National Transportation Safety Board

Marine Accident Brief

Fire Aboard Towing Vessel *San Gabriel*

Accident no.	DCA16FM027
Vessel name	*San Gabriel*
Accident type	Fire
Location	LyondellBasell refinery dock "D," Houston, Texas; 29˚43'23"N, 95˚14'06"W.
Date	February 26, 2016
Time	About 2220 central standard time (coordinated universal time – 6 hours)
Injuries	None
Property damage	$875,000 est.
Environmental damage	None
Weather	Clear night, visibility 10 miles, north winds about 15 mph, air temperature 50˚F
Waterway information	Houston Ship Channel between Simms Bayou and Light 162, about 2 miles* east of Interstate 610.

About 2220 on February 26, 2016, a fire broke out in the engine room lavatory on board the uninspected towing vessel *San Gabriel* while moored at a sulfur-loading dock in Houston, Texas. Shoreside firefighters extinguished the blaze, which caused extensive damage to the interior spaces. All crewmembers were able to evacuate the vessel safely, and no pollution was reported as a result of the fire.

***San Gabriel* docked at Buffalo Marine facility in Houston, Texas, after the fire.**

* All miles in this report are statute miles.

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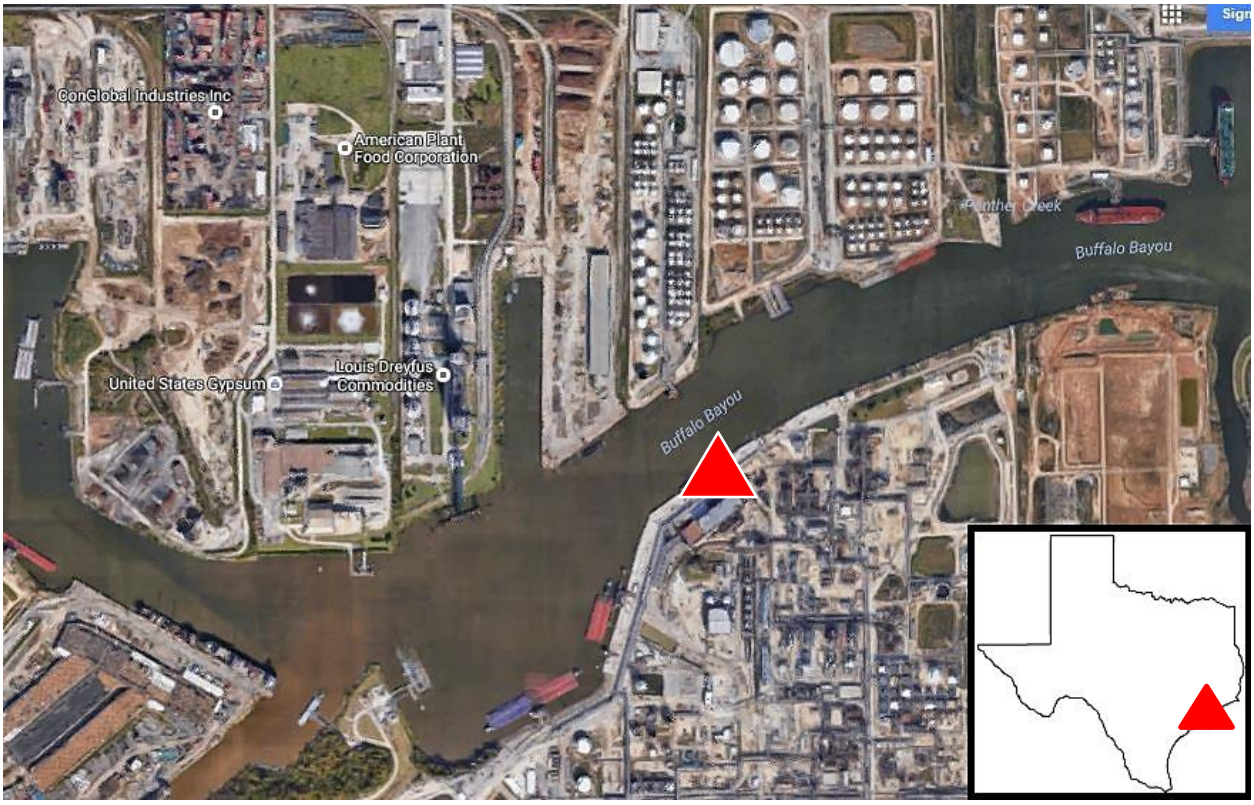
About 2100 on February 25, the evening of the accident, the *San Gabriel* arrived at dock "D" of the LyondellBasell terminal in preparation to load liquid molten sulfur into barges alongside for a planned tow the following morning. About 2220, while making a round of the engine room, a deckhand noticed a fire in the lavatory on the upper level. He notified the captain who was in the galley, grabbed a nearby fire extinguisher, and then kicked the door open and discharged the extinguisher into the lavatory. The captain sounded the general alarm to alert the remaining three crewmembers who were sleeping. When he proceeded to the lavatory and saw 6- to 7-foot flames coming from the overhead, the captain attempted to fight the fire with a second fire extinguisher. Another crewmember attempted to use a firehose to assist, but the fire pump would not start. After failing to put out the fire with extinguishers, the captain locked down the engine room by closing both doors, ordered the crew to vacate the area, and activated the engine room's CO_2 fire suppression system, which discharged all seven bottles. Each bottle contained 100 pounds of CO_2.



