



National Transportation Safety Board

Marine Accident Brief

Grounding of Commercial Towing Vessel *Justice*

Accident no.	DCA13NM013
Vessel name	<i>Justice</i>
Accident type	Grounding
Location	Hog Island Channel, 140 yards northeast of light 17, near Cape Cod Canal, MA 41°43.04' N, 70°38.80' W
Date	March 21, 2013
Time	0001 eastern daylight time (UCT – 4 hours)
Injuries	None
Damage	\$1,207,600
Environmental damage	Est. 232 gallons of unrecoverable gear oil released into Buzzards Bay, causing a visible sheen in 50- to 500-sq-ft patches
Weather and sea conditions	Clear, winds west to northwest 5 to 10 knots, calm seas, air temperature 30°F; Hog Island Channel had a northeasterly current and was beginning flood tide
Waterway information	Hog Island Channel, connecting the west side of Cape Cod Canal to Buzzards Bay, is 4 miles long, 500 feet wide, dredged to a controlling depth of 32 feet

The towing vessel *Justice* was heading to Buzzards Bay, Massachusetts, with five crewmembers when it grounded on a hard, rocky bottom southwest of Cape Cod Canal, just outside Hog Island Channel on March 21, 2013. The impact, at 0001 eastern daylight time,



Boston Towing and Transportation's tug *Justice*.
(Photo by Chris Grimaldi, www.tugboatinformation.com)

sheared the starboard stern drive from the vessel and resulted in the discharge of 232 gallons of gear oil. The vessel docked 15 minutes later without further incident using its remaining port stern drive. No one was injured.

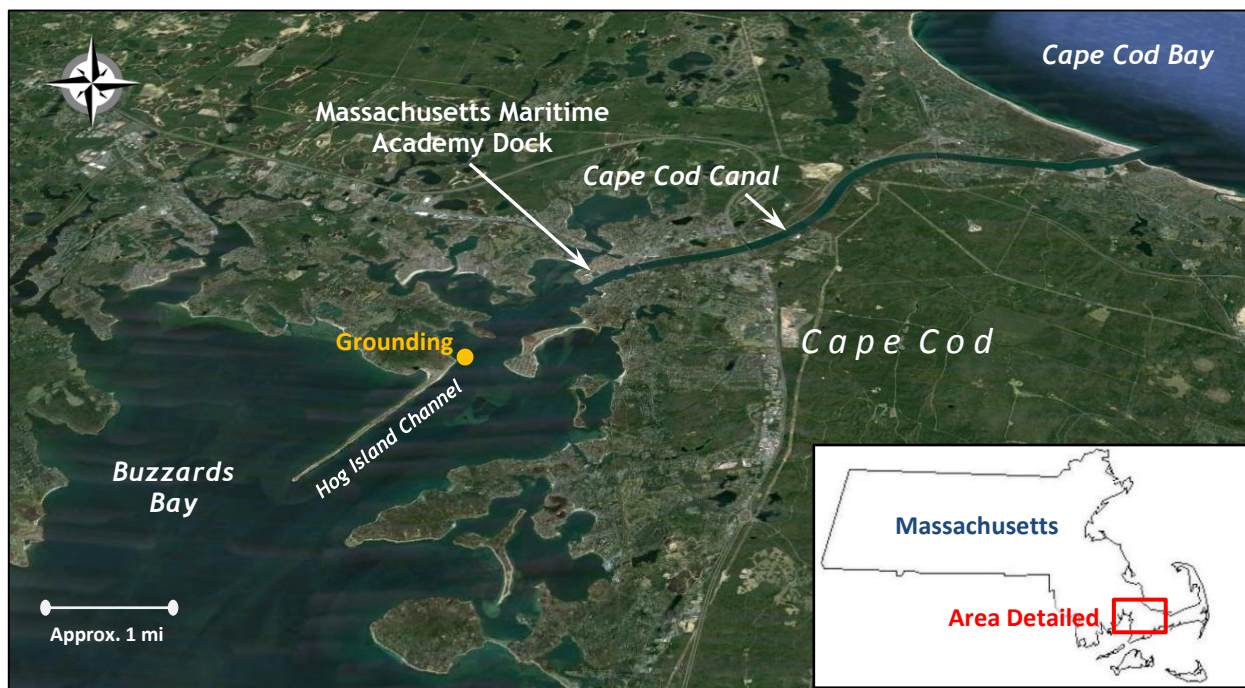
The *Justice* was specifically designed for Boston Towing and Transportation to provide offshore terminal support. According to the designer, the vessel is a modified Ramparts 3000 class tug, capable of varied duties, including harbor and coastal towing, ship handling, and

