National Transportation Safety Board

Marine Accident Brief

Grounding and Sinking of the Harbor Tug *Kaleen McAllister*

Accident no.	DCA13LM020
Vessel name	*Kaleen McAllister*
Accident type	Grounding and sinking
Location	Northwest Harbor, Baltimore, Maryland (39°16'9.38" N, 76°34'47.73" W)
Date	May 4, 2013
Time	1951 eastern daylight time (coordinated universal time – 4 hours)
Injuries	None
Damage	Est. $1.5 million in repair costs
Environmental damage	Est. 2,400 gallons of marine diesel fuel discharged to the harbor
Weather and sea conditions	Clear skies, winds northeast 14 to 18 knots, air temperature 61°F, water temperature 61°F, mean wave height 1 foot, tide ebbing (1 foot higher than predicted)
Astronomical data	Sunset 2003, civil twilight ending 2032 eastern daylight time
Waterway	Patapsco River, sheltered harbor channel

Near sunset on the evening of May 4, 2013, the harbor assist tug *Kaleen McAllister* got under way from its berth in Baltimore Harbor with a crew of three to assist in docking a tow and barge entering the port. A few minutes later, the tug struck the charted edge of an adjacent collapsed pier and began flooding. The tug returned to its berth, where the crew and shoreside support personnel attempted to control the flooding, but the effort was unsuccessful and the vessel sank alongside the pier within 30 minutes. No one was injured; the sinking resulted in the discharge of about 2,400 gallons of diesel fuel and estimated vessel repair costs of $1.5 million.

Harbor assistance tug *Kaleen McAllister*, Baltimore Harbor, October 2010. (Photo from www.shipspotting.com)

The *Kaleen McAllister* is a subtype of towing vessel typically known as a harbor assist tug. These tugs assist larger and less maneuverable ships or large tows with barges in docking and transiting to and from the confined waters of harbors. Harbor assist tugs have a relatively deep draft and high propulsive power for their size.

The *Kaleen McAllister* was purpose-built in 1960 as the conventional single screw and rudder US Navy shipyard tug *Pontiac* (YTB-756). The vessel was repowered and converted to a commercial tug in 2003. A single Z-drive, or azimuthing stern drive (ASD), replaced the propeller and rudder. The ASD unit is shaft-driven from the main engine and able to rotate 360 degrees via integral hydraulic motors, eliminating the need for a rudder. The unit's propeller blades are controllable pitch, which allow for variable thrust in any direction. In 2011, the vessel was repowered again to the current main engine.

The *Kaleen McAllister* was berthed at Pier 1 in North Locust Point, Baltimore Harbor, near Fort McHenry with other boats in the McAllister fleet (see harbor image, below). The tug's crew was assigned to work shifts on the tug for a number of days in a row and usually did not stay on board the vessel overnight during their shifts as McAllister dispatch would call them for intermittent escort jobs throughout the day. With a three-person crew, the master or mate typically operated the tug from the wheelhouse while the other was on standby (not necessarily in the wheelhouse), and a deckhand assisted on deck. On the morning of the accident, the crew was called at home about 0500 for the tug's first assignment of the day. The tug was operated by the mate and under way by 0615, returning to its berth at 0905. The vessel departed for a second job at 1218 with the master at the helm and returned at 1450.

