regulatory Training Requirements

To be certified as the captain of a small passenger vessel, an individual must serve for at least 1 year on the type of vessel for which he or she is seeking a mariner credential and must pass an examination. To pass this test, an individual must demonstrate knowledge in a number of subjects, including, but not limited to, piloting, shiphandling, watchkeeping, first aid, fire prevention and firefighting, and emergency procedures. After passing the test, a captain is not required to undergo periodic training or to be tested on subject-matter knowledge, except as a participant in drills conducted by the Coast Guard as part of its annual inspections.

Federal regulations do not require deckhands on small passenger vessels to hold merchant mariner credentials or to possess formal qualifications for their positions. Regarding emergency duties such as firefighting, abandoning ship, and rescuing people in the water, Title 46 *CFR* 185.420 stipulates the following, in part:

The owner, charterer, captain or managing operator shall instruct each crewmember, upon first being employed and prior to getting underway for the first time on a particular vessel and at least once every three months, as to the duties the crewmember is expected to perform in an emergency . . .

In addition, vessel captains are required to conduct emergency drills, as stipulated by Title 46 *CFR* 185.520:

The master shall conduct sufficient drills and give sufficient instructions to make sure that all crewmembers are familiar with their duties during emergencies that necessitate abandoning ship or the recovery of persons who have fallen overboard.

Title 46 *CFR* 185.524 requires captains of small passenger vessels to conduct sufficient fire drills to make sure that each crewmember is familiar with his or her duties in case of a fire. In addition, Title 46 *CFR* 185.520(f) and 185.524(d) require that vessel operators also log or otherwise document abandon-ship, man-overboard, and fire drills for Coast Guard review on request. The records must include the date of the drill and a general description of the drill scenario and the training topics it addressed. The *Island Lady* captain said the emergency drills were documented in a logbook that stayed on board the vessel and that the fire destroyed the logbook.

Company-Based Training

The *Island Lady* deckhands told investigators that all their maritime training had been obtained on the job, including initial orientation where they learned about their duties and responsibilities. The company gave them a 19-page handbook titled *Shuttle Procedures* that listed procedures for transferring passengers at sea. The deckhands also received a 37-page handbook titled *Employee Emergency and Safety Manual* with instructions about fire (explaining various types of fire), heavy weather operations, man-overboard and abandon-ship emergencies, bomb threats, collisions, and hijackings. The employee manual also explained drug-testing procedures. In the event of a fire or smoke condition, the manual directed the captain to sound the vessel's alarm, activate the automatic distress device, and set the vessel on a course to limit the effect of the wind on the fire. Afterwards, the captain was to announce the location of the smoke/fire and direct the crew to report there, and to direct other personnel to assist the passengers to the designated muster area. The manual contained a set of instructions for engineers, but an engineer was not on board the vessel at the time of the fire, nor was one required. The manual did not instruct or guide the crew regarding responses to engine alarms or failures.

The captain told investigators that the most recent crew drill took place in mid-December 2017, about a month before the fire, in which the senior deckhand participated. He said this drill consisted of a man-overboard exercise, a simulated fire in the engine room, and an abandon-ship exercise. He and the senior deckhand ran the fire pump for 5 minutes and charged the two firehoses. They also handled the portable fire extinguishers but did not activate them. There were no records of any other drills in 2017. The company provided an *Island Lady* logbook dated November 13, 2015 through December 18, 2016. In the 13 months of available records, the company logged three fire drills (April 10, 2016, September 7, 2016, and November 5, 2016) and two man-overboard drills (June 21, 2016, and November 5, 2016).

1.11 Vessel Information

Construction and Equipment

The double-deck, single-hull *Island Lady* was built in 1994 by Lydia Yachts of Stuart Inc. in Stuart, Florida.⁹ The vessel's hull was cold-molded construction, consisting of wood frames sheathed with epoxy-laminated plywood and covered with fiberglass. The vessel was originally outfitted with three engines and three propellers. About a year later, the original owner removed

⁹ The *Island Lady* was designated as a Subchapter T small passenger vessel under Title 46 *CFR* Part 175. This subchapter applies to vessels of less than 100 gross tons that carry 150 or fewer passengers, or has overnight accommodations for 49 or fewer passengers, and that (1) carry more than 6 passengers, including at least 1 for hire; (2) are chartered with a crew provided or specified by the owner or the owner's representative and carry more than 6 passengers; (3) are chartered with no crew provided or specified by the owner or the owner's representative and carry more than 12 passengers; or (4) if a submersible vessel carries at least 1 passenger for hire; or (5) is a ferry carrying more than 6 passengers.

the center engine (a Volvo Penta TAMD61A) and its propeller shaft and replaced the remaining two engines (Detroit 8V92TI diesels) with Caterpillar 3406E engines. For more than 20 years, the vessel operated as a whale-watching vessel in Boothbay Harbor, Maine. A.B.K. Enterprises purchased the *Island Lady* in November 2015 after having leased the vessel during one or two winter seasons (when the vessel was not used in Maine).

Vessel particulars were as follows:

Length:	72 feet
Beam:	21 feet
Draft:	4.5 feet
Gross tonnage:	65
Crew:	3 minimum (1 captain, 2 deckhands)
Passenger capacity:	149
Propulsion:	Twin 800-horsepower Caterpillar model 3406E turbocharged diesel engines, two propellers, two rudders

The enclosed wheelhouse was located on the forward top deck (refer to figure 4) with the open deck for passengers located behind it. The lower-level main deck contained the foredeck, an enclosed space for passengers, a bar area, and the aft deck. Four hinged doors provided egress from the enclosed passenger area, in accordance with regulations.¹⁰ Exits on the main deck led to the stern and bow. A stairway on the stern led to the upper deck and a vertical ladder on the bow connected the wheelhouse and the bow.

Watertight bulkheads subdivided the below-deck area into compartments that contained the fuel tanks, engines, generators, water and waste tanks, fire suppression apparatus, and other equipment. The engine room had two small access hatches from the main deck, one between the generators and one over the engines. Each of the other below-deck compartments also had an access hatch (figure 11).

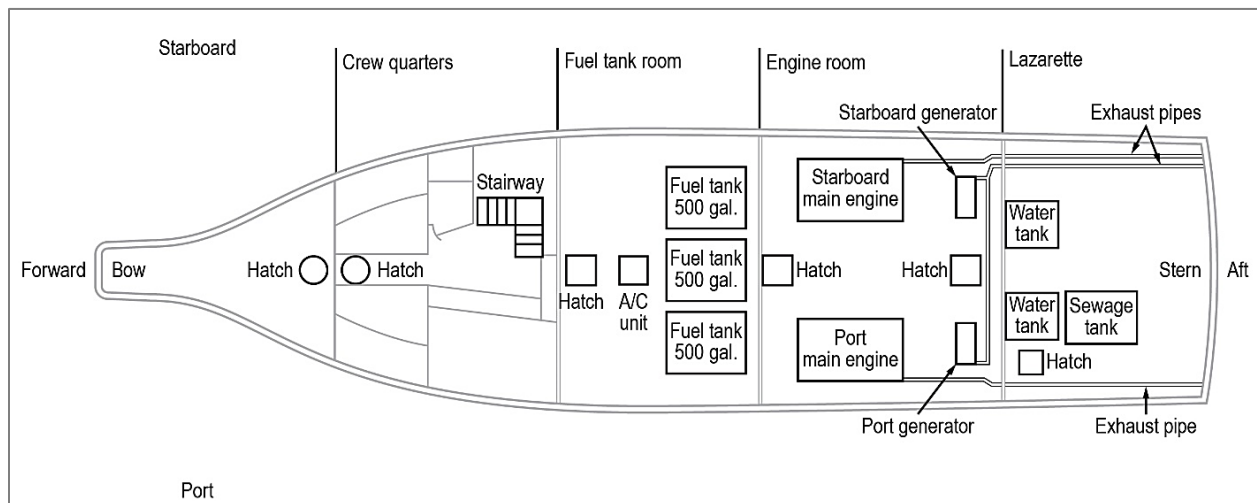


Figure 11. Layout of the *Island Lady's* lower level.

¹⁰ According to Title 46 *CFR* 177.500(a), “each space accessible to passengers or used by the crew on a regular basis must have at least two means of escape, one of which must not be a watertight door.” In certain circumstances, one means of escape suffices, such as from deck areas smaller than 322 square feet (Title 46 *CFR* 177.500[o]).

The captain told investigators that the *Island Lady*'s navigation equipment included an autopilot, a radar with 24-mile range, global positioning system (GPS) instruments, a depth-meter, a fish-finder, and a compass. The vessel was also equipped with two very-high-frequency (VHF) radios, a cellular telephone, and a public-address system.

Certification

The *Island Lady* was certificated and inspected as a small passenger vessel per regulations at Title 46 *CFR* Part 175–185. The vessel's COI, valid for 5 years, was issued on March 21, 2017, after the vessel had been inspected for certification. After the vessel's last drydock examination on April 3, 2017, its COI was amended to reflect the date of the examination.¹¹ Sector St. Petersburg was the local Coast Guard office in charge of inspecting the *Island Lady*.

The COI permitted the *Island Lady* to operate on lakes, bays, and sounds, plus limited coastwise routes and in partially protected waters off the west Florida coast between the Fenholloway River (Stake Point) to the north and Everglades City (Lopez River) to the south, not more than 20 miles from a harbor of safe refuge. The COI allowed the *Island Lady*'s passengers to transfer only to and from the *Tropical Breeze I* in specific locations, using the shuttle vessel's midship portside transfer station. Transfers were not allowed when the sea state exceeded 2 feet.

The *Island Lady*'s maximum capacity was 152 people, consisting of 149 passengers and 3 crewmembers. The COI permitted the vessel to carry adult passengers only and required the embarkation doors to be closed while passengers were on board.

Propulsion System

The *Island Lady* was powered by two Caterpillar 6-cylinder, 800-horsepower model 3406E diesel engines (figure 12). Each engine was equipped with an aftercooler, had a single turbocharger on the aft end, and was coupled to a shaft and a four-bladed propeller by an electrohydraulic transmission. Vessel operators controlled the engines' forward and astern speeds by moving levers on the wheelhouse console.

The Caterpillar engine manual contained a section explaining the gauges and indicators for the engines. The manual stated that a "warning" lamp alerted the operator of engine problems. The following were examples of problems: low oil pressure, high coolant temperature, low coolant level, and high inlet air temperature. The manual provided guidance to the operator for each of the alarm conditions. If an alarm activated for low engine oil pressure, the operator was advised to remove the load, reduce engine speed to low idle, and shut down the engine. For a high jacket-water temperature alarm, the following procedure was to be carried out: reduce load and engine speed, inspect the cooling system for leaks, and determine if the engine needed to be shut down immediately or if it could be cooled by reducing the load.

¹¹ See section "1.11 Vessel Information; Inspection History" for further details on the April 3, 2017 inspection.



Figure 12. The *Island Lady*'s starboard engine in May 2017. (Photo provided by the Coast Guard)

Cooling System

Each engine was directly cooled by a closed-type jacket-water system via cooling passages in the engine block. An engine-driven raw-water pump (figure 13) drew seawater for cooling by way of a through-hull inlet pipe. An inline sea strainer prevented debris from entering into the pump casing. The gear-driven raw-water pump impeller was constructed of rubber and fitted onto a splined shaft that rotated at a speed proportional to the engine rpm. According to Caterpillar specifications for the 3406E engine, the nominal operating temperature of the jacket-water system was 192°F. The setpoint for the high-temperature alarm was 217°F after a 30-second delay.