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firefighting. At the time of the accident, the vessel was transiting solo for a scheduled vessel escort operation.

Propulsion and steering on the *Justice* is provided by twin azimuthing stern drive (ASD) propulsion units, commonly referred to as z-drives. Each unit is shaft-driven by a main engine and able to rotate 360 degrees via integral hydraulic motors, eliminating the need for rudders. The unit's controllable pitch propeller blades combined with the rotation allow for variable thrust in any direction.

At 2000 on March 20, the evening before the grounding, the *Justice* was moored at the Massachusetts Maritime Academy pier, having just completed a westbound transit through Cape Cod Canal with the master navigating the vessel. For the previous several months, the *Justice* was usually docked at this pier when awaiting escort jobs eastbound through Cape Cod Canal. The vessel was scheduled to meet the tug *Barbara McAllister* and barge *B-220* at 0300 the next morning at Buzzards Bay Tower. The tug was to escort the tow as it transited eastbound through the canal.



Cape Cod Canal, northern Buzzards Bay, and the grounding location. (Background by Google Earth)

The crew of five consisted of a licensed master, licensed mate, chief engineer, assistant engineer, and deckhand. The mate assumed his scheduled navigation watch at 2330; the deckhand was performing general duties at that time, and the remainder of the crew was off duty. The mate conducted pre-underway equipment checks in preparation for the tug's departure. The checks, which included the chart plotter and radar, were satisfactory, and at 2340, the mate maneuvered the tug off the pier and began the southwest transit through Hog Island Channel toward the bay.

About 2344, the mate used the tug's autopilot feature to set the port ASD to steer and hold a course of 216 degrees, which he typically used to transit that leg of the channel. The vessel's speed was about 8.5 knots, and the mate adjusted the autopilot manually to make minor course corrections for set and drift. He stated that the navigational and propulsion systems were

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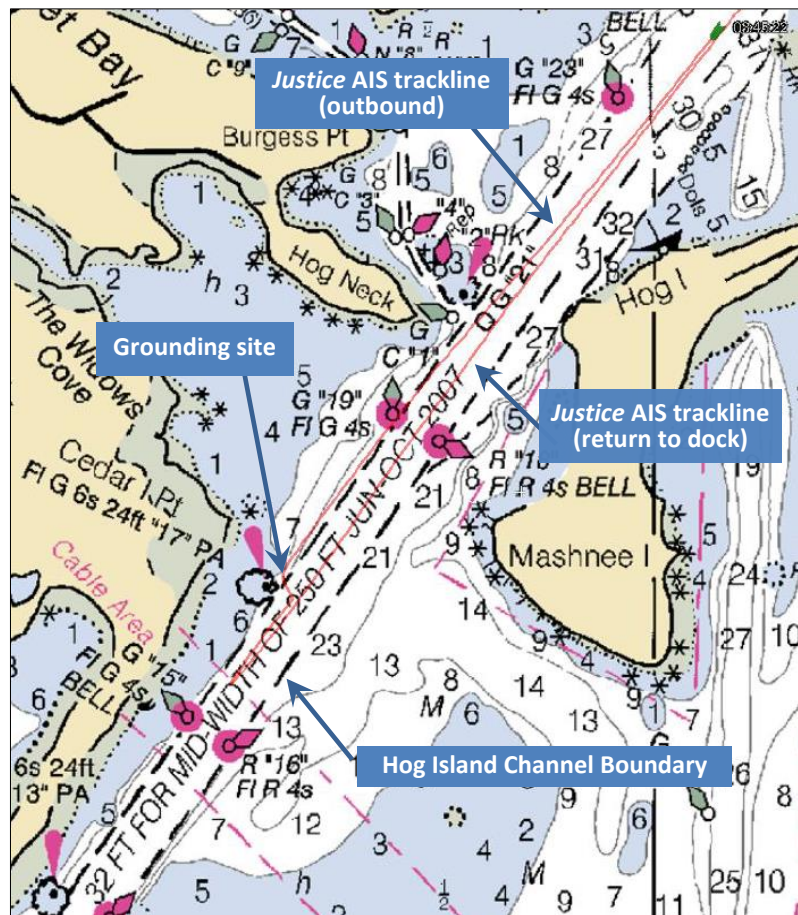
functioning properly, and he continually watched his surroundings and checked the chart plotter and radar.

