



National Transportation Safety Board

Marine Accident Brief

Engine Room Fire On Board Towing Vessel *Patrice McAllister*

Accident no.	DCA-12-LM-014
Vessel	<i>Patrice McAllister</i>
Accident type	Fire
Location	Lake Ontario – 4 miles southeast of Point Petre, near Prince Edward Point, Ontario, Canada; 43°46.0' N, 077°02.0' W (Canadian territorial waters)
Date	March 27, 2012
Time	0229 eastern daylight time (coordinated universal time –4 hours)
Injuries	One fatality and five minor injuries
Environmental damage	None
Weather and sea conditions	Clear skies; winds 12 knots from 010°; 3.5-foot seas and good visibility; air temperature 27° F; water temperature 36° F.
Waterway characteristics	The accident occurred in open waters of Lake Ontario. The lake is 193 miles long, 53 miles wide, with an average depth of 283 feet.

On March 27, 2012, at 0229 eastern daylight time, the uninspected towing vessel (UTV) *Patrice McAllister*, with six crewmembers on board, experienced an engine room fire. At the time, the vessel was transiting east on Lake Ontario en route from Toledo, Ohio, to Staten Island, New York. The crew released CO₂ from the vessel's fire suppression system into the engine room and extinguished the fire; however, the fire later reflash and burned out of control. The vessel's chief engineer was fatally injured, and the five remaining crewmembers suffered minor injuries. No pollution resulted from the accident.



The *Patrice McAllister* under way. Photo by Paul Beesley, www.shipspotting.com.

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The US Coast Guard was the lead investigative agency in the accident. The Transportation Safety Board of Canada (TSB) provided assistance. The National Transportation Safety Board (NTSB) conducted an independent investigation; assisted with metallurgical, materials, and chemical analyses; and downloaded the engine electronic control module.



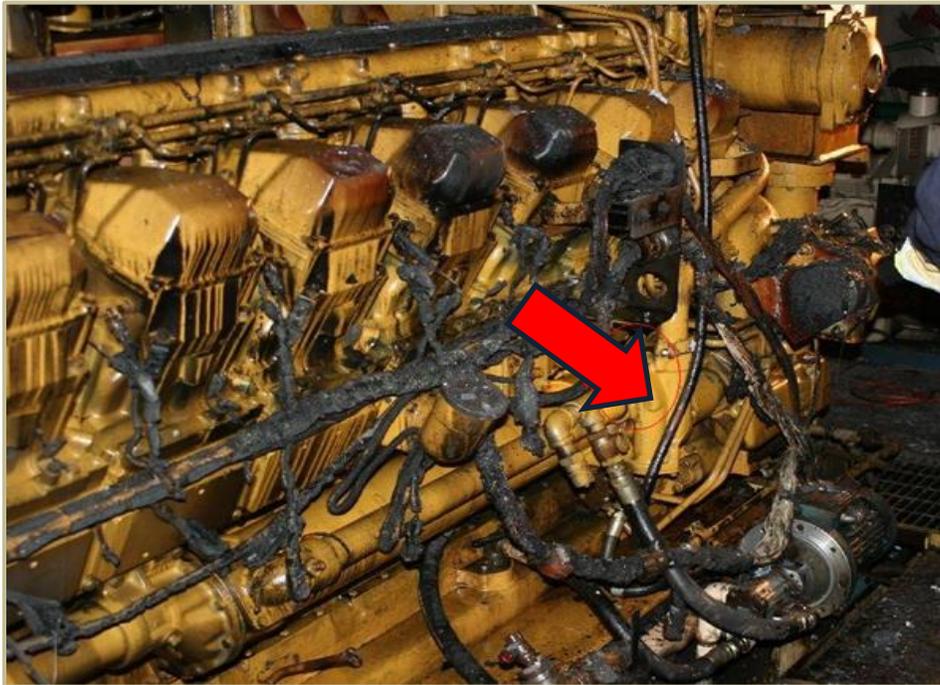
Lake Ontario, including the location where the *Patrice McAllister* crew reported the fire. Background by Google.

On March 23, 2012, about 4 days before the accident, the *Patrice McAllister* departed the Ironhead Shipyard in Toledo, where the vessel had undergone a complete overhaul. McAllister Towing of New York, LLC, had purchased the vessel in December 2011, and the accident voyage was to transfer the vessel to McAllister Towing's fleet in Staten Island.

Shortly after midnight on March 27, 2012, the *Patrice McAllister* was transiting at about 10–12 knots through Canadian territorial waters on Lake Ontario. It was being powered by the vessel's portside main engine, which was running at about 1,630 rpm at the time; the crew had shut off the starboard-side main engine to repair a leak in the lubrication oil cooler line.