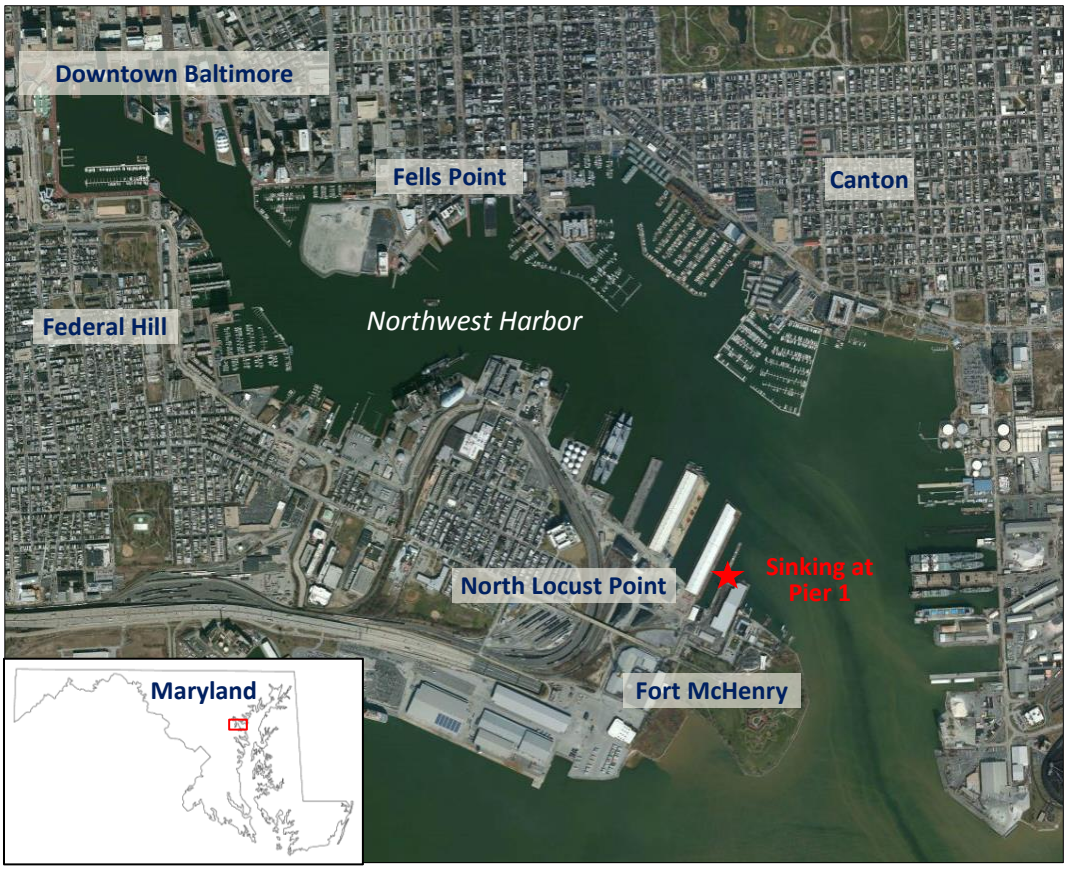