About 10 minutes later, the deckhand arrived in the wheelhouse, but he did not have a clear view of the tug's path from his seat to the port side and aft of the mate's centerline helm chair. The mate stated that he may have started the accident leg a bit further to starboard than normal in the channel, but he was comfortable with the tug's position. As the transit continued, however, he became aware that the vessel was moving toward the west side of the channel, and about 2359, he became concerned with its position. The mate said he did not immediately take manual control of the steering because he anticipated that his current autopilot command (requested course) would cause the ASD to "kick in" and adjust the vessel's heading to the minor course corrections he had entered.

The Coast Guard developed a trackline from automatic identification system (AIS) data that showed the tug had been moving progressively to starboard and crossed outside the channel's western edge near buoy 19 (see AIS trackline, at right). About 0001, the mate determined that the current autopilot command would not bring the vessel back into the channel given its speed and course, and he manually took control of the steering. Five seconds later, the *Justice* grounded about 140 yards northeast of the charted position of Hog Island Channel light 17, shearing off the integrated nozzle and propeller (lower part) of the starboard ASD.

Following the grounding, the mate found the starboard ASD unresponsive, and he shut down the starboard engine. Using the port ASD, he maneuvered the vessel back into the channel and notified Cape Cod Canal Control of the incident. The *Justice* immediately took on a 2- to 4-degree port list due to the lost weight of the sheared-off starboard ASD. The master was awakened by a "rumbling" sound, and when he arrived on the bridge, he coordinated a vessel assessment by directing the crew to check all spaces for flooding. With no water ingress reported, he then relieved the mate, piloted the *Justice* back to Massachusetts Maritime Academy, and docked at about 0015.

Each ASD consists of three parts. The upper part within the hull containing the hydraulic oil is mounted to the intermediate section reservoir. The intermediate part, which is integral to