About 0229, a small hairline fracture in the port engine's pre-lubrication oil pump discharge line began spraying lubrication oil into the engine room. The oil spray made contact with the hot portside engine manifold and flashed into an oil spray fire.

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The engine room fire resulted from a fracture in the port main engine's pre-lube pump discharge line. Photo by TSB.

The chief engineer was in the engine room when the fire broke out. The only exit was an accommodation ladder leading to a watertight door onto the fiddley deck, a partially raised deck located directly above the engine room near the smokestack. Because the accommodation ladder was in the path of the oil spray fire, the chief engineer had to exit through the fire, which ignited his clothing. He collapsed on deck after exiting. The other crewmembers, who had been alerted to the fire moments earlier by heat and smoke coming through a galley rangehood vent, discovered the chief engineer and extinguished the flames in his clothing. The chief engineer suffered burns on more than 90 percent of his body. The oil spray fire also ignited combustible material on the fiddley deck.

The crewmembers prepared to release the CO₂ into the engine room from the vessel's fixed fire suppression system. They secured the vessel's centerline passageway by closing its aft watertight door leading to the weather deck and its forward door leading to the galley (see "Vessel Layout" for configuration drawings). However, the crewmembers did not close the watertight door onto the fiddley deck, through which the chief engineer had escaped, before the master released the CO₂. Had the crew done so, the door would have helped segregate the centerline passageway from the engine room and the fiddley deck. In addition, no means existed to mechanically isolate the engine room's exhaust and supply ventilation.

On receiving word that the engine room was secured, the master released the CO₂, which, as expected, caused the portside main engine to shut down, followed by the generator and ventilation system. The vessel lost all power and began drifting in an easterly direction. At 0346, after observing a noticeable reduction in heat and smoke, the master reported to the Canadian Coast Guard that the fire was extinguished. During this time, crewmembers opened the doors to the vessel's superstructure and began de-smoking it. However, this action compromised the fire

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boundary by allowing CO₂ to escape and fresh air to enter the interior of the vessel, which caused the fire to reflash. At 0419, the smoke alarms sounded. Because the vessel had lost power, crewmembers were unable to run the main fire pump, and they had already released all of the CO₂. The fire also blocked access to the portable fire pump. As a result, the crewmembers were unable to fight the fire, which now raged out of control. It spread into the accommodation space and consumed all combustible material up through the upper wheelhouse. The vessel's two liferafts, stowed on the bridge deck, were inaccessible to the crew because of the flames and intense heat. Unable to abandon ship into out-of-water flotation, the crew huddled in survival suits at the stern of the vessel, waiting to be rescued.

At 0456, a Canadian Coast Guard rescue helicopter evacuated the chief engineer, who later died from his injuries. An hour later at 0556, the remaining five crewmembers, who sustained minor smoke inhalation injuries, were evacuated to the Canadian Coast Guard ship *Cape Hearne*. The *Patrice McAllister* was salvaged later that afternoon by the UTV *Bowditch* and towed to Clayton, New York.



The fire-damaged *Patrice McAllister* after being towed to port. Photo by TSB.

The NTSB materials laboratory in Washington, DC, examined the pre-lubrication oil pump nipple/flange assembly (“assembly”) for the port engine. The assembly exhibited a circumferential fracture adjacent to the fillet weld, which is a weld of about triangular cross

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section that joins two pieces, especially perpendicularly. The fracture had progressed to about 75 percent of the assembly circumference, and was located along a thread root adjacent to the fillet weld. A scanning electron microscope revealed that fatigue was the only failure mode on the fracture surface. No indications of other failure modes, such as overstress or corrosion, were found.



The assembly, as received. The crack was located along a thread valley and spanned across about 75 percent of the assembly's circumference.

About 35 gallons of lubrication oil had sprayed out. This particular oil, Mobil DELVAC 1300 Super 15W-40, had a flashpoint temperature of 419° F and an auto-ignition temperature of about 569° F. According to the engine manufacturer, the temperature of the exhaust manifold would have been about 930° F at the time, and so the oil easily auto-ignited when the spray came in contact with the manifold. Although the manifold's cover prevented solid objects from directly touching the manifold, it did not keep out spraying liquids or gases.

A burn pattern and residue of burnt lubrication oil extended athwartship (side to side) from port to starboard, and from the overhead to the bilges, including the accommodation ladder.