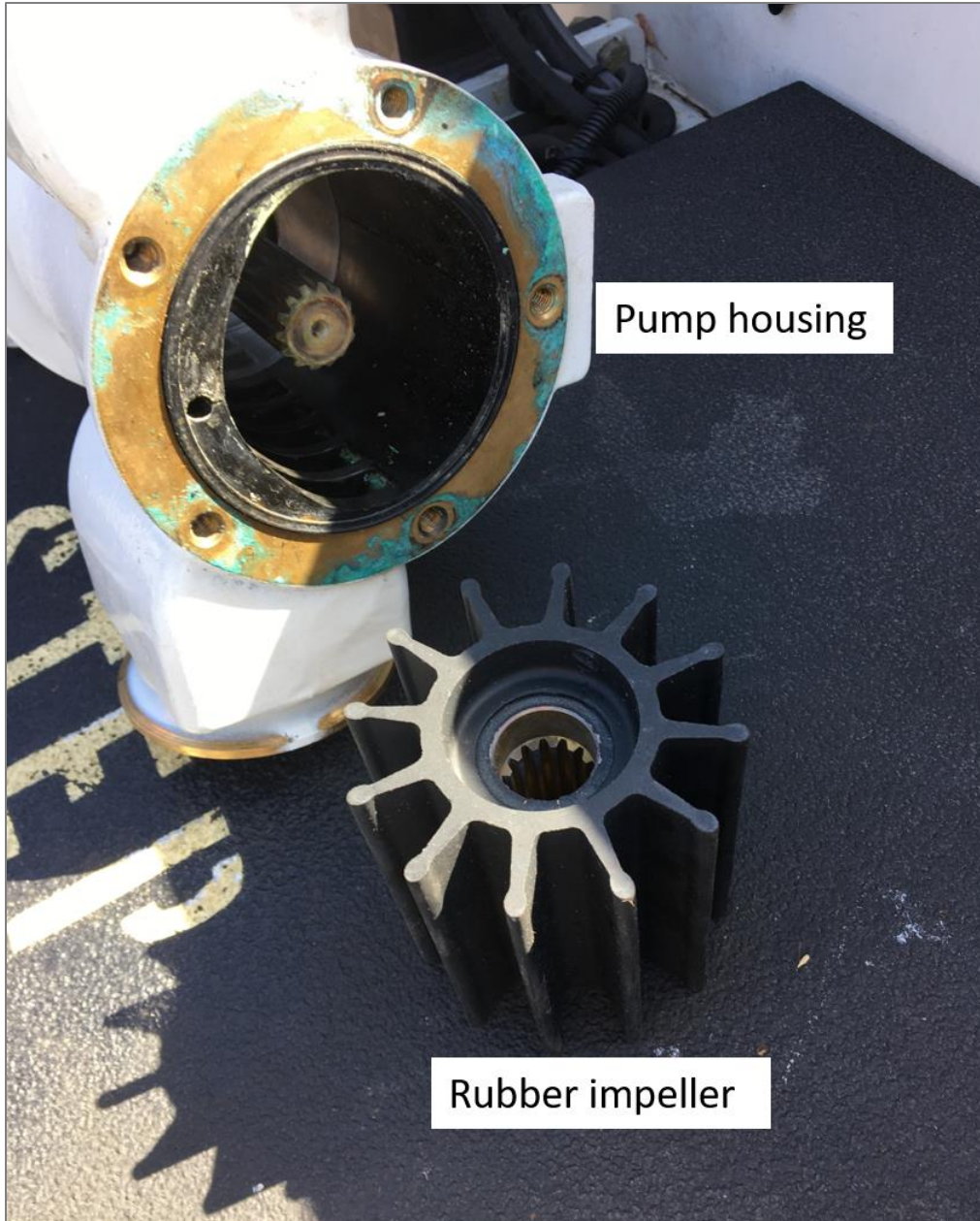


Figure 13. Upper left: Housing for raw-water pump. Center: New rubber impeller.

The raw-water pump first discharged into an aftercooler, which cooled the intake air entering the engine from the turbocharger. From the aftercooler, seawater flowed to a heat exchanger that cooled the engine jacket-water and then flowed to the transmission cooler (also known as a reduction gear cooler). The seawater then flowed into a spray ring in the exhaust tubing that sprayed water directly into the 8-inch-diameter exhaust tubes (wet-exhaust system).¹² A drawing of the system (figure 14) shows the flow of cooling water through the engine.

¹² According to Caterpillar, initial exhaust temperatures on an operating engine are about 750°F at full power and about 450°F at idle. In a wet-exhaust system, water-cooled inboard engines inject cooling water into the engine exhaust; this process cools the exhaust gases substantially and also muffles engine noise. The mix of water and gas then exits out of the tube and into the waterway. Because of the substantially reduced exhaust temperatures, exhaust tubing does not have to be constructed of noncombustible material.

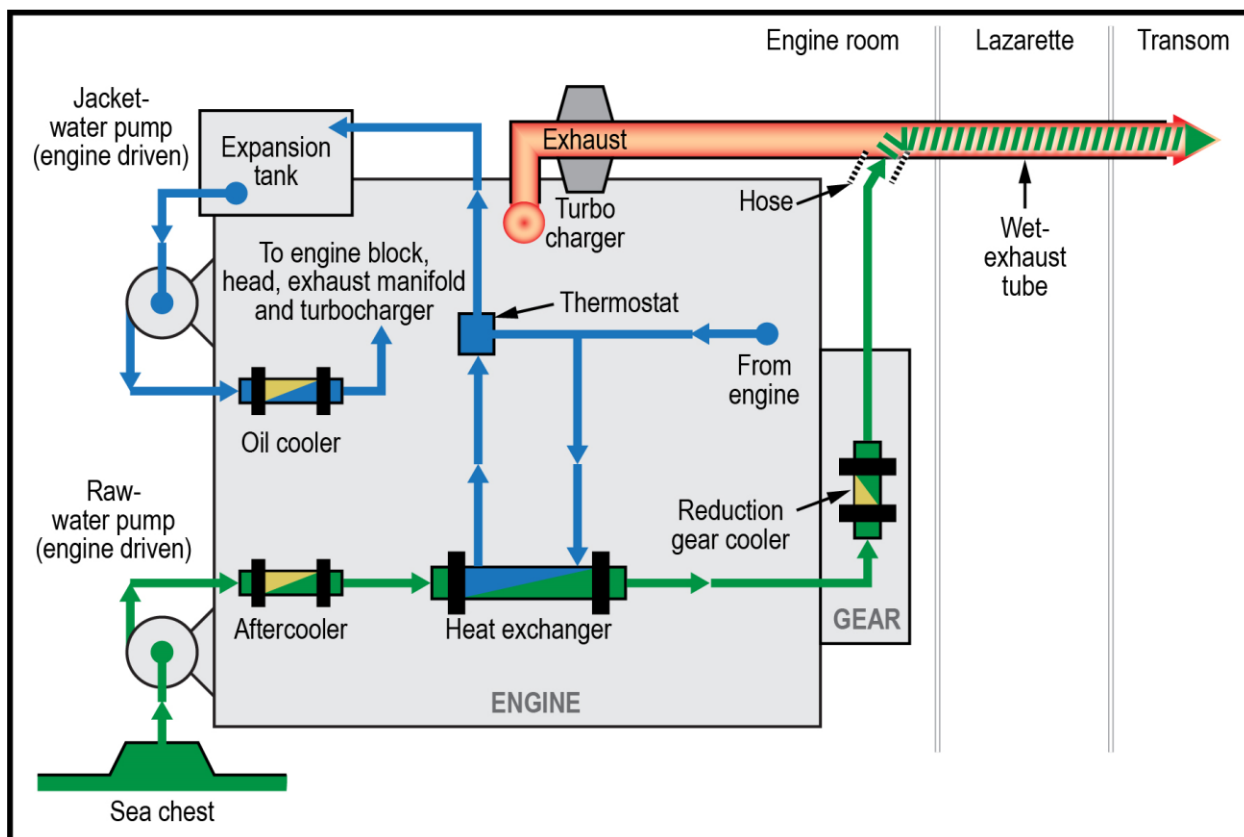


Figure 14. Simplified diagram of the engine cooling water system. The raw-water system is shown in green and the jacket-water system components are shown in blue.

The exhaust tubes were constructed of fiberglass and connected with rubber joints. According to the vessel specifications obtained from the original owner, the original exhaust tubing was Vernatube, which was a resin-impregnated glass filament-wound tubing. The manufacturer stated that the original tubing was made exclusively with a fire-retardant resin formulated for high-temperature applications. However, Tropical Breeze Casino had since replaced some or all of this tubing: For example; according to March 2017 maintenance records, the company purchased and installed 22 feet of 8-inch exhaust tubing and 22 clamps, and the July 2017 maintenance records noted replacement of a leaking exhaust tube in the lazarette. Investigators obtained the purchase receipt to determine the properties of the replacement tubing. The tubing was Novaflex marine hard-wall water exhaust tubing, which the manufacturer stated met standards for marine wet-exhaust applications.

The exhaust tubing transited aft through the lazarette, which also housed the steering system, marine sanitation system, head pumps, and fresh water pumps. The exhaust tubing was held in place by wood supports and was in direct contact with the wood bulkheads between the engine room and the lazarette (figure 15). No fire detection system was located in the lazarette, nor was it required to be.¹³

¹³ The Coast Guard provided analyzed data about fire origination on board domestic passenger vessels from the past 18 years (see Appendix B). The summary statistics show that most fires originate in the engine room, followed by auxiliary spaces separate from the engine room, such as steering gear spaces (which include lazarettes) and ship service generators. Also see section “2.5 Lack of Fire Detection in Unmanned Spaces with Exhaust Tubing.”



Figure 15. Engine exhaust tubes transiting through the lazarette spaces on board vessels constructed similarly to the *Island Lady*.

Electrical System

Electrical power was produced by two Kubota alternating-current generators, one behind each engine. Each generator's output was rated at 17 kilowatts. The captain told investigators that, normally, the vessel needed only one generator at a time in the winter (because of reduced need for air-conditioning); on the day of the accident, the starboard generator was running. None of the crewmembers reported any electrical problems on the vessel either before or during the fire, other than the loose electrical connection on the port engine's starting battery that the captain tightened before departure.

Fuel System

Fuel was delivered from the fuel tanks to the engines via piping; emergency stop valves were located in a recessed panel on the main deck. The fuel tanks were located in a separate compartment forward of the engine room. Each tank had a drain valve located at its bottom that connected via hoses to the drain valves from other fuel tanks. The drain valves and hoses were also used to equalize the fuel levels in the tanks. Level indicators constructed of plastic tubing and affixed to marked vertical stanchions were connected to the drain valves. When the valves were opened, and as the fuel level changed in the tanks, a corresponding visual change in the plastic tube would indicate the level. There were no automatic shutoff valves for isolation of the level indicators.

In accordance with Title 46 *CFR* 182.440 (a)(7), "tubular gauge glasses, if fitted to diesel fuel tanks, must be of heat[-]resistant materials, adequately protected from mechanical damage, and provided at the tank connections with devices that will automatically close in the event of rupture of the gauge or gauge lines." In March 2017, during a Coast Guard vessel examination of the *Island Lady*, the inspector found the fuel valves in the open position and photographed them (figure 16). The inspector told the crew to close the valves and he later looked for the regulation

about appropriate tubing material and automatic shutoff valves. He was unable to find the regulation and did not document the finding in the Coast Guard inspection report.

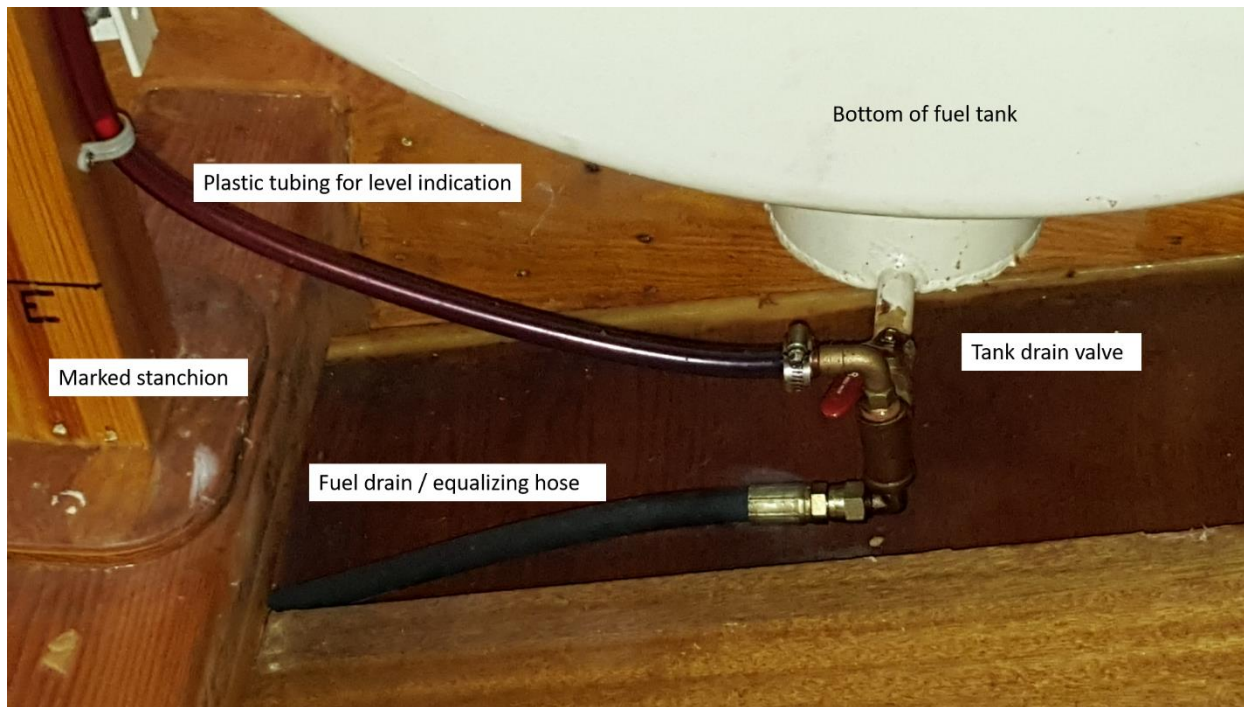


Figure 16. The *Island Lady's* fuel tank drain valve and plastic tubing to fuel-level indicator. (Image provided by the Coast Guard.)