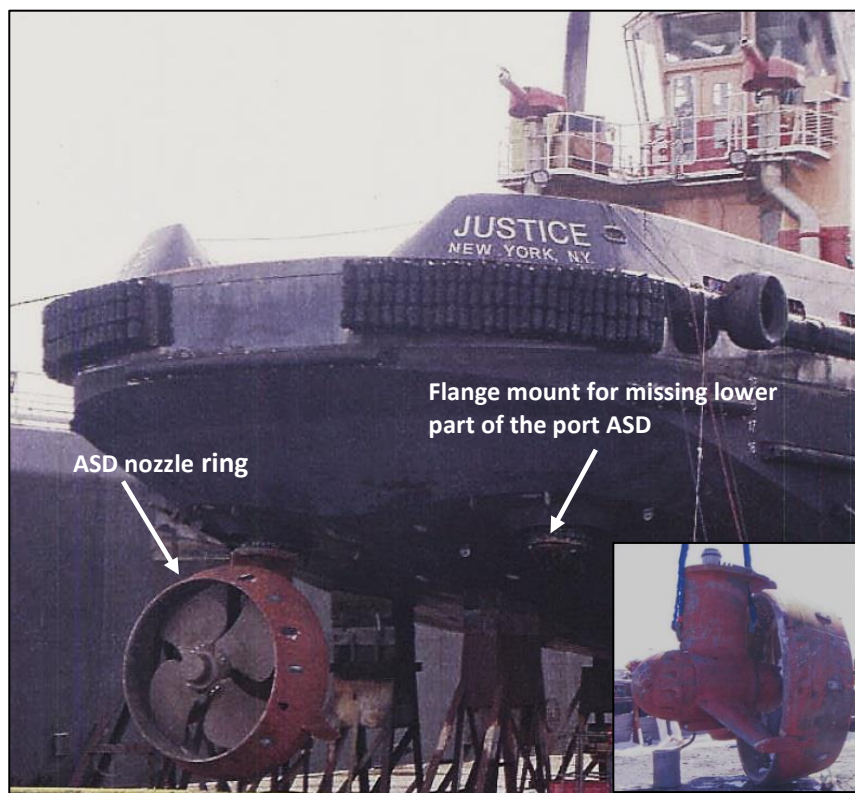


AIS trackline in red, channel boundaries (black dashes), and site of grounding. (Excerpt from NOAA Nautical Chart 13236)

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the hull structure, provides mounting flanges for the upper and lower parts and allows for shaft penetration through the hull. The lower part consists of the propeller and nozzle ring. A flange mounting surface with threaded fasteners connects the lower part to the intermediate part. These fasteners sheared off as a result of the impact, causing the lower part of the ASD to fall from the tug to the channel bottom. The port and starboard ASDs extend below the hull by about 32 inches. This allowed the forward portion of the tug to pass over the obstruction that impacted the aft-mounted ASD. (See photo of *Justice* in dry dock, below.)

After the grounding, the Cape Cod Canal was closed to deep-draft vessels by the US Army Corps of Engineers, New England District, which is responsible for operations and maintenance of the waterway, and reopened after the lost ASD was located later the same day. The lower part of the ASD was recovered by 1806 on March 21 and placed on a barge. As the unit was designed, the upper part of the starboard ASD filled with seawater after the loss of the lower part, but flooding was contained in the upper part and no water entered the hull.



Stern view of *Justice* in dry dock after the accident. Inset, lower part of starboard ASD after salvage. (Photo by Coast Guard)

The starboard ASD held 630 gallons of Mobil Gear 600 XP 100 gear oil—398 gallons were recovered from the upper and lower parts of the ASD, but the remaining 232 gallons were released into the waterway. Pollution response units were alerted to the incident, and overflights of Buzzards Bay began on March 21. A visible oil sheen was reported but deemed unrecoverable. Another visible sheen was seen around the vessel at the Massachusetts Maritime Academy dock, and sorbent boom was deployed around the vessel the morning after the accident. The tug held 36,788 gallons of diesel fuel at the time, but without

damage to the hull, no fuel oil was released. The owner reported that costs to repair the *Justice* were about \$1,207,600.

The mate was operating in autopilot when the grounding occurred. The SIMRAD AP50 autopilot on the *Justice* is connected only to the port ASD. The starboard ASD is physically set by the operator to thrust directly aft, supplying only ahead propulsion when in autopilot. This starboard unit thrust is available for immediate use without disengaging the autopilot. The autopilot system displays the tug's ordered course, its actual course, and the autopilot's actual commands to the port ASD to achieve the ordered course. The operator can either type in an autopilot course change or adjust the autopilot course by pushing a single button in increments as

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small as 1 degree. During the channel transit, the mate of the *Justice* was inputting incremental changes to hold his course.

The autopilot operates on two settings—Auto and Work. Both settings change the direction of the port ASD only (not the propeller pitch, and therefore thrust) and do not compensate for set and drift. The Work setting provides a quicker response and holds a tighter course than the Auto setting.

Electronics technicians conducted post-accident testing on March 22, 2013, the day after the grounding and again during post-repair sea trials in June 2013. They found the autopilot to be functioning normally. The mate stated that use of the autopilot was common practice for this transit and he routinely set a course of 216 degrees on the accident leg of the channel. The Boston Towing and Transportation operations manual does not restrict or limit the use of autopilot by the vessel operator.