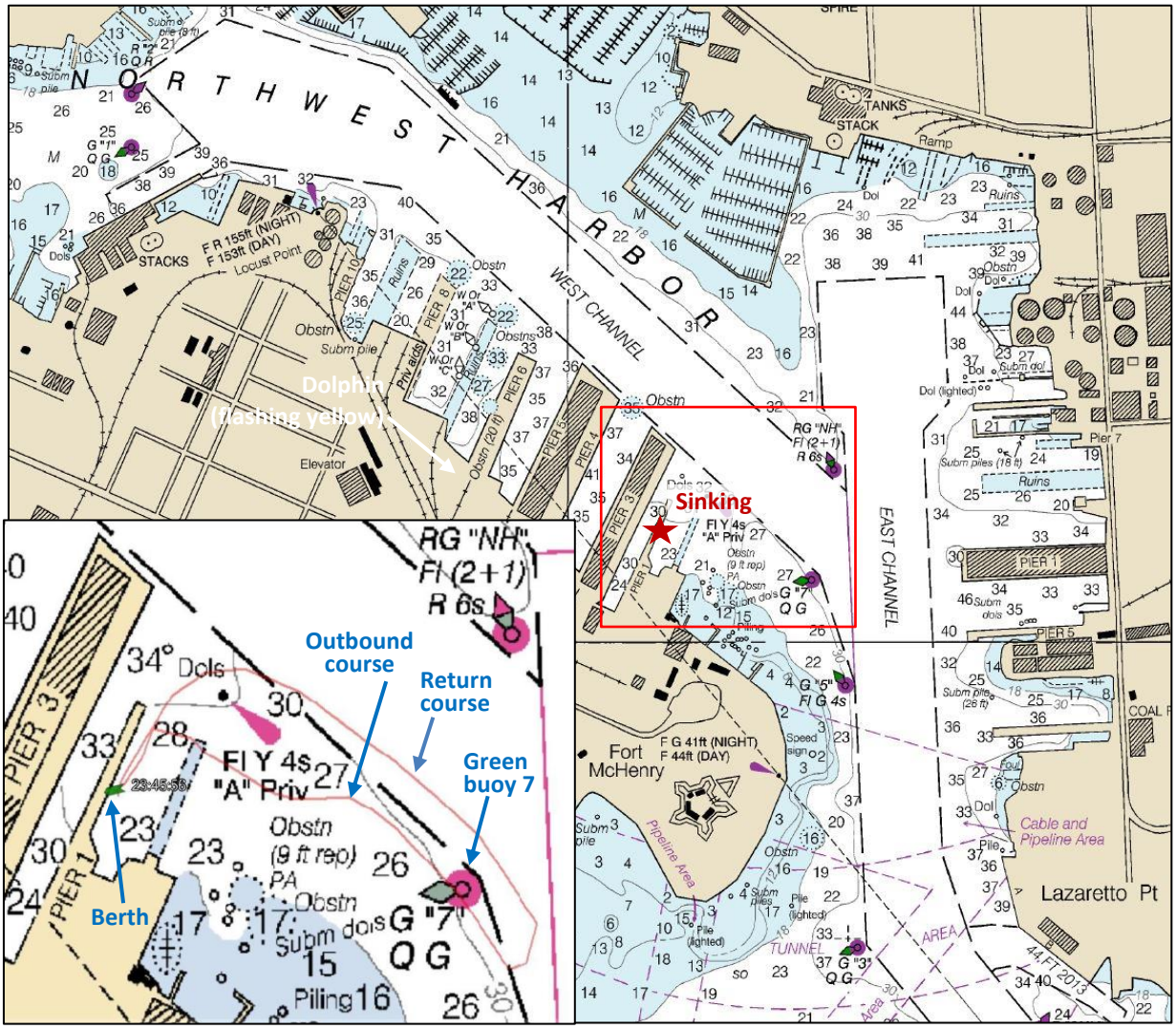