Fire Detection System

In accordance with Title 46 *CFR* Part 181 Section 400, a space containing propulsion machinery must be equipped with a fire detection system of an approved type. Accordingly, the engine room on board the *Island Lady* had a Checkfire system manufactured by Interstate Fire Protection (figure 17). The system was custom-designed and custom-built with two 190°F heat detectors (one mounted above each propulsion engine) wired to a control module located in the wheelhouse. The engine room was the only space on board the vessel required to have a fire detection system.

CHECKFIRE Marine Fire Detection & Control System - Installation Detail

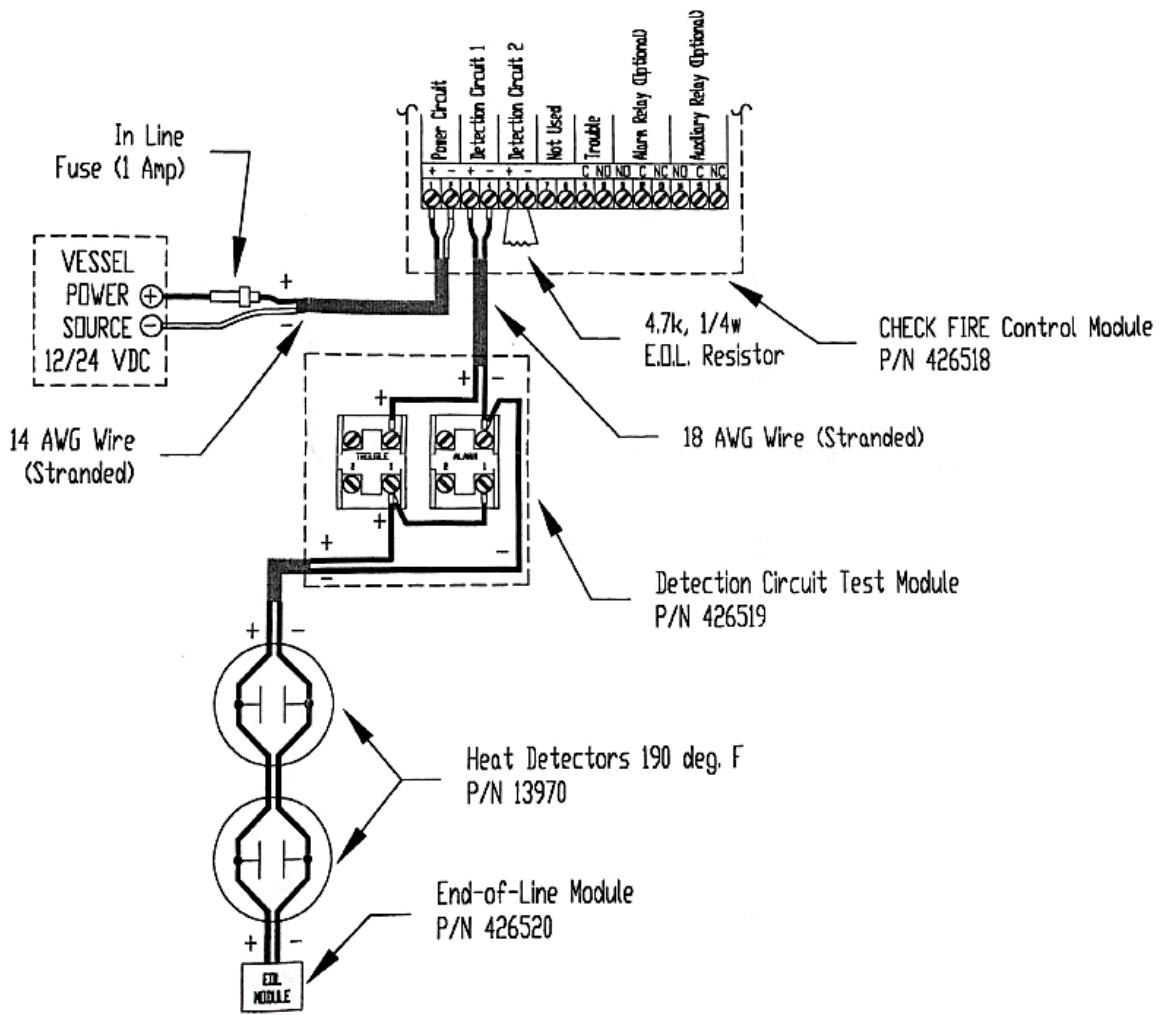


Figure 17. Drawing of the fire detection system layout. (Drawing by Checkfire, provided by the Coast Guard)

The fire detection system was to be tested annually; however, investigators could not find a record of the last test. The captain said in an interview that the heat detectors had been tested but that the records were destroyed in the fire. A Coast Guard “New to Zone” inspection of the *Island Lady* in November 2015 indicated that the overall firefighting system was inspected and found satisfactory. The Coast Guard’s most recent inspection report of the *Island Lady* (March 2017) listed the vessel’s firefighting system as “inspected with deficiencies noted,” but the deficiencies were not related to the detection system, and the owner addressed them during the inspection.¹⁴ Neither Coast Guard inspection narrative specifically mentioned testing of the fire detection system. After the fire, investigators could not locate the two heat detectors or the engine room alarm panel; they were likely destroyed in the blaze.

¹⁴ The noted deficiencies included a broken bracket on a fire extinguisher in the engine room and carpeting installed over the hatch to the fuel shutoff valve.

Fire Suppression System

Title 46 *CFR* Part 181 Section 400 also requires that spaces containing propulsion machinery be equipped with a fixed fire extinguishing system. Accordingly, the engine room on board the *Island Lady* was equipped with a Kidde custom-engineered and manually operated carbon dioxide (CO₂) system, installed in 1999.¹⁵ The last maintenance on the system was the annual maintenance and inspection performed in May 2017 by a third-party fire protection inspection and service company.

The system consisted of two 75-pound cylinders of CO₂ located in the fuel tank compartment forward of the engine room (figure 18).¹⁶ A distribution line from the cylinders penetrated through the forward engine room bulkhead and traveled down the centerline of the engine room to a tee that terminated in two bell-shaped discharge nozzles over the aft end of each engine.



Figure 18. Components of the *Island Lady*'s fixed fire suppression system in March 2017 before the fire. (Photo by the Coast Guard)

According to the drawings, a manual pull box located on the main deck would remotely activate the release of CO₂. The engine room's ventilation dampers were manually operated and could be closed locally on the main deck.

¹⁵ Custom-engineered fire suppression systems are designed specifically for an individual vessel's engine room. The system is designed to meet the needs of that particular space and the system is built with approved components.

¹⁶ The May 2017 suppression system maintenance report contained a note that stated the CO₂ cylinders were due for hydrostatic testing. Investigators were not able to determine if this testing was completed before the fire occurred. Required tests of CO₂ systems include weighing the gas cylinders (they must be recharged if their weight loss exceeds 10 percent of the charge); testing time delays, alarms, and ventilation shutdowns according to the manufacturer's instruction manual; and making sure hoses and nozzles are clean.

Firefighting Equipment

In addition to the fixed fire suppression system described earlier, the *Island Lady* had five portable fire extinguishers and two 1.5-inch-diameter, 50-foot-long firehoses (according to the vessel's COI).

Lifesaving Equipment

The *Island Lady*'s COI required that the vessel carry lifesaving equipment for 152 persons. The equipment included 152 adult lifejackets, three life rings, and one rescue boat/platform. Two liferafts, rated for 50 people each, were installed on top of the wheelhouse.¹⁷ The vessel was not required to carry child lifejackets because the COI allowed adult passengers only. On the *Island Lady*, lifejackets were stowed in the wheelhouse and in lockers in the aft section.¹⁸

Inspection History

Coast Guard Inspection. The Coast Guard inspected the *Island Lady* four times during the 2-year period between November 2015 (when A.B.K. Enterprises purchased the vessel) and the accident. The November 2015 "New to Zone" inspection (mentioned earlier) was conducted after the vessel was relocated from Maine to Port Richey. At the time, the Coast Guard inspector stated that it was evident that the vessel had been "very well maintained" and was in "excellent condition." Four deficiencies (unrelated to the fire) were noted during this examination. On November 12, 2015, two Coast Guard officers returned to the vessel, ensured that the four deficiencies were corrected, and issued a COI and inspection decal.

On February 10, 2017, the *Island Lady*'s COI expired and a new one was required. On March 16, 2017, the Coast Guard issued a "no-sail" CG-835 form (*Vessel/Facility Inspection Requirements*) because the vessel missed its annual inspection. The following day, a company official contacted the Coast Guard and scheduled the inspection. On March 21, 2017, two Coast Guard officers inspected the *Island Lady* while under way, including observing the 3-person crew conducting man-overboard, abandon-ship, and fire drills. After the inspection, the officers removed the no-sail CG-835 but noted seven deficiencies unrelated to the fire. The crew immediately corrected three of the deficiencies, and on April 17, 2017, the owner sent photos to the Coast Guard showing that the remaining deficiencies were corrected as well. The Coast Guard issued the new COI on March 21, 2017, stating that the vessel had completed satisfactory annual inspection and was fit for service and the route.

On April 3, 2017, Coast Guard personnel conducting a drydock exam noted three deficiencies unrelated to the fire.¹⁹ Within 4 days, all deficiencies were corrected and the inspection was concluded.

¹⁷ This rating met the requirements of Title 46 *CFR* 180.200 and 180.205 (number and type of survival craft) for the *Island Lady*'s limited coastwise route in predominantly warm water, which the Coast Guard defines as monthly mean low water temperature of normally more than 59 degrees F.

¹⁸ Federal regulations at Title 46 *CFR* 180.78 state, "lifejackets must be stored in convenient places distributed throughout accommodation spaces," and "each stowage container for lifejackets must not be capable of being locked. If practicable, the container must be designed to allow the lifejackets to float free." Further, "each lifejacket kept in a stowage container must be readily available." The Coast Guard's most recent inspection of the *Island Lady* verified the availability of lifejackets.

¹⁹ The Coast Guard noted some hull delamination near the propeller, a non-standard electrical cable on the water heater, and a missing flame shield on a generator fuel strainer.

1.12 Reported Incidents

During Tropical Breeze Casino Cruz’s ownership of the *Island Lady*, the Coast Guard received four reports of incidents involving the vessel: In August 2016, an 87-year-old passenger tripped and fell while stepping over a doorway threshold and broke her hip. She was taken to the hospital and died 3 days later. In September 2017, a concerned citizen contacted the Coast Guard alleging that the *Island Lady* caused a wake and forced several recreational vessels out of the channel. The Coast Guard investigated, but no enforcement action was taken. In October 2017, due to a control cable failing and preventing the starboard engine from disengaging from the transmission, the *Island Lady* struck a building along the banks of the Pithlachascotee River, damaging both the building and the vessel’s bow. The Coast Guard issued a CG-835 requiring engine repairs before the vessel could carry passengers again. The following day, a Coast Guard inspector witnessed the satisfactory engine repair and cleared the CG-835. In November 2017, the Coast Guard received a report that a crewmember fell through an open hatch to the engine room, causing injury to her forehead, legs, torso, and a toe. A week later, after her symptoms worsened, the crewmember went to the emergency room, where her toe was determined to be broken and infected. The Coast Guard referred the incident to enforcement for failure of the marine employer to notify the Coast Guard of a marine casualty.

1.13 Waterway Information

The Pithlachascotee (“Cotee”) River flows for more than 20 miles through Pasco County into Miller’s Bayou at the town of Port Richey and then empties westward into the Gulf of Mexico.²⁰ Two 90-degree turns in the channel near the river’s mouth were known to local mariners as the S-turn. On the day of the accident, the tide ranged about 3.5 feet, from -0.4 feet at low tide (0624) to 3.1 feet at high tide (2253). According to 2009 data, the controlling depth of the river was 3.8 feet (4.9 feet at midchannel) to the basin with 5.7 feet in the turning basin. An extensive shoal area lies off the mouth of the river; the Gulf of Mexico is only about 1–5 feet deep from the shoreline to about 3 nautical miles out. Between there and the Nine-Nautical-Mile line, the Gulf ranges from 6.5 to 14 feet in depth.²¹

1.14 Company Information

A.B.K. Enterprises, the owner of the *Island Lady*, began operating as “Paradise Casino” in October 1995. At a later date, the company name was changed to “SunCruz.” In 2001, the operator changed its name again, this time to “Port Richey Casino.” In 2015, when the company purchased the casino boat *Tropical Breeze I*, a new company was formed—“Tropical Breeze Casino Cruz, LLC”—which was the operating company when the *Island Lady* fire occurred. At that time, the company operated two vessels: the casino boat *Tropical Breeze I* and the shuttle boat *Island Lady*.