The mate held credentials for master of towing less than 200 gross registered tons in near coastal waters and master of steam or motor vessel not more than 200 gross registered tons. He had worked for Boston Towing since 2003 and previously on two other company towing vessels outfitted with ASDs. He arrived on board the tug on March 19 at 1030 to begin his 7-day work rotation of 1 week on and 1 week off. He shared watch and navigational duties with the master, working 6 hours on and 6 hours off, from 2330–0530 and 1130–1730. He had worked as a mate on the *Justice* since August 2012, and he typically transited the canal once or twice a week, both at night and during the day.

Following the accident, the mate and the other four crewmembers were tested for alcohol and drugs with negative results. Records for use of the vessel cell phone and the mate's personal cell phone indicate they were not a distraction.

The mate had navigated the same waterway for the past 7 months and was familiar with the operating characteristics of the towing vessel. He stated that the transit was routine until moments before the grounding, the vessel's propulsion and navigation equipment were functioning normally throughout the transit, no other vessels were nearby, and he did not feel that the current and weather were factors in the grounding. He further stated that during the transit he was continually conducting visual checks of his surroundings, the chart plotter, and the radar. He stated that he did not feel the vessel was unusually close to lighted buoy 19, although AIS shows the vessel's trackline passing a few feet from the buoy. No discrepancies were found with the tug's autopilot function or with the aids to navigation in the waterway, as verified by the Coast Guard and Army Corps of Engineers the following morning.

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Looking east at light 17 in Hog Island Channel. The structure is 24 feet high and flashes a green light every 6 seconds.

On the night of the accident, navigational aids—channel markers, lights, and lighted buoys—as well as the vessel’s chart plotter would have provided clear visual indications of the 500-foot-wide navigable channel. Light 17, above, is a large fixed structure with a flashing green light. AIS data show the *Justice* was on a course toward this light when the vessel grounded on a charted rocky ledge 140 yards before it. The mate’s use of autopilot was considered typical, and he was making minor course corrections to the autopilot in an effort to maintain his position in the channel. However, avoiding the rocky ledge would have required aggressive course adjustment well in advance of light 17.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the grounding of the commercial towing vessel *Justice* in Hog Island Channel was the mate's ineffective use of the vessel's autopilot to maintain a course within the navigable channel and his delay in taking manual control as the vessel approached charted hazards.

Vessel Particulars

Vessel	<i>Justice</i>
Owner	Reinauer Transportation Companies
Operator	Boston Towing and Transportation
Port of registry	New York, NY
Flag	United States
Class, type	Commercial towing vessel, harbor/ship assist (tug)
Builder, date	J.M. Martinac Shipbuilding Corp. Tacoma, WA Built 2009
Official number (US)	1223348
Construction	Steel
Length overall	98 ft (29.9 m)
Beam	36.0 ft (11.0 m)
Depth	17.7 ft (5.4 m)
Draft forward/aft ^a	16.5 ft (5 m)/19.5 ft (5.9 m)
Gross and ITC tonnage	197 gross tons, 399 ITC tons
Engines	Two 2,700-hp MTU 16V-4000 engines, total 5,400 hp (4,027 kW)
Propulsion and steering	2 Rolls Royce US-255 controllable pitch azimuthing stern drives (ASD)
Fuel	40,000 gal tank capacity 36,788 gal diesel on board
Persons on board	5 crew

^a Aft draft marks measure the draft to the lowest point of the ASD nozzle ring, while forward draft marks are taken from the bottom of the skeg.

For more details about this accident, visit www.nts.gov/investigations/dms.html and search for NTSB accident ID no. DCA13NM013.

Adopted: May 29, 2014

The NTSB has authority to investigate and establish the probable cause of any major marine casualty or any marine casualty involving both public and nonpublic vessels under 49 *United States Code* 1131. This report is based on factual information provided by the US Coast Guard from its informal investigation of the accident and NTSB onsite investigation and analysis.