Image of the Northwest Harbor arm of Baltimore Harbor, indicating the site of the grounding and sinking. (Background by National Geographic MapMaker)

At 1745, the crew was called at home for a third assignment to assist in docking a tow and barge entering the port. The crew was on the tug and preparing to get under way by 1930, with the mate navigating. At 1948, the mate backed the tug astern to the end of the pier. He then turned to port to head eastward into the harbor and West Channel (see chart excerpt and automatic identification system [AIS] track, below). He centered the wheel and increased power, and the tug came up to 5 knots.



Portion of NOAA Chart 12281, Baltimore Harbor, showing the West Channel. Inset at lower left is a close-up of Pier 1 showing the *Kaleen McAllister*'s outbound and return tracklines in light red. The outbound course from the tug's berth travels east past the end of the submerged pier, also indicated on the chart.

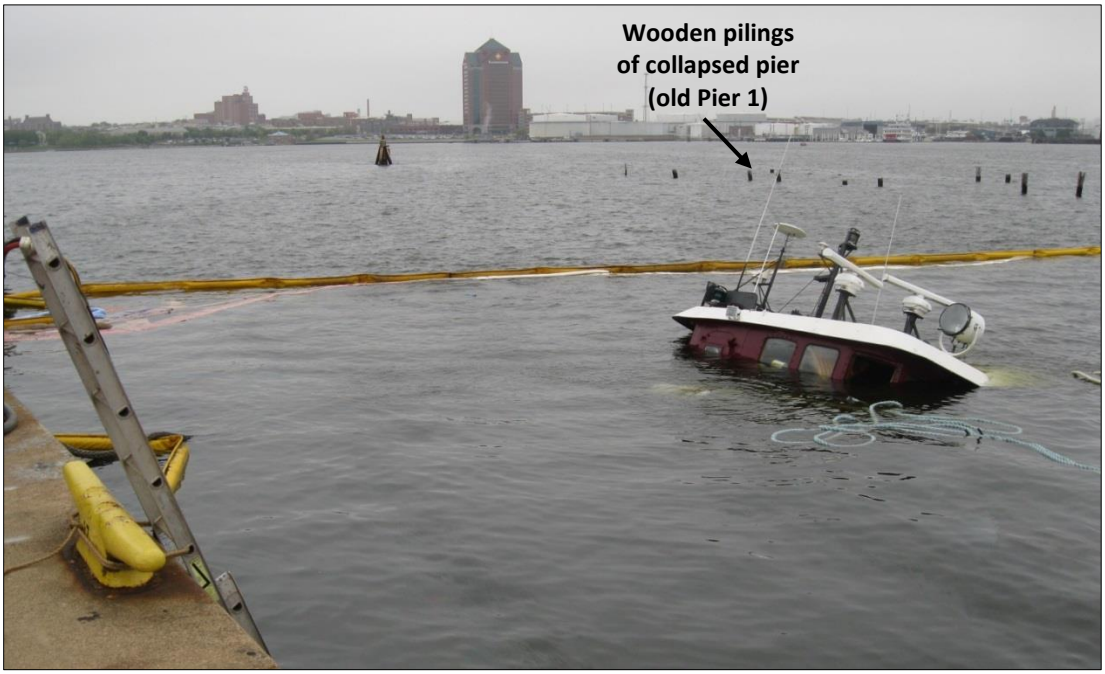
The mate stated that he was navigating by visual reference to maintain the green no. 7 buoy dead ahead of him, and he intended to pass between the lighted yellow dolphin (cluster of closely driven piles) and the adjacent collapsed pier that was parallel to Pier 1. Based on his experience with the area, he judged that he would pass clear to the north of any hazards associated with the collapsed pier. He also stated that he did not refer to the chart plotter on a laptop in the wheelhouse. About 1951, he felt "a rumble under the hull" and stopped the engine. At that time he noted that "the pilings of the abandoned pier were closer to my starboard side than anticipated."

The master stated he was in his room when the tug departed and a few minutes later felt "contact of the hull with a submerged object." When the mate shouted for assistance, the master

went to the wheelhouse where he noted that the depth finder showed enough water under the keel to operate. The master took over maneuvering the tug as the deckhand and mate went to the machinery spaces to check for damage. They shortly discovered rapid flooding in the engine room bilge and informed the master. The master felt it was unsafe to proceed, turned the vessel back around to return to Pier 1, and notified McAllister's dispatch office and the United States Coast Guard of the contact.

The water level quickly rose to the engine room deck plates, and the master directed the deckhand and mate to pump out the space with portable diesel pumps. About 7 minutes later, at 1958, the tug reached Pier 1 and tied up starboard side to the pier. The first portable dewatering pump was running and a second was rigged to assist. Flooding was outpacing pumping, and a call for assistance brought three more pumps to the effort from the tugs *Treasure Coast*, *Sun Coast*, and a Baltimore Fire Department fire boat. Eventually, five pumps were placed on the deck of the *Kaleen McAllister* with suction hoses running down into the machinery spaces. As the vessel continued to sink deeper and list, however, it became clear the pumping would fail. The crew then worked to cover the diesel fuel tank vents with plastic and tape to minimize oil pollution. Although the vessel had both a fixed diesel bilge/ballast pump and an electric fire pump that could be used to pump the bilge, operating them required lining up bilge system valves in the engine room. Because the water level in the engine room had rapidly submerged these valves and created a risk of electrocution, the portable pumps were used instead.

The mate stated that McAllister's shoreside managers arrived on scene and assisted in the damage control and prepared a pollution response. They considered using another tug to push the *Kaleen McAllister* further into the berth where the water was shallower, but due to the vessel's large list and the rapid rate at which it was sinking, an attempt was deemed too dangerous. By about 2030, the tug had sunk and an oil sheen was observed. The vessel settled on the bottom with a port list and its wheelhouse top just above the surface of the water.