Day-to-Day Operations

At the time of the accident, the company had four boat captains on its payroll and an engineer who worked mostly on shore. The owner managed day-to-day company operations. Shoreside support consisted of an administrative assistant, an engineer, a dockmaster, and the port captain. Tropical Breeze Casino Cruz offered three scheduled departures per day, 7 days a week:

²⁰ National Oceanic and Atmospheric Administration, National Ocean Service, *United States Coast Pilot*, vol. 5 (Atlantic Coast: Gulf of Mexico, Puerto Rico, and Virgin Islands), 2004, p. 340.

²¹ National Oceanic and Atmospheric Administration, National Ocean Service, Coast Survey, United States - Gulf Coast, Florida, Chart 11409, *Anclote Keys to Crystal River*, 1999.

1100, 1530, and 1900. Return trips were scheduled for 1730, 2100, and midnight. Customers could choose to stay for just a few hours or until the last return to shore. The *Island Lady* captain told investigators that he worked 7 days a week; 4 days a week on the *Island Lady* and 3 days a week on the *Tropical Breeze I*.

Port Captain

The port captain, who was also the vessel owner's spouse, told investigators that he took care of the slot machines and helped supervise general operations. He held a merchant mariner credential as captain of 100-ton vessels and had previously operated the *Island Lady*. His responsibilities included upkeep and maintenance of vessels and oversight of vessel safety, daily operations, and personnel. He was the person whom the *Island Lady* captain called on the day of the fire after receiving the high-temperature alarm.

Engineer

The company engineer was off-duty on the day of the accident but had worked for Tropical Breeze Casino Cruz for about 4 and a half years. He did not hold nor was he required by federal regulations to hold any Coast Guard credentials. He graduated from Marchman Technical College where he studied marine service technologies. He said his studies included training on passenger vessels and that he completed a year and a half-long class on diesel engines. Initially, his job entailed working overnights on the casino boat *Royal Casino I* until it was taken out of service, and then the *Tropical Breeze I*. He was employed as engineer and deckhand. About a year before the accident, the *Island Lady* was added to his responsibilities, which included checking fluids and performing minor repairs. He said he typically spent about 15–20 minutes daily on board the *Island Lady*, starting the engines, replacing light bulbs, and fixing toilets, as needed. The rest of the time, he worked at the shoreside facility.

Other Company Vessels

The company's casino boat, the *Tropical Breeze I* (figure 19), was built in 1991 and served as the company's casino boat starting in 2015. Between 2015 and the date of the accident, the Coast Guard attended the vessel seven times for scheduled certification, drydock inspections, and in response to passenger and crewmember concerns. The Coast Guard noted any deficiencies during the inspections, the company addressed them, and the Coast Guard subsequently cleared them.



Figure 19. Casino boat *Tropical Breeze I*.

Since 1995, Port Richey Casino/Tropical Breeze Casino Cruz had also owned other casino and shuttle boats—the *Monte Carlo*, the *Royal Casino I*, the *Royal Express*, and the *Royal Express II*—all of which had undergone Coast Guard inspections and which the company eventually retired. Another of the company’s shuttle boats, the *Express Shuttle II*, was destroyed in a fire in 2004 (see section “1.15 Previous Fire and NTSB Safety Recommendations Involving Company Vessel”).

Vessel Maintenance

Tropical Breeze Casino Cruz had implemented a preventive maintenance program for its vessels after receiving NTSB Safety Recommendation M-06-12 in response to the 2004 *Express Shuttle II* fire.²² The captain and the engineer told investigators that the crew conducted maintenance checks on the *Island Lady* every morning before transits, checking oil-, water-, and bilge levels and the vessel’s overall condition. Any item requiring additional maintenance was reported to the company. Investigators found a blank “engine room daily checklist” (figure 20) on the company’s shoreside computer, which included various items to be inspected each day, including the engines, generators, fuel levels, and bilges, as well as other general inspections. For the main engines, a visual inspection was to be conducted and the following was to be checked: coolant, oil, transmission fluid (if added), sea strainers, and belts and hoses. Investigators requested to see completed daily checklists, but none were provided, as the company said they were destroyed in the fire and no copies were kept shoreside.

²² An effective preventive maintenance program contains such elements as procedures for reporting maintenance and repair needs, retaining and reviewing maintenance and repair records, conducting vessel inspections and repairs according to manufacturers’ guidelines, verifying and testing repairs, and overseeing the maintenance and repair process. It also contains procedures that promote effective interaction between the personnel who operate vessels and the staff who perform vessel maintenance.

ISLAND LADY			
Engine Room Daily Check List			
DAY:	DATE:	Name:	
24Volt CCW	3406	Caterpillar Main Motors	DEIO400 SAE15W40
CAT TDTO Transmission Fluid			
<u>STARBOARD MAIN</u>		<u>PORT MAIN</u>	
<input type="checkbox"/> EIC Coolant Added		<input type="checkbox"/> EIC Coolant Added	
<input type="checkbox"/> Oil Added		<input type="checkbox"/> Oil Added	
<input type="checkbox"/> Trans Fluid Added		<input type="checkbox"/> Trans Fluid Added	
<input type="checkbox"/> Sea Strainers Cleaned		<input type="checkbox"/> Sea Strainers Cleaned	
<input type="checkbox"/> Belts Ok		<input type="checkbox"/> Belts Ok	
<input type="checkbox"/> Hoses Ok		<input type="checkbox"/> Hoses Ok	
<input type="checkbox"/> Visual Inspection		<input type="checkbox"/> Visual Inspection	
Dont Just Check off the Lines, Actually do it and put down how much Added, Complete Every Morning			
12 Volt		Kubota Generators	DEIO400 SAE15W40
<u>STARBOARD GENERATOR</u>		<u>PORT GENERATOR</u>	
<input type="checkbox"/> Water Added		<input type="checkbox"/> Water Addec	
<input type="checkbox"/> Oil Added		<input type="checkbox"/> Oil Added	
<input type="checkbox"/> Sea Strainers Cleaned		<input type="checkbox"/> Sea Strainers Cleaned	
<input type="checkbox"/> Hoses Ok		<input type="checkbox"/> Hoses Ok	
<input type="checkbox"/> Visual Inspection		<input type="checkbox"/> Visual Inspection	
Notes will be written down and read everyday by proceeding Engineer the next day, No Exeptions			
General Check List			
<input type="checkbox"/> Fuel Level Tank 1	<input type="checkbox"/> Tank 2	<input type="checkbox"/> Tank 3	
<input type="checkbox"/> A/C Strainers Bow/Stern Cleaned		<input type="checkbox"/> Check Steering Fluid	
<input type="checkbox"/> A/C Filters Checked		<input type="checkbox"/> Check Fresh Water Filter	
<input type="checkbox"/> Check Voids For Water		<input type="checkbox"/> Take Inventory	
<input type="checkbox"/> Empty Sewage 3 Miles		<input type="checkbox"/> Take Out Trash	
<input type="checkbox"/> Bilges Clean		<input type="checkbox"/> Wipe Down Motors	
<input type="checkbox"/> Tools Organized	Notes: _____		
<input type="checkbox"/> Order Stock	_____		
<input type="checkbox"/> Resupply Oil 15w 40	_____		
<input type="checkbox"/> Refuel Diesel Can	_____		
<input type="checkbox"/> Clean Engine Room	_____		

Figure 20. Blank (sample) daily checklist for the *Island Lady* engine room.

The Caterpillar 3406E engine manual, “Operation and Maintenance Manual,” stated that “fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST,” were to be used to determine the maintenance intervals. The manual also stated that engines in “severe operation” may require more frequent maintenance.²³ The *Island Lady* engineer told investigators that he created a maintenance report based on the Caterpillar maintenance schedule and his experience. This report did not include Caterpillar’s recommended intervals, nor was there any guidance from Tropical Breeze Casino Cruz. The engineer estimated that the *Island Lady* operated

²³ Caterpillar defined severe operation as “the use of an engine that exceeds current published standards for the engine.” The following factors can contribute to severe operation: environment, improper operating procedures, and improper maintenance procedures.

for about 6 hours a day and said that it had recently started operating 7 days a week, an increase from 4 days a week.

Daily maintenance identified in the Caterpillar manual included a walk-around inspection to look for leaks and loose connections and a check of the crankcase oil level, the coolant system level, the air cleaner condition, and the oil level in the transmission. The Caterpillar manual also contained specific interval-related instruction, such as:

- Every 50 hours or weekly
 - Replace zinc rods²⁴
 - Inspect seawater strainer
 - Inspect aftercooler condensate drain valve

- Every 250 hours (or yearly, whichever comes first)
 - Sample and analyze crankcase oil
 - Change engine oil
 - Replace fuel filter
 - Drain fuel tank of water and sediment
 - Test cooling system additive
 - Clean the engine
 - Clean or replace air cleaner
 - Check, adjust, or replace belts
 - Check or replace hoses and clamps
 - Clean and check batteries
 - Check raw-water pump and rubber impeller
 - Check battery electrolyte level

- Every 1,000 hours or 2 years
 - Inspect turbocharger
 - Clean and test aftercooler core

- Every 3,000 hours
 - Replace water temperature regulator
 - Inspect engine mounts, crankshaft vibration damper, valve lash and rotators, fuel injectors, heat exchanger, and starting motor
 - Clean and inspect engine speed/timing sensor

- Every 5,000 hours
 - Inspect jacket-water pump and alternator

- Every 6,000 hours or 6 years
 - Replace aftercooler core

- Every 10,000 hours
 - Determine engine operating parameters
 - Complete major overhaul

The Caterpillar manual also gave direction regarding overhaul considerations, stating that the need for overhauls was generally indicated by increased fuel consumption and reduced power. The manual further explained that factors such as preventive maintenance, the quality of fuel used, operating conditions, and oil analysis results were important considerations in deciding when to overhaul an engine.

²⁴ Zinc rods are inserted into the engine's raw water-cooling system to help prevent the corrosive action of seawater.

The Tropical Breeze Casino Cruz engineer told investigators that he changed the engine oil monthly and reported any maintenance issues to the company. He estimated that the *Island Lady* engines had about 13,000 hours on them at the time of the accident but said that he “hadn’t thought about logging hours” and would only occasionally enter the engine hours on the daily checklists.

The engineer kept monthly maintenance reports for both company vessels on a computer in the dock office. Each month was represented by one page (figure 21) and included oil and filter changes, impeller replacements, and so on.

Island Lady Monthly Maintenance Report

DATE: October 2017 Name: XXXXXXXXXX

Starboard S#9WR01393	3406E Caterpillar Mains	Port S#9Wr01392
24 volt Dual d8		24 volt Dual d8
<u>08/25/17</u> Flush		<u>08/25/17</u> Flush
<u>09/04/2017</u> Oil Changed		<u>09/04/2017</u> Oil Changed
<u>09/04/2017</u> Fuel Filter		<u>09/04/2017</u> Fuel Filter
<u>08/25/17</u> Heat Exchanger		<u>08/25/17</u> Heat Exchanger
<u>04-21-17</u> AirFilter		<u>04-21-17</u> AirFilter
<u>12/08/2016</u> Transmission Fluid Change		<u>12/08/2016</u> Transmission Fluid Change
<u>08/25/17</u> Thermostat		<u>08/25/17</u> Thermostat
<u>07/17/17</u> Belts		<u>10/05/2016</u> Belts
<u>7/17/17</u> Battery Water		<u>7/17/17</u> Battery Water
<u>5-17-17</u> Impeller		<u>05-25-17</u> Impeller <u>05-25-17</u> Impeller Bilge
Starboard Kubota Gen	Generators	Port Kubota Gen V1505
12 Volt		12 volt
<u>09/15/2016</u> Flush		<u>09/15/2016</u> Flush
<u>09/04/2017</u> Oil Changed		<u>09/04/2017</u> Oil Changed
<u>09/04/2017</u> Fuel Filter		<u>09/04/2017</u> Fuel Filter
<u>07/17/17</u> Heat Exchanger		<u>09/04/2017</u> Heat Exchanger
<u>06-20-17</u> AirFilter		<u>06-20-17</u> AirFilter
<u>07/17/17</u> Thermostat		<u>07/17/17</u> Thermostat
<u>07/17/17</u> Belts		<u>12/08/2016</u> Belts
<u>09/04/2017</u> Battery Water		<u>09/04/2017</u> Battery Water
<u>07/17/17</u> Impeller		<u>09/04/2017</u> Impeller

Notes: _____

Figure 21. Monthly maintenance report for the *Island Lady*, October 2017.

Although the maintenance report was filled out on a monthly basis, each listed item did not necessarily require a monthly maintenance interval. Moreover, the monthly maintenance report did not contain Caterpillar's suggested intervals for engine maintenance, but was instead simply a form used to track the dates on which some maintenance was completed. No entries had been made for the number of engine hours or the next scheduled date of service. Investigators examined the *Island Lady's* maintenance log for the year before the fire, between January 2017 and October 2017 (no records were available before or after this timespan). The log's pages contained fields for manual entries of dates of service and an area for comments.

According to the monthly maintenance reports, the impellers of the raw-water pumps for both main engines were replaced in May 2017. No records were available to show the number of hours or days of operation on the impellers. Investigators obtained photos, taken by the engineer in connection with the replacement, of water leaking from the pump housing (figure 22) and of one of the old pump housings and rubber impellers before replacement (figure 23). At least six of the 12 vanes were missing from that impeller.