The fire caused extensive damage to the entire vessel, including the lower and upper engine room, galley, crew mess, crew quarters, upper and lower wheelhouses, and internal and external deckhouse structures. Both the port- and starboard-side engines required extensive repair; all auxiliary equipment required extensive repair or replacement; the entire superstructure needed to be replaced; and so did all electrical equipment, interior and exterior fittings, and navigational and communications systems and equipment. According to the surveyor's report, total estimated cost for repair and towage to New York was about \$3,569,000.

Following the accident, the five surviving *Patrice McAllister* crewmembers and the body of the chief engineer were tested for illegal drugs and alcohol. All test results were negative.

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The steel door of the centerline passageway to the galley (main deck frame 25) is lying on the deck. The wooden door frame was consumed in the fire. Photo by TSB.

The chief engineer was 49 years old. He held a merchant mariner's credential with endorsement as designated duty engineer, and had 22 years' experience in the maritime industry. He had been the chief engineer of this vessel for 13 years, from the time it was built in 1999. The chief engineer and the assistant engineer stood watch in rotations of 12-hours-on/12-hours-off.

The master was 29 years old. He held a merchant mariner's credential with endorsements as unlimited third mate and master, 1600 gross tons, of near coastal towing vessels. He had worked for McAllister Towing since he graduated from a maritime academy in 2005, and had been sailing as master for the last 2 years. The master and the mate stood watch in rotations of 6-hours-on/6-hours-off. The remaining two crewmembers were deckhands, who both held merchant mariner's credentials.

In an August 11, 2011, notice of proposed rulemaking (NPRM), titled *Inspection of Towing Vessels*, the Coast Guard stated that it would establish safety regulations governing the inspection, standards, and safety management systems of towing vessels. The proposal included provisions covering specific electrical and machinery requirements for new and existing towing vessels, the use and approval of third-party auditors and surveyors, and procedures for obtaining certificates of inspection. In two letters dated December 8, 2011, the NTSB expressed support for

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the NPRM and the intent of the proposed rules. Proposed regulations that are applicable to the *Patrice McAllister* accident and may have lessened the damage and injuries are:

- Fire hazards to be minimized ... storage areas are kept free from accumulation of combustible materials.
- Training crews to ... fight a fire in the engine room ... stop any mechanical ventilations system for the engine room and effectively seal all natural opening to the space to prevent leakage of the extinguishing agent.
- The (portable fire) pump must be stowed with its hose and nozzle outside of the machinery space.
- Liferaft launching will be covered by Subchapter W.
- Where practical, each space on an existing towing vessel where crew may be quartered or normally employed must have at least two means of escape.

As a result of the *Patrice McAllister* accident, the government/industry Towing Safety Advisory Committee (TSAC) issued Task #12-06: *Recommendations to Improve Operational, Structural or Other Standards to Enhance Fire Prevention and Containment aboard Towing Vessels*. The background and discussion for the recommendations stated that, over a 5-year period beginning in 2007, a fifth of all reported fires on board UTVs were oil spray fires. The *Patrice McAllister* is cited as a recent example of a fire spreading into other areas of the vessel, resulting in significant additional fire damage. The lack of fire dampers in ventilation systems, along with compromised boundaries due to holes, openings, and casual modification, appear to be major problems in containing engine room fires. By September 20, 2013, TSAC is to recommend additional standards to ensure the safe operation of towing vessels.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the engine room fire on board the *Patrice McAllister* was the ignition of lubricating oil that sprayed from a fatigue-fractured fitting on the portside main engine's pre-lubrication oil pump onto the hot surface of the portside main engine's exhaust manifold. Contributing to the extent of the fire damage was the crewmembers' compromise of the fire boundaries when they prematurely began de-smoking the vessel's superstructure; the inability to completely secure the engine room's fire boundaries; and the abundance of flammable material throughout the vessel.

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Vessel Particulars

Vessel	<i>Patrice McAllister</i>
Owner/operator	McAllister Towing & Transportation Co., Inc.
Crew complement	6
Port of registry	Wilmington, DE
Flag	United States
Type	Uninspected towing vessel
Built	C & G Boatworks Inc. – Mobile, Alabama, 1999
Official number	1082214
IMO number	9215799
Construction	Steel
Depth	15.2 ft (4.62 m)
Length	105.2 ft (31.9 m)
Breadth	34.0 ft (10.3 m)
Gross tonnage	149
Engine power and type	Twin 3516B Caterpillar diesels 16 cylinders each 4,400-hp/3,278 kW
Service speed	Unknown
Cargo	n/a
Persons on board	6 crew

For more details about this accident, visit <http://www.nts.gov/investigations/dms.html> and search for NTSB accident ID DCA12LM014.

Adopted: June 6, 2013

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.