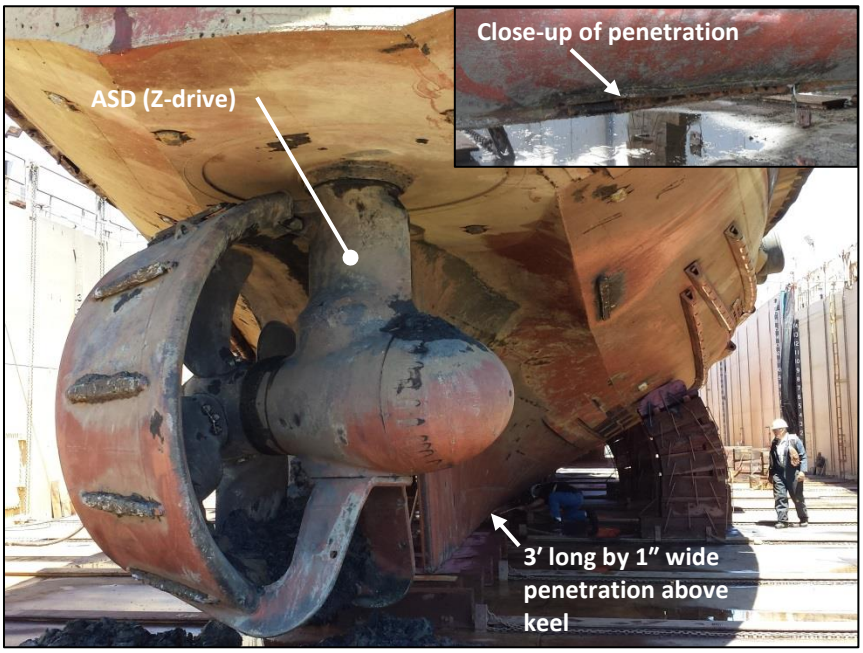
The sunken vessel oil-boomed off and resting on the bottom at its berth on the east side of Pier 1 on May 6, 2013. The remaining exposed pilings of the collapsed pier and associated dolphin are seen above the wheelhouse.

As an uninspected towing vessel (UTV), the *Kaleen McAllister* was not required to be inspected by the Coast Guard, but the owner participated in the Coast Guard's voluntary towing

vessel examination program. The last exam was successfully completed in January 2012 and was valid for 3 years. UTV exams deal primarily with mariner credentials, vessel documents and records, and onboard equipment related to navigation, lifesaving, firefighting and prevention, pollution prevention, and towlines. They do not include hull or other machinery assessments required for Coast Guard–inspected vessels.

The vessel was underwater for 3 weeks, and the owner estimated $1.5 million in repairs would be required to return the tug to service. According to the McAllister operations manager, the vessel had about 16,769 gallons of diesel fuel on board before the accident. A few hundred gallons of lube and hydraulic oil were also on board. Immediately following the sinking, an oil spill response company placed booms around the vessel. A salvage company was hired to defuel, dewater, lift, repair, and refloat the tug. An estimated 2,400 gallons of diesel fuel was discharged into the harbor.

The tug was refloated on May 25, 2013, and divers found a 3-foot by 1-inch hole in the 5/8-inch hull plating adjacent to the keel on the starboard side. The hole was temporarily patched, and the vessel was towed to a Baltimore shipyard on May 26.