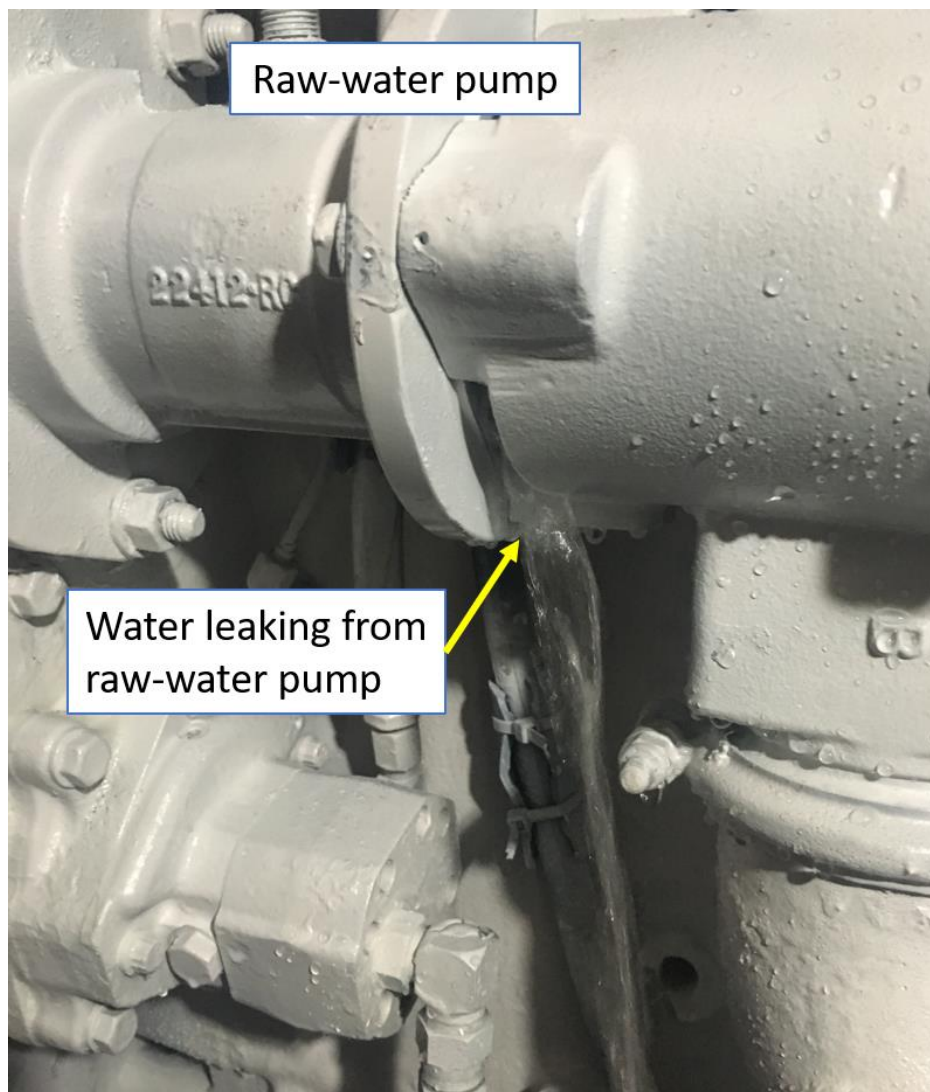


Figure 22. Water leaking from the *Island Lady's* raw-water pump before its May 2017 replacement, photographed by the engineer.

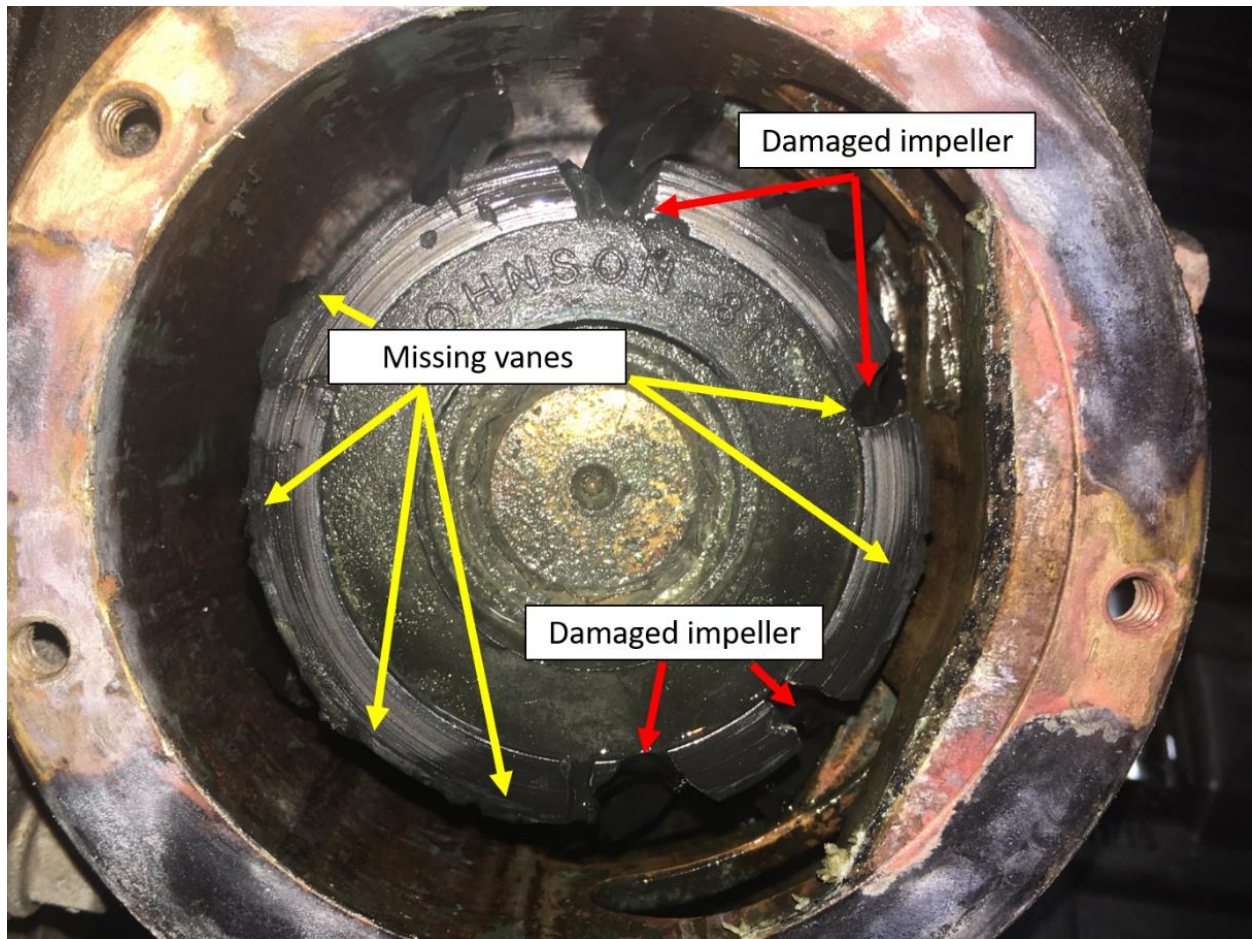


Figure 23. Raw-water pump housing and impeller from the *Island Lady* during the components' May 2017 replacement, photographed by the engineer.

Ring Power provided a photo to show the condition of a newly installed rubber impeller in a raw-water pump housing (figure 24).

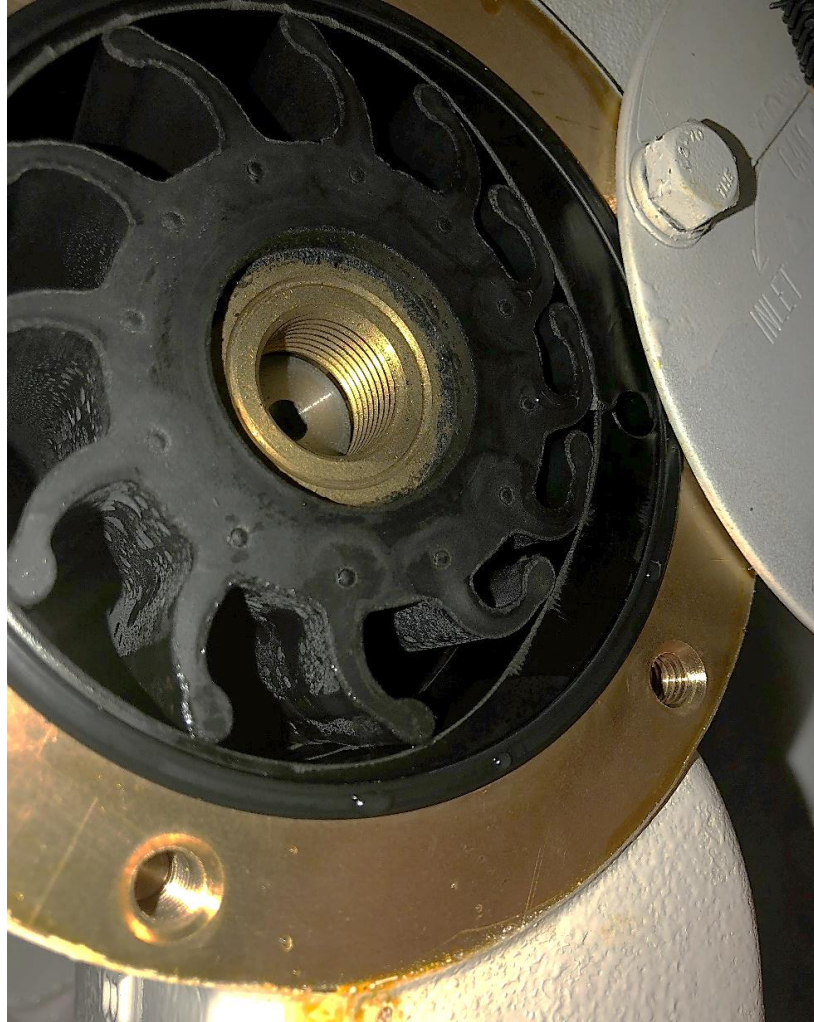


Figure 24. New raw-water pump impeller installed in its pump housing. (Photo by Ring Power)

According to interviews with the captain and the engineer, they would notify the owner of any maintenance that they believed required assistance from outside vendors, and the owner would decide if or when to schedule such repair work. According to the engineer's maintenance log and invoices supplied by Tropical Breeze Casino Cruz, the *Island Lady's* starboard engine was rebuilt in March 2017 (the port engine was not overhauled at that time). The engineer told investigators that the starboard engine was overhauled because it was producing excessive blowby, meaning that pressurized products of combustion were entering into the crankcase through worn internal components. He also said that the starboard engine was "putting oil through the turbocharger." The owner stated that the timing of the starboard engine overhaul was placed during a downtime in the vessel's schedule due to its COI having expired and the vessel not being permitted to carry passengers. According to the engineer, he and one of the company boat captains completed the work on the starboard engine. The owner told investigators that a service representative from Ring Power tested the engine afterwards. The service representative was reportedly called after hours and was paid in cash, and there was no service report.

The engineer took photographs of starboard engine components during the overhaul. Two of the six removed pistons showed signs of vertical score marks (figure 25). Scoring of diesel engine pistons can result from overheating, lack of lubrication, or debris ingestion. As the engine

is operated with scored pistons, unburned fuel and the pressurized products of combustion are more likely to enter into the crankcase.

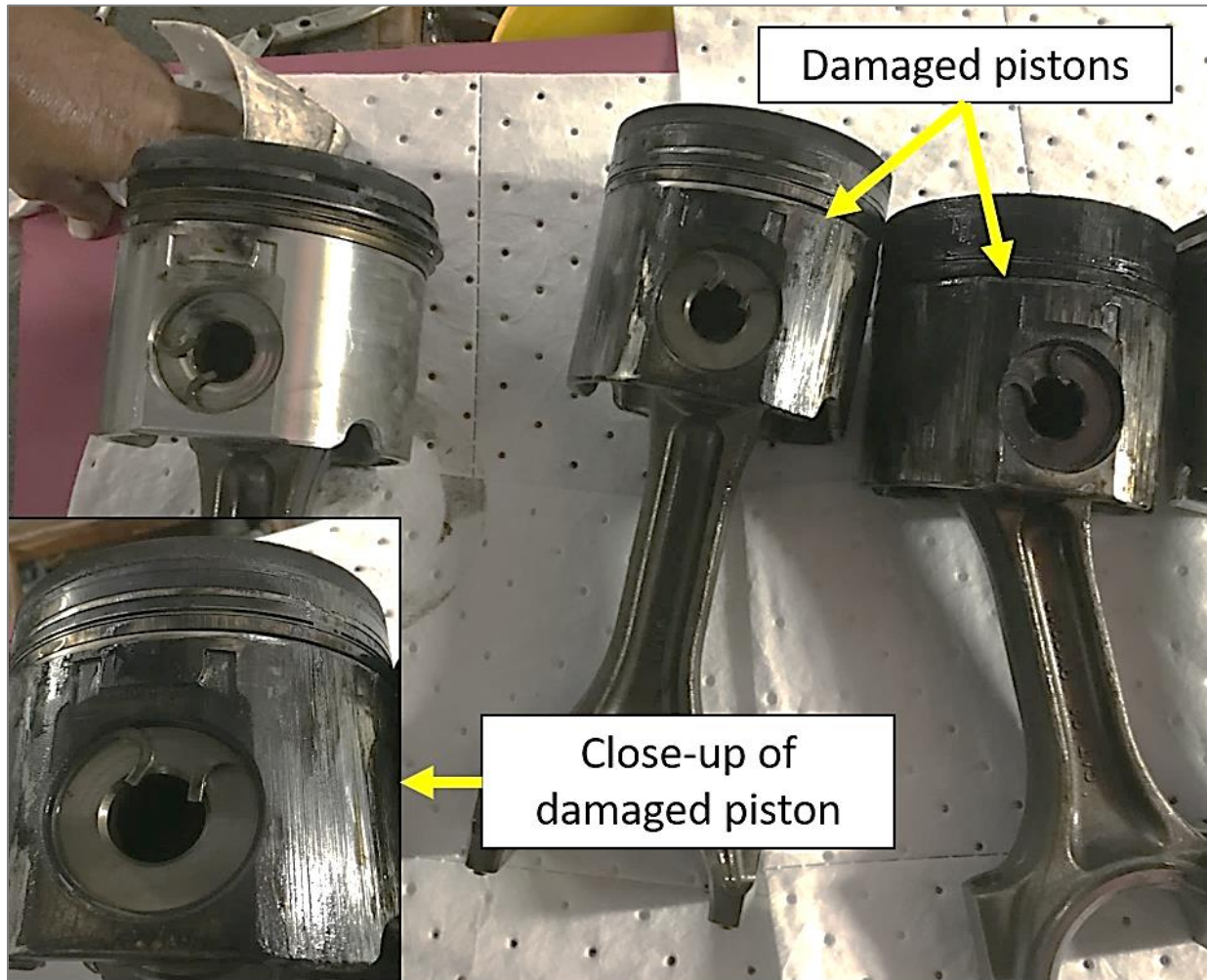


Figure 25. Removed pistons from the *Island Lady's* starboard engine during March 2017 overhaul, photographed by the engineer. The piston in the upper left shows no damage; the remaining pistons are scored.

The engineer told investigators that after the vessel was purchased, the engines were “rolling coal,” meaning that they were producing black smoke. As a result, the vessel’s transom was blackened (figure 26). The engineer said that the company called “a bunch of people” to determine the reason for the excessive smoke, but nobody was able to provide an answer.



Figure 26. Stern of the *Island Lady* while in drydock April 2017. (Photo by Coast Guard)

1.15 Previous Fire and NTSB Safety Recommendations Involving Company Vessel

The NTSB investigated a previous fire on board a Port Richey Casino vessel (at that time, the company operated as “Paradise of Port Richey”). On the morning of October 17, 2004, a fire broke out in the engine room of the small passenger vessel *Express Shuttle II* at the mouth of the Pithlachascotee River as the shuttle was returning to the dock.²⁵ Only the master and two deckhands were on board when the fire broke out. The crew did not activate the vessel’s fixed fire suppression system; instead, they tried unsuccessfully to fight the fire with portable extinguishers. When the fire burned out of control, they abandoned ship to a passing recreational boat. Firefighters from Port Richey and Pasco County fought the blaze, but the vessel, valued at \$800,000, was a constructive total loss. One deckhand was treated for smoke inhalation at a local hospital.

The NTSB determined that the probable cause of the fire on board the *Express Shuttle II* was a fractured, improperly installed fuel injection line on the inboard side of the starboard engine that allowed diesel fuel to spray onto the engine and ignite. Contributing to the cause of the fire was the failure of Paradise of Port Richey to have a preventive maintenance program, which could have identified the company’s ongoing problem with the vessel’s fuel lines before a failed line led to the fire. Contributing to the extent of the damage were the vessel’s faulty fire detection system and the crew’s failure to employ proper marine firefighting techniques.

In the *Express Shuttle II* investigation, the NTSB determined that fuel lines on the vessel had failed numerous times in the months before the fire. Company employees indicated that

²⁵ *Fire On Board U.S. Small Passenger Vessel Express Shuttle II, Pithlachascotee River Near Port Richey, Florida, October 17, 2004*, Marine Accident Report NTSB/MAR-06/02, Washington, DC: National Transportation Safety Board, 2006.

rather than following a regular schedule for vessel maintenance and repair, Paradise of Port Richey waited until a fuel line fractured before addressing any underlying issues. NTSB investigators found that the company did not keep accurate records of such repairs and had no formal system that would have identified an ongoing maintenance problem.

As a result of the *Express Shuttle II* investigation, the NTSB issued five new safety recommendations, two of them to the operating company, Paradise of Port Richey:

M-06-12

Develop and implement a preventive maintenance and inspection program for systems affecting the safe operation of your vessels, including the hull and the mechanical and electrical systems.

M-06-13

Develop and implement a training program in marine firefighting for your crewmembers.

The company stated that it agreed to implement a preventive maintenance program and marine firefighting training. In correspondence from July 2006, the company outlined the steps it had taken to address the issues. As a result, the NTSB classified Safety Recommendations M-06-12 and -13 “Closed—Acceptable Action” in December 2006.

Also following the *Express Shuttle II* fire, the NTSB issued two new safety recommendations to the Coast Guard:

M-06-10

Establish firefighting training requirements for crewmembers on board all small passenger vessels.

M-06-11

Require that Officers-in-Charge, Marine Inspection, before issuing a certificate of inspection to a small passenger vessel that is required to have a fire detection system, verify that all system components are approved for use in fire detection systems and that the circuits of the system are electrically supervised.

The Coast Guard implemented Safety Recommendation M-06-11 and the NTSB classified it “Closed—Acceptable Action” in April 2007. However, the Coast Guard did not implement Safety Recommendation M-06-10, stating in part that, per Title 46 *CFR* Subchapter B, masters on small passenger vessels are already required to demonstrate proficiency related to topics of fire prevention and firefighting, and that other crew already receive training in duties they are expected to perform in an emergency, such as fire. The NTSB responded in part that exams alone do not ensure proficiency and, with respect to vessel masters, an individual could fail the few fire-related questions and still pass the master’s exam. The NTSB classified Safety Recommendation M-06-10 “Closed—Unacceptable Action” in June 2009.

The NTSB also issued a new safety recommendation to the engine manufacturer, Caterpillar, following the *Express Shuttle II* investigation:

M-06-14

Revise the service manual for your marine engines to give specific instructions on how to replace a single fuel line and on where fuel line clamps should be located.

Caterpillar implemented this recommendation and revised its marine engine service manuals as requested. Accordingly, the NTSB classified M-06-14 “Closed—Acceptable Action” in July 2007.

The NTSB also superseded (by issuing M-06-10) an existing safety recommendation to the Coast Guard (based on a November 17, 2000, fire on board the small passenger ferry *Port Imperial Manhattan*²⁶):

M-02-9

Establish firefighting training requirements for crewmembers on board small passenger vessels in commuter and ferry service.

Safety Recommendation M-02-9 was classified “Closed—Superseded” in the *Express Shuttle II* report.

The NTSB also reiterated two existing safety recommendations to the Coast Guard (also based on the *Port Imperial Manhattan* fire):

M-02-5

Require that companies operating domestic passenger vessels develop and implement a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull and mechanical and electrical systems.

M-02-10

Revise Navigation and Vessel Inspection Circular [NVIC] No. 1-91 so that it provides more in-depth guidance in training and drills for firefighting on board small passenger vessels.^[27]

Regarding the reiterated M-02-10, the Coast Guard declined once again to implement the recommendation, stating in part that it preferred to keep the guidance provided in NVIC 1-91 general in nature with respect to fire-related training and firefighting. The NTSB replied in part that, although NVIC 1-91 was indeed only a guidance document, fire safety could be improved by outlining more in-depth detail about training and firefighting drills instead of simply listing tasks

²⁶ *Fire On Board the Small Passenger Vessel Port Imperial Manhattan, Hudson River, New York City, New York, November 17, 2000*, Marine Accident Report NTSB/MAR-02/02, Washington, DC: National Transportation Safety Board, 2002.

²⁷ NVIC no. 1-91 pertained to recommended qualifications for deckhands working on board small passenger vessels.

that deckhands should be familiar with in emergencies. The NTSB classified the reiterated M-02-10 “Closed—Unacceptable Action” in June 2009.

The Coast Guard also declined to implement Safety Recommendation M-02-5, stating in part that small passenger vessels are already subject to a comprehensive set of regulations promoting vessel safety. The NTSB expressed disappointment, responding in part that these regulations do not address vessel maintenance, do not require vessel owners to develop systematic programs for addressing repairs and maintenance, and do not require any maintenance oversight. As a result, in April 2005, the NTSB initially classified Safety Recommendation M-02-5 “Open—Unacceptable Response.”

Six years later, in March 2011, the NTSB reclassified M-02-5 “Open—Acceptable Response” after reviewing the Coast Guard Authorization Act of 2010 (Public Law 111–281), Section 610, in which the Coast Guard obtained congressional authority to require safety management systems (SMS, which incorporate preventive maintenance programs) on domestic passenger vessels. However, in February 2017, after another 6 years had passed and the Coast Guard had not yet finalized the necessary regulations to implement safety management systems, the NTSB reclassified M-02-5 “Open—Unacceptable Response,” the status in which the recommendation remains as of the date of this report. For further discussion about and reiteration of Safety Recommendation M-02-5, see section “2.3 Insufficient Preventive Maintenance” in this report. In addition, section “2.4 Crew Emergency Response, Training, and Documentation” contains further detail about SMS and also reiterates a related safety recommendation, M-12-3, for the Coast Guard to require SMS on domestic passenger vessels.

2. Analysis

2.1 Exclusions

At the time the fire broke out, the weather was mild and did not hamper detection of the fire. The *Island Lady* crewmembers had just begun the day's work, and their interviews and work/rest histories indicated that they were well-rested. In addition, all crewmembers tested negative for illicit drugs and alcohol. Therefore, the NTSB concludes that weather, fatigue, and impairment due to alcohol and other drugs were not factors in the accident.

2.2 Cause of the Fire

The captain said that, after receiving a high-temperature alarm for the jacket-water system of the port engine, he also noticed that the temperature gauge for the jacket-water system was elevated. He reduced the speed to idle, took the engine out of gear, and proceeded down to the engine room to investigate. On entering the engine room, he noticed steam or light smoke and saw a wet area on the port bulkhead outboard of the port engine; the raw-water pump was mounted on the port side of the engine. A component failure in the raw-water system would have resulted in water discharge, consistent with what the captain observed. Caterpillar's manual stated that a pump seal failure would also result in water discharge; in fact, in May 2017, when the impellers were replaced on the raw-water pumps, the engineer photographed a stream of water discharging from one of the pumps' housing.

A raw-water system failure would have caused the port engine to overheat because the engine's jacket-water system that removed the heat of combustion from the engine was cooled by the raw water through a heat exchanger. A reduced flow of cooling water to the heat exchanger would cause a rise in jacket-water temperature. Therefore, the NTSB concludes that the high-temperature alarm for the port engine's jacket-water system resulted from a failure of the port engine's raw-water pump.

The raw-water system cooled various components of the engine and also supplied cooling water to the wet-exhaust system tubing, which was not designed to run in a dry condition. The overheating engine, with high jacket-water temperatures and eventually a loss of jacket water from the cracked block, would have developed higher exhaust temperatures. Those elevated temperatures, plus the loss of raw water that normally cooled the wet-exhaust tubing, would have caused the internal temperatures of the tubing to rise, degrading the tubing material and eventually leading to ignition. Supporting this analysis was the shoreside surveillance video, which showed flames emanating from the port exhaust opening on the vessel's stern before flames were visible elsewhere, indicating a fire in the exhaust tubing. This fire would then have ignited the surrounding wood supports. The NTSB therefore concludes that the fire likely started in the port engine's fiberglass exhaust tubing and spread to wood structures in the lazarette, through which the tubing transited.

Good marine practice stipulates that an engine that has experienced a complete loss of cooling and is overheating should be shut down to avoid damage; the Caterpillar manual also advises doing so. The captain understood from the jacket-water alarm and the elevated temperature on the gauge that the port engine was overheating and he also believed that a cooling water hose may have failed, but he still did not shut down the port engine. He said that he left it idling because he had "always been trained to . . . put it in neutral . . . let it cool down, because I didn't want to

turn it off if overheating.” The Caterpillar manual did recommend idling a properly operating engine for at least 3 minutes to reduce and stabilize internal engine temperature before stopping if the engine had been running at high rpm or high load; however, the *Island Lady* engines had only operated at high load for less than 5 minutes and, moreover, a high-temperature alarm was sounding, indicating an abnormal condition. Many shipboard diesel engines are equipped with automatic shutdowns that activate if an initial high-temperature alarm is not addressed and the temperature continues to rise; this technology protects the engines from damage. The engines on the *Island Lady* were not equipped with automatic shutdowns.