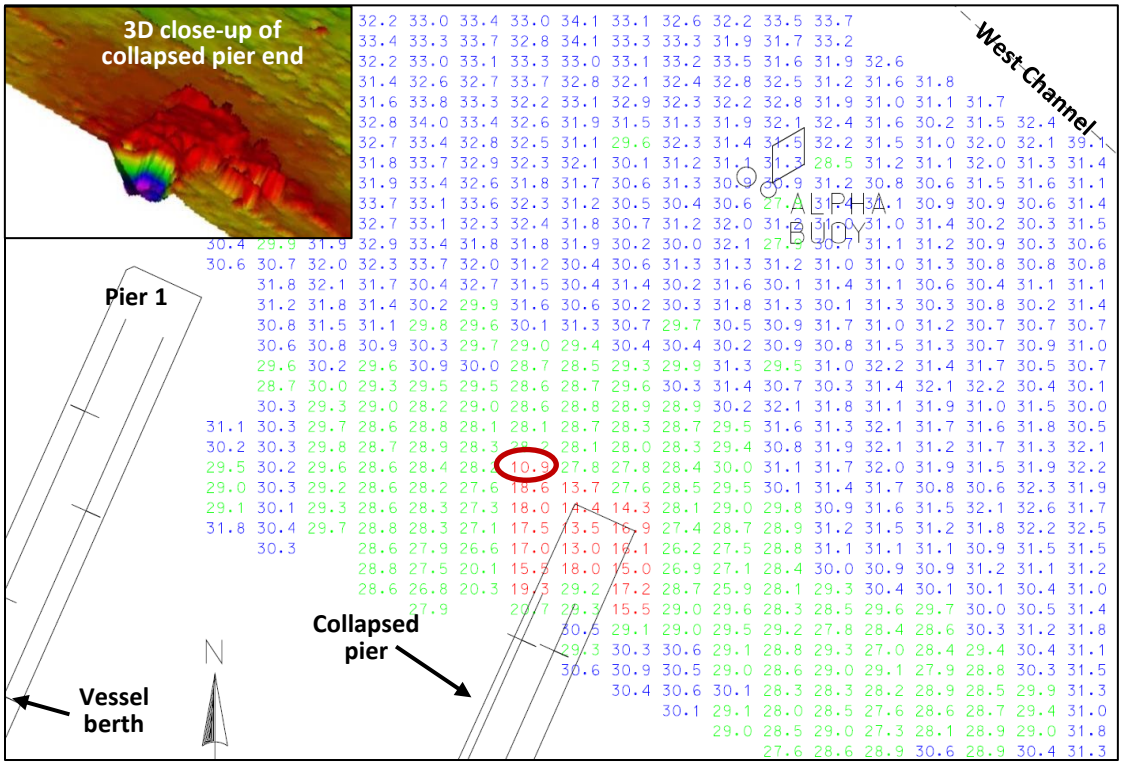


Kaleen McAllister **in dry dock after salvage. Location of 3-foot-long hull tear shown in upper right inset. (Photographs by Coast Guard)**

According to the end-of-month log for April 30, the *Kaleen McAllister* had 12,269 gallons of diesel on board. A few days before the accident, the *Kaleen McAllister* received the remaining diesel fuel (about 4,500 gallons) from a sister tug to facilitate a routine dry-docking of that vessel. As a result, the *Kaleen McAllister*'s diesel tanks were at about three-quarters capacity and the tug's resulting draft was about 14 feet 6 inches, according to crew interviews. The mate stated that this draft was deeper than usual.

A hydrographic sidescan sonar survey conducted by the US Army Corps of Engineers on May 10 detailed the bottom profile at the north end of the collapsed pier, east of the current Pier 1 where the tug was berthed. The survey shows that depths near the northwest corner of the pier along the *Kaleen McAllister*'s AIS trackline were as low as 10.9 feet at mean lower low water (MLLW). Data from the buoy nearest the accident verified the tide at the time of the grounding was 1.6 feet above MLLW (1 foot higher than predicted), resulting in a water depth

above the northwest corner of 11.5 feet. These data, in conjunction with the tug's draft of over 14 feet and crew statements regarding the time they heard and felt the tug strike something, indicate the vessel struck a fixed, submerged object at the northwest end of the collapsed pier.



US Army Corps of Engineers sidescan sonar hydrographic survey results for the area between the West Channel and collapsed pier struck by the tug. Soundings are measured in feet to mean lower low water, the same baseline used on local NOAA nautical charts. Red circle indicates the shallowest sounding near the end of the collapsed pier.