According to the captain, the port engine continued to run until he beached the vessel and both engines shut down. Had the captain shut down the port engine instead of placing it in idle, and had he then used only the functioning starboard engine, the overheating condition would have subsided. Instead, as the *Island Lady*'s port engine continued to run in a high jacket-water temperature condition, the jacket-water system circulated the remaining and increasingly hot water through the engine. The engine eventually failed and one of the jacket-water cooling passages in the engine block fractured from the excessive heat. Therefore, the NTSB concludes that the captain's decision to continue to run the port engine in an overheated condition, even though the starboard engine was available and functioning normally, allowed the port engine to overheat to failure and the engine's exhaust tubing to ignite.

Although the company had emergency guidance for both its vessels, investigators found no evidence that the company provided its crews with any specific instructions on how to address high-temperature or other engine and machinery alarms. After the captain received the alarm, he notified the company port captain who told him to put the vessel in reverse to try to clear any possible debris in the raw-water inlet. The port captain did not advise the captain to shut down the engine. Had the captain received specific guidance regarding high-temperature alarms, he may have shut down the port engine immediately. The NTSB concludes that Tropical Breeze Casino Cruz did not provide adequate guidance to its crews regarding response to engine and other machinery alarms.

After receiving the high-temperature alarm, the captain slowed the vessel, turned around, and began heading back to the boarding dock to address the overheating issue. If the captain had continued farther out to sea and the fire erupted, the evacuation would have been much more complicated. Offshore, the crew would have needed to launch liferafts, and passengers would have had to jump or swim to the rafts instead of wading about 150 feet to shore after the captain beached the vessel. Therefore, the NTSB concludes that the captain's decisions to return the vessel to the dock after receiving the engine high-temperature alarm and to subsequently beach the *Island Lady* when smoke overwhelmed the vessel were prudent and increased the likelihood of survival for those on board.

2.3 Insufficient Preventive Maintenance

Tropical Breeze Casino Cruz stated that it had implemented a preventive maintenance program for its vessels after receiving Safety Recommendation M-06-12 in response to the 2004 *Express Shuttle II* fire. However, when investigators interviewed company officials and reviewed maintenance records, they discovered several issues with the program that indicated that it was not adequate or robust.

For example, although the engine manufacturer, Caterpillar, provided a preventive maintenance schedule in its manual, investigators found no evidence that Tropical Breeze Casino Cruz followed all components of the program. Instead, the company engineer had created a basic monthly maintenance report, which recorded only completed maintenance and did not take engine hours into consideration for maintenance intervals, nor did it have a maintenance schedule with future dates for inspections and maintenance to be completed.

The engineer kept this maintenance report for both company vessels on the company's computer in the office on the dock. Investigators examined the *Island Lady*'s maintenance log for the year before the fire, between January 2017 and October 2017. No maintenance records were available before January 2017 and after October 2017. The items listed on the maintenance report were:

“Flush, oil change, fuel filter, heat exchanger, air filter, transmission fluid change, thermostat, belts, battery water, and impeller.”

Several maintenance items that were identified in the Caterpillar maintenance schedule were not included in Tropical Breeze Casino Cruz's monthly maintenance reports, such as the zinc rod replacement, crankcase oil analysis, auxiliary water pump inspections, hose and clamp inspections, engine speed/timing sensor inspections, valve lash adjustments, and fuel injector checks, among other items. Several of these maintenance items were critical for proper operation, and the infrequent maintenance and inspection likely resulted in undetected, wear-related damage.

Based on the captain's statement that he believed a hose may have failed, releasing cooling water onto the port bulkhead, investigators considered the hoses associated with the raw-water system as a possible source for this water release. Caterpillar recommended that the hoses and clamps be inspected every 250 service hours. Although the monthly maintenance report (kept on a shoreside computer) did not include an entry for inspection or replacement of hoses, the daily engine room checklist (kept on board the vessel) had a fillable field titled “Hoses ok.” According to the owner, all completed daily checklists retained on board were consumed in the fire; therefore, investigators were unable to determine the quality of any hose inspections. After discussion between investigators and the owners, although the monthly maintenance reports were kept shoreside, there was no evidence that the company had reviewed them or provided guidance regarding engine maintenance to the engineer, indicating a lack of oversight by the company.

Caterpillar's interval for raw-water pump inspections was every 250 hours. Accordingly, the pumps installed on the *Island Lady* should have been inspected and the results documented at these intervals. However, Tropical Breeze Casino Cruz's monthly maintenance report did not include an entry for inspection of the raw-water pumps. The only reference to the pumps in a report was in May 2017, when an entry recorded the replacement of both pump impellers. When the *Island Lady* operated 6 hours a day, 4 days a week, the pumps should have been inspected about every 10 weeks. Once the engines were being operated 7 days a week (when the *Island Lady* increased the number of trips to the casino boat), the pumps should have been inspected every 6 weeks. After the report entries for the May 2017 impeller replacements, no records were available to show any maintenance or inspections completed on the pumps, nor were there any receipts to show parts purchased for the pumps. Even if the *Island Lady* had been operating at the more conservative 4 days a week, the port engine would have accumulated about 24 hours a week, which would have amounted to about 840 hours in the 35 weeks between the date when the impellers were replaced and the accident. Based on that estimate, the pumps should have been

inspected three times since May 2017, but investigators found no record of inspection or replacement since that date. The NTSB therefore concludes that the company's lack of inspections and infrequent maintenance likely resulted in undetected, wear-related damage causing the port engine's raw-water pump to fail.

Investigators learned that the starboard engine had been overhauled in March 2017, but the port engine had not, although the engines likely had similar running hours. No details were available about the overhaul; no service reports and no engine hours were recorded. According to company officials, at the time of the fire, the engines had an estimated 13,000 hours on them. In an undated vessel specification sheet, sometime after the year 2000, the previous owner had recorded the port engine's hours as "2,191.4."

Photos taken during the drydock in April 2017 and video footage of the vessel's stern on the day of the accident show dark exhaust and soot coating the stern. In an interview, the engineer said that after the vessel was purchased, it started blowing black smoke out of the exhaust. He said several people, including Caterpillar representatives, were unable to determine the source of the smoke. Regardless, the accumulation of soot on the stern indicated that the engines were not operating as designed.

A well-developed oversight system for maintenance should include record-keeping and documentation. The Caterpillar manual recommended that accurate maintenance records be kept to determine operating costs, establish maintenance schedules, and show compliance with maintenance practices and intervals. The manual stated that such records were essential to a well-managed engine maintenance program and should include fuel consumption, service hours, and detailed service records. However, Tropical Breeze Casino Cruz did not follow these elements in its maintenance program. If the company had performed scheduled preventive maintenance and overhauls as Caterpillar recommended, the *Island Lady's* raw-water pump would have been inspected on a regular schedule. The purpose of a raw-water pump is to cool an engine's jacket-water system; without the pump functioning, the jacket water temperature rises and an engine overheats. Additionally, in a wet-exhaust system, loss of raw-water supply will cause the temperature of the exhaust gases in the tubing to rise substantially. Any issues with the pump could have been identified and addressed before the engine overheated. No records were available to indicate that the raw-water pump had been inspected from the time the impeller was replaced to the day of the fire—a period more than three times the length of the manufacturer's recommended interval. The NTSB therefore concludes that if Tropical Breeze Casino Cruz had followed Caterpillar's recommended maintenance schedule for the *Island Lady's* propulsion engines, the failed raw-water cooling pump would have been inspected and likely replaced. The NTSB therefore recommends that Tropical Breeze Casino Cruz develop and apply an oversight system to ensure that its maintenance program complies with the manufacturer's recommended preventive maintenance program for the engines and associated machinery and systems on board its vessels.

Following the two previous fires on board the small passenger vessels *Port Imperial Manhattan* in 2000 and the *Express Shuttle II* in 2004, the NTSB issued and then reiterated Safety Recommendation M-02-5 to the Coast Guard to develop and implement maintenance systems on board domestic passenger vessels. However, because of the Coast Guard's lack of progress on the issue, the recommendation remained "Open—Unacceptable Response" at the time of the *Island Lady* fire. In correspondence with the NTSB regarding the recommendation, the Coast Guard stated that small passenger vessels are already subject to a comprehensive set of regulations designed to promote vessel safety, and that operators are responsible for maintaining their vessels

accordingly. The NTSB replied that it was necessary for companies to develop a preventive maintenance program for all systems affecting the safety of passenger vessels. Preventive or periodic maintenance programs are an integral part of any well-run vessel operation, and a requirement to develop and implement such programs should not be burdensome to vessel operators. With a required, ongoing preventive maintenance program, owners might be less likely to operate substandard vessels that place the public at risk. However, the Coast Guard has yet to require preventive maintenance programs for small passenger vessels.

Currently, numerous operators of domestic small passenger vessels have voluntarily implemented SMS, which include integral preventive maintenance programs. The NTSB maintains that companies operating domestic passenger vessels should be required to develop and implement a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull, mechanical systems, and electrical systems. Had the Coast Guard completed implementation of Safety Recommendation M-02-5, Tropical Breeze Casino Cruz would have been required to have a compliant preventive maintenance program subject to Coast Guard oversight, and the *Island Lady* fire may have been prevented. Therefore, the NTSB once again recommends that the Coast Guard require that companies operating domestic passenger vessels develop and implement a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull and mechanical and electrical systems.

In addition to covering preventive maintenance, SMS also addresses crew training, emergency preparedness, documentation, oversight, and so on. For further discussion, see next section.

2.4 Crew Emergency Response, Training, and Documentation

When the high-temperature alarm for the port engine sounded, there was no obvious indication of fire on board the *Island Lady*. The captain and crewmembers said that they saw steam or light smoke coming from the engine room, and they tried to identify its source by lifting the access hatch to the engine room and by subsequently entering the space. However, at that time, there was no visible fire in the engine room. From what the deckhands told investigators, it is possible that they left the hatch open after the initial check of the engine room. Leaving the hatch open could have supplied the fire with oxygen once the fire spread into the engine room.

After one of the deckhands informed the captain of the steam or light smoke in the engine room, the captain directed the crew to open the doors leading to the main deck to air out the enclosed main deck. Such an action could feed more oxygen to a heat source and is not advisable. Basic marine firefighting training includes closing all vents, doors, and other openings to a fire. The deckhands' leaving the hatch open and the captain's order to air out the enclosed main deck suggested that they lacked understanding of basic marine firefighting principles to limit oxygen to a suspected fire.

Although federal regulations require that crewmembers know their emergency duties before getting under way and that captains conduct sufficient fire drills to ensure that crews are familiar with fire-related duties, only the senior deckhand on the *Island Lady* had participated in a recent fire and emergency drill (in mid-December 2017). The other deckhands, because of their recent employment with Tropical Breeze Casino Cruz, had not yet undergone any emergency training, including fire drills. Deckhand 1 was rehired a week before the accident and said he did recall drills during his previous employment with the company. However, the new-hire deckhand

stated that, during his 5 and a half months of employment with the company, he had not participated in a drill. The pre-hire deckhand had boarded the vessel for the first time just minutes before departing on the accident voyage and had not participated in any onboard drills. Further, although activating the engine room's fire suppression system was not applicable in the *Island Lady* accident, in postaccident interviews only the captain could explain how the system worked.

Following the *Express Shuttle II* fire in 2004, the company agreed to implement NTSB Safety Recommendation M-06-13 to develop and implement a crew training program in marine firefighting. Based on the company's correspondence, the NTSB classified that recommendation "Closed—Acceptable Action" in December 2006. However, the circumstances of the *Island Lady* fire and the postaccident interviews suggest that the *Island Lady* crewmembers were not, in fact, proficient enough in marine firefighting practices. The NTSB therefore concludes that the *Island Lady* crewmembers had insufficient training in firefighting. Moreover, as with its firefighting program, Tropical Breeze Casino Cruz's job training program may need enhancement as well, including greater familiarization with the vessel, company policies, and duties (emergency and other). Given the recurring nature of this company's accidents and the high risk to passenger safety, the NTSB therefore recommends that Tropical Breeze Casino Cruz revise its marine firefighting and job training programs, including documenting both on board and ashore that all crewmembers are qualified and can continually demonstrate proficiency in their duties, such as firefighting techniques and other emergency situations.

The NTSB has long advocated SMS, which is a comprehensive, documented system to enhance safety.²⁸ Safety of operations is the objective behind every action and decision by both those who oversee procedures and those who carry them out. Regardless of the size of the company, an SMS ensures standardized and unambiguous procedures for each crewmember during both routine and emergency operations. Duties and responsibilities are specified and supervisory and subordinate chains of command delineated. As a result, each crewmember understands precisely what he or she is to do in critical phases of operations. In addition, SMS calls for the creation of plans to respond to a range of possible emergency situations, with crewmember duties and responsibilities specified. As noted earlier in this report, SMS also covers preventive maintenance. The Coast Guard requires that US vessels engaged in oceangoing international service have SMS, but such a requirement is not yet in place for the domestic vessel fleet.

Following the 2010 allision of passenger ferry *Andrew J. Barberi* with a terminal at Staten Island, New York, in which 50 people were injured, the NTSB issued Safety Recommendation M-12-3 to the Coast Guard²⁹:

Require all operators of U.S.-flag passenger vessels to implement safety management systems, taking into account the characteristics, methods of operation,

²⁸ See for example SMS-related Safety Recommendations M-05-6 to the Coast Guard and M-05-2 to the New York City Department of Transportation resulting from the 2003 *Andrew J. Barberi* allision with a pier at Staten Island, New York; M-10-7 to ferry operator Interstate Navigation Co. resulting from the 2008 collision between its vessel *Block Island* and Coast Guard cutter *Morro Bay* on Block Island Sound, Rhode Island; and M-14-7 to ferry operator Seastreak, LLC resulting from the 2013 allision of its vessel *Seastreak Wall Street* with a pier at Manhattan, New York.

²⁹ *Allision of Passenger Ferry Andrew J. Barberi With St. George Terminal, Staten Island, New York, May 8, 2010*, Marine Accident Report NTSB/MAR 12/01. Washington, DC: National Transportation Safety Board, 2012. By issuing Safety Recommendation M-12-3, the NTSB superseded a previous SMS-related recommendation, M-05-6.

and nature of service of these vessels, and, with respect to ferries, the sizes of the ferry systems within which the vessels operate.

After the Coast Guard initially responded that it was developing appropriate regulations for all US-flag passenger vessels (part of Public Law 111–281), the NTSB classified Safety Recommendation M-12-3 “Open—Acceptable Response” in May 2013. However, in April 2014, after more than 3 years had passed since Congress authorized the Coast Guard to mandate SMS and nearly 1 year had passed since the Coast Guard (in its response to receiving M-12-3) expressed intent to initiate rulemaking, the NTSB reclassified the recommendation “Open—Unacceptable Response,” the status in which M-12-3 remains as of the date of this report.

The NTSB continues to believe that SMS is an essential tool for enhancing safety on board all US passenger vessels and that the Coast Guard is the appropriate authority to ensure implementation and enforcement of such a system. In the case of the *Island Lady* and Tropical Breeze Casino Cruz, a Coast Guard requirement for SMS would likely have ensured greater adherence to completing crew training drills, appropriate responses to emergencies such as alarms and fires, and failsafe record-keeping of training and maintenance-related documents. The NTSB concludes that implementing SMS on all domestic passenger vessels would further enhance operators’ ability to achieve the higher standards of safety that the Coast Guard requires of US oceangoing vessels in international service. Therefore, the NTSB once again recommends that the Coast Guard require all operators of U.S.-flag passenger vessels to implement SMS, taking into account the characteristics, methods of operation, and nature of service of these vessels, and, with respect to ferries, the sizes of the ferry systems within which the vessels operate.

2.5 Lack of Fire Detection in Unmanned Spaces with Exhaust Tubing

The small passenger vessel regulations at Title 46 *CFR* 181.400(c) require that a space containing propulsion machinery be equipped with a fire detection system of an approved type. The *Island Lady* had a custom-designed and custom-built fire detection system in the engine room, installed in 1994 when the vessel was constructed. The system had a control panel manufactured by Interstate Fire Protection and two heat detectors in the engine room wired directly to the panel.

The captain stated that he did not recall the *Island Lady*’s fire detection system sounding during the fire, which is logical given that the fire did not originate in the engine room where the heat detectors were located. Instead, the most likely place of ignition was the lazarette, where the overheating exhaust tubes led through wood structures at the stern. However, regulations did not require fire detection systems in such spaces, nor was the *Island Lady*’s lazarette equipped with one. Further, the lazarette was unmanned, making early fire detection by the crew unlikely and further investigation difficult.

As evident in the Coast Guard information on fire origination (appendix B), auxiliary spaces (such as lazarettes) are the second-most frequent locations in which fires start on board small passenger vessels. Moreover, these below-deck spaces are often difficult to access, especially while under way. Therefore, automatic fire detection would help crews identify otherwise unknown small fires and provide the opportunity to begin prompt firefighting efforts. Early detection is critical to extinguishing a fire. The earlier a fire is responded to, the better the chance of extinguishing it before it spreads beyond control. In the case of the *Island Lady*, after the undetected fire took hold and spread, it eventually engulfed the entire main deck. The NTSB therefore concludes that had the *Island Lady* been outfitted with fire detectors in the lazarette, the

fire and its location would have been identified earlier, providing the opportunity for swifter response.

The NTSB is concerned that other small passenger vessels do not have fire detection systems in spaces such as lazarettes that contain machinery, hot exhaust tubing, and fuel sources. As shown in this accident, the lack of fire detection in these spaces can put passengers and crewmembers at risk. The NTSB therefore recommends that the Coast Guard require fire detection systems in unmanned spaces with machinery or other potential heat sources on board small passenger vessels.

2.6 Inappropriate Material and Design of Fuel Tank Level-Indicator System

The *Island Lady*'s fuel tanks had tank level indicators constructed of plastic tubing and manually operated metal-construction valves that could isolate the level indicators from the tanks (no automatic shutoff valves were available). Once the fire reached the fuel tank room, the plastic tubing would have quickly melted. If the manual valve for isolating the level indicator was open, the entire content of the fuel tank would empty, exacerbating the fire until the fuel was consumed. Although the position of the isolation valves could not be determined because they had melted from the fire, the tanks were indeed found empty after the fire. If automatic shutoff valves had been available, the fuel in the tank would have quickly been isolated. The NTSB therefore concludes that the use of plastic tubing on local tank level indicators and lack of automatic shutoff valves on the fuel tanks resulted in release of diesel fuel, which contributed to the severity of the fire.

A Coast Guard inspector found the fuel tank isolation valves open during an examination of the *Island Lady* in March 2017, raising concern that the valve arrangement and plastic materials did not meet applicable regulations and instructing the crew to close the valves. The inspector later looked for the regulation against plastic tubing and manual valves for fuel tank level indicators, but was unable to find it. Consequently, the use of plastic materials and lack of automatic fuel shutoff valves was not entered as a finding in the Coast Guard inspection report. Title 46 *CFR* 182.440 (Independent fuel tanks, (a) materials and construction (7) tubular gauge glasses) required the level indicators to be constructed of heat-resistant material and fitted with an automatic shutoff device. The NTSB concludes that during an inspection of the *Island Lady* before the fire, the Coast Guard did not correctly assess the fuel system's compliance with applicable regulations.

Had the Coast Guard reported the *Island Lady*'s fuel tank level-indicator system as failing to meet federal regulations, Tropical Breeze Casino Cruz would have had to replace the components to comply with regulations. The NTSB is concerned that other small passenger vessels may also have plastic tubing or other unapproved material in their fuel tank level-indicator systems, which can put passengers and crewmembers at risk by releasing fuel if a failure occurs during a fire or from impact. The Coast Guard can issue Marine Safety Information Bulletins (MSIBs), which are directed to OCMI and vessel operators and that highlight specific safety issues in recent marine accidents. An MSIB relating to fuel tank level-indicator systems could enhance small passenger vessel safety by highlighting this issue to both regulators and industry. The NTSB therefore recommends that the Coast Guard issue an MSIB that addresses the need to use only approved material and components in fuel tank level-indicator systems.

3. Conclusions

3.1 Findings

1. Weather, fatigue, and impairment due to alcohol and other drugs were not factors in the accident.
2. The high-temperature alarm for the port engine's jacket-water system resulted from a failure of the port engine's raw-water pump.
3. The fire likely started in the port engine's fiberglass exhaust tubing and spread to wood structures in the lazarette, through which the tubing transited.
4. The captain's decision to continue to run the port engine in an overheated condition, even though the starboard engine was available and functioning normally, allowed the port engine to overheat to failure and the engine's exhaust tubing to ignite.
5. Tropical Breeze Casino Cruz did not provide adequate guidance to its crews regarding response to engine and other machinery alarms.
6. The captain's decisions to return the vessel to the dock after receiving the engine high-temperature alarm and to subsequently beach the *Island Lady* when smoke overwhelmed the vessel were prudent and increased the likelihood of survival for those on board.
7. The company's lack of inspections and infrequent maintenance likely resulted in undetected, wear-related damage causing the port engine's raw-water pump to fail.
8. If Tropical Breeze Casino Cruz had followed Caterpillar's recommended maintenance schedule for the *Island Lady*'s propulsion engines, the failed raw-water cooling pump would have been inspected and likely replaced.
9. The *Island Lady* crewmembers had insufficient training in firefighting.
10. Implementing safety management systems on all domestic passenger vessels would further enhance operators' ability to achieve the higher standards of safety that the Coast Guard requires of US oceangoing vessels in international service.
11. Had the *Island Lady* been outfitted with fire detectors in the lazarette, the fire and its location would have been identified earlier, providing the opportunity for swifter response.
12. The use of plastic tubing on local tank level indicators and lack of automatic shutoff valves on the fuel tanks resulted in release of diesel fuel, which contributed to the severity of the fire.
13. During an inspection of the *Island Lady* before the fire, the Coast Guard did not correctly assess the fuel system's compliance with applicable regulations.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire on board small passenger vessel *Island Lady* was Tropical Breeze Casino Cruz's ineffective preventive maintenance program and insufficient guidance regarding the response to engine high-temperature conditions, which resulted in the captain's continued operation of an engine that was overheating due to a cooling water pump failure, leading to ignition of the exhaust tubing and surrounding structure. Contributing to the spread of the fire was the lack of fire detection in the vessel's lazarette, which was not required by regulations and which allowed the fire to take hold unbeknownst to the crew.

4. Recommendations

4.1 New Recommendations

As a result of its investigation of this accident, the National Transportation Safety Board makes the following new recommendations:

To Tropical Breeze Casino Cruz, LLC:

Develop and apply an oversight system to ensure that your maintenance program complies with the manufacturer's recommended preventive maintenance program for the engines and associated machinery and systems on board your vessels. (M-18-11)

Revise your marine firefighting and job training programs, including documenting both on board and ashore that all crewmembers are qualified and can continually demonstrate proficiency in their duties, such as firefighting techniques and other emergency situations. (M-18-12)

To the US Coast Guard:

Require fire detection systems in unmanned spaces with machinery or other potential heat sources on board small passenger vessels. (M-18-13)

Issue a Marine Safety Information Bulletin that addresses the need to use only approved material and components in fuel tank level-indicator systems. (M-18-14)

4.2 Previously Issued Recommendation Reiterated in this Report

As a result of its investigation, the National Transportation Safety Board reiterates the following safety recommendations:

To the US Coast Guard:

Require that companies operating domestic passenger vessels develop and implement a preventive maintenance program for all systems affecting the safe operation of their vessels, including the hull and mechanical and electrical systems. (M-02-5)

Require all operators of U.S.-flag passenger vessels to implement safety management systems, taking into account the characteristics, methods of operation, and nature of service of these vessels, and, with respect to ferries, the sizes of the ferry systems within which the vessels operate. (M-12-3)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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Adopted: December 11, 2018

Appendix A

Investigation

On January 15, 2018, the NTSB launched an investigator-in-charge from the Office of Marine Safety, who interviewed crewmembers, employees, passengers, and good Samaritans. Witness videos were obtained and inspection documents reviewed. In May 2018, investigators returned to Port Richey to inspect the salvaged engines together with the engine manufacturer. In October 2018, the investigator in charge returned to Port Richey and conducted further interviews with the company owner.

The NTSB investigated the fire under Title 49 *CFR* 1131 as an accident of recurring character because of a similar fire on board another of the operating company's vessels, the *Express Shuttle II*, in 2004.

Appendix B

Table of Vessel Fires

Coast Guard-provided information on fire origination, compiled from its MISLE database (Marine Information for Safety and Law Enforcement).

Fires on US-Flag Inspected Passenger Vessels				
2001–2018	Subchapter			
Source Analysis	H	K	T	Subtotals
Engine Room	24	62	187	273
Auxiliary	21	7	3	31
Accommodation	4	3	13	20
Exhaust	1	4	9	14
Wheelhouse	1	2	7	10
Galley	1	1	7	9
Unspecified		2	5	7
Arson		1	4	5
During Drydock	1		2	3
Shore Connection		1	1	2
Main Deck		1	1	2
Storage		1		1
Pilothouse		1		1
Trailorized			1	1
Fire at Shipyard			1	1
Rescue boat	1			1
Shoreside Source		1		1
Hotwork main deck			1	1
Grand Totals	54	87	242	383

MISLE data as of November 28, 2018