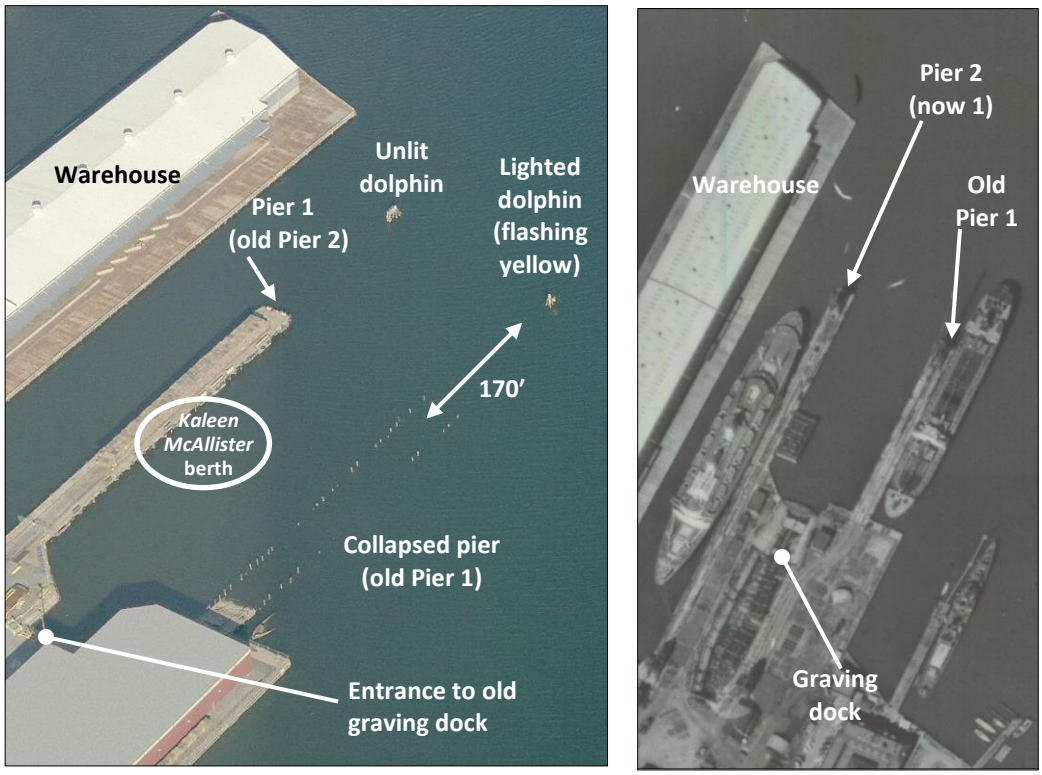
The crew of the *Kaleen McAllister* worked varying shift rotations on board the vessel. The master had a 14-day shift on the tug and then 14 days off, the mate was 19 days on and 9 off, and the deckhand was 14 days on and 7 off. The mate started his "time on" shift on April 22, 2013. On the evening of May 2, he slept on board the vessel from 2230 to 0430, and on the evening of May 3 he slept at home from 2230 to 0500. He also took a rest between jobs on the afternoon of May 4. Therefore, fatigue does not appear to be a factor in the grounding. After the accident, the master, mate, and deckhand were directed to undergo alcohol and drug testing, and all results were negative.

The mate had been a deckhand/utility man with McAllister for 8 years and began working as a mate-in-training after receiving his mate's endorsement in the spring of 2012. He was assigned to the *Kaleen McAllister* about 3 months before the accident to continue his training. The master of the *Kaleen McAllister* stated he had been serving as trainer to the mate and remained in the wheelhouse with him when the mate was operating the tug until about 2 months before the grounding.

The tug was navigated by a yoke controller in the wheelhouse. A laptop located at the helm used Rosepoint ECS 2011 navigation software with global positioning system (GPS) input. The vessel was equipped with multiple GPS units and two 3-cm radars. The mate stated that on the accident trip, and typically when transiting east, he backed off Pier 1 and dead reckoned to buoy 7, an unlit buoy to the east (see chart image/AIS track). This path would route the tug through a gap of about 170 feet between the collapsed pier and its dolphin.

On the first trip and third trip (grounding trip) of the day, with the mate operating, the data show a transit between the lighted dolphin and the sunken pier. However, on the second trip, when the master was operating the tug, the data show an initial track further north, between both dolphins, before heading east above the lighted dolphin and entering the channel. Corroborating the second trip's data, the master of the *Kaleen McAllister* told Coast Guard investigators that the tug was docked bow-in 90 percent of the time at the berth. When docked in that orientation, he would back the vessel to the end of the pier, turn 180 degrees, and then go forward until the tug was north of the dolphin before turning to starboard and proceeding east. He attributed this practice to an abundance of caution. However, the master had witnessed the mate on 30 or 40 jobs and was aware that both the mate at the time of the grounding and other McAllister tug masters navigated between the dolphins and the collapsed pier, and it seemed to be a safe practice.

Arrangement and History of the Piers



Left, aerial view looking north of the accident area in 2012 (photo by Bing Maps). Right, piers 1 and 2 associated with a graving dock in 1972 (photo from John Hopkins University, https://jscholarship.library.jhu.edu/).

McAllister harbor tow operations had recently moved to the property near the accident location. In July 2011, McAllister towing contracted for berthing its Baltimore Harbor towing vessels at what is now charted as North Locust Point Pier 1. This pier was part of the Lower Yard of the Bethlehem Key Highway Shipyard and included a graving dock. The operating graving dock had an eastern Pier 1 and a western Pier 2.

A dolphin, or collection of pilings, was constructed about 170 feet beyond the end of each pier to assist in the mooring of vessels. With continued disuse of the property, in the late 1990s, the eastern Pier 1 collapsed but its dolphin remained. NOAA chart 12281 displays the old western Pier 2 as Pier 1 and the remains of the eastern pier as a charted obstruction. Soundings of 23 feet or more are displayed in the area. In 2000, the dolphin located beyond the derelict pier had a lighted private aid installed with an "A" located on it and a characteristic of "FL Y 4s," indicating flashing yellow, every 4 seconds. The dolphin located beyond the western pier (current Pier 1) is unlit.

When asked in an interview how often tugs navigated inside of the dolphin pilings, the deckhand responded that of the hundreds of transits he had observed, very few occurred inside of the dolphin.

The mate told Coast Guard investigators that he had piloted tugs to and from Pier 1 about 500 times, both alone and in training with a master observing. He stated that most of the time when heading east he transited between the lighted dolphin and the collapsed pier, had done so during observed training, and had never been instructed not to transit this route. However, he had never seen the master on board at the time of the accident (who was his trainer) navigate between the lighted buoy and the collapsed pier. He stated that he transited in this fashion to avoid outbound traffic hugging the south shore near Pier 1 that is obstructed by the tall Pier 3 warehouse visually and by radar. He therefore transited between the lighted dolphin and the collapsed pier in order to join the channel at a smaller angle heading southwest. The mate stated that, on the evening of the grounding, he saw some small boat traffic on the north side of the channel but no large vessels.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the grounding and sinking of the harbor assist tug *Kaleen McAllister* was the mate's practice of transiting near a submerged portion of a collapsed pier, a known and charted underwater hazard, which ultimately resulted in the vessel striking the obstruction.

Vessel Particulars

Vessel	*Kaleen McAllister*
Owner/managing owner	McAllister Towing and Transportation Company Inc.
Port of registry	New York, NY
Flag	United States
Type/Service	Harbor assist tug/towing vessel
Built	1960 (converted 2003)
Official number (US)	1104217
IMO number	8981810
Construction	Steel
Length overall	109 ft (33.2 m)
Breadth	29 ft (8.8 m)
Depth	16 ft (5.0 m)
Design draft light/loaded	12 ft (3.7 m)/13.5 ft (4.1 m)
Gross registered tonnage (ITC)	243
Engine power, manufacturer	3300 hp (2461 kW); EMD 12-710 G7C
Propulsion type	Single Schottel 1515 controllable pitch, azimuthing stern drive
Fuel capacity/on board	22,778/16,769 gallons, diesel
Persons on board	3

Adopted: November 3, 2014