Aerial view of LyondellBasell refinery where *San Gabriel* was docked during the fire. The accident location is labeled with a red triangle.

The crew monitored the fire through the engine room exterior windows for about 30 minutes and believed that the fire was extinguished. But when they opened the exterior door to check on the fire, it re-flashed. They attempted to fight the fire in the lavatory with the last remaining extinguishers, to no avail. Then about 2330, the captain contacted the terminal facility fire department for help. He was told to vacate the burning vessel and relocate to the barge alongside. The captain and the crew collected their belongings and abandoned ship to the barge; later, they moved to the pier. The fire spread through the house from the main deck up to the quarters deck and the wheelhouse.

According to the manager of emergency and security services at the LyondellBasell terminal, when the Houston Refinery Fire Department was notified by the captain of the *San*

Gabriel at 2328, refinery assets were dispatched immediately. The Port of Houston Police Department provided a fire incident log that indicated LyondellBasell notified the police about the fire at 2345. Two Houston Port Authority fireboats and several other firefighting assets were dispatched to the scene. About 2347, shoreside fire teams began battling the fire using fire nozzles spraying water and foam into exterior doors and windows. Nearly an hour thereafter, at 0048, refinery firefighters boarded the *San Gabriel* and began fighting the fire from inside the vessel. The fire in the galley was extinguished 5 minutes later, and the fire was completely extinguished at 0115. Several assets from the Channel Industries Mutual Aid (CIMA) assembled outside the gate of the terminal to monitor the air for contaminants and to assist if needed.[1] The US Coast Guard closed the Houston Ship Channel with a safety zone near LyondellBasell from 0015 to 0200 the morning of the accident, between Simms Bayou and Light 162.

The morning after the fire, investigators and the Harris County fire marshal boarded the *San Gabriel* after dewatering was complete. They found charred interior spaces on the main deck, quarters deck, and wheelhouse deck. The heaviest heat, smoke, and water damage was located on the main deck.

Fire damage to the *San Gabriel* galley located on the main deck. (Photo by Coast Guard)

The room in which the fire broke out was the main deck lavatory, located just aft of the galley in the upper level of the engine room. The room, which was about 5 feet 5 inches wide and 6 feet long, was totally consumed by the fire. The bulkheads of the lavatory were constructed of steel and had been covered with FRP (fiber-reinforced plastic) interior paneling. The room was

[1] Channel Industries Mutual Aid is a non-profit organization combining the firefighting, rescue, hazardous material handling, and emergency medical capailities of the refining and petrochemical industry in the Greater Houston Metropolitan Area.

accessed via an aluminum door on the aft bulkhead that partially melted in the heat of the fire. There had been three electrical fixtures located inside the lavatory: a fluorescent light in the overhead, an electrical switch box with two switches on the aft bulkhead, and an exhaust fan mounted on the outboard bulkhead. Directly under the exhaust fan, a 5-foot-high wooden cabinet used to store linens and paper products, such as toilet paper and paper towels, had been installed.

Based on a fire-pattern analysis, fire damage survey, and witness statements, the fire marshal concluded that the fire had originated in the lavatory in the area of the exhaust fan. He observed hot spots and burn patterns on the outboard bulkhead under the exhaust fan opening that were not seen anywhere else in the lavatory. Nothing remained of the suspect fan, which was burned completely. The only identifiable objects found in the lavatory debris were a ceramic toilet, fluorescent light fixture, an electrical outlet, wood framing, and small pieces of copper. There were visible signs of heat distortion of the forward port bulkhead at the top by the air conditioning ventilation duct penetrations. The aft starboard bulkhead had separated from the deck due to the heat.

At left, the opening where exhaust fan had been mounted inside lavatory. At right, heat damage to painted surface of exterior bulkhead around exhaust ventilation duct.

The 180-cubic-feet-per-minute, 8-inch through-wall exhaust fan in the lavatory was manufactured by Broan, model 509. According to a representative from the *San Gabriel*'s operating company, Buffalo Marine Service, the unit had been installed by an electrician in the shipyard in October 2014 to replace a failed unit. The fan manufacturer's specifications stated that the fan motor drew 1.5 amps and was not "engineered for continuous usage." Crewmembers stated that they typically had shut off the fan after use, but there were times when it had been left on.

Broan fan, model 509. (Photos from www.broan.com)

Crewmembers informed investigators that no hot work was being conducted, and nobody was smoking in the area at the time of the fire.

Drug and alcohol tests were conducted on all crewmembers; all results were negative. The captain and pilot alternated on a 6-hours-on/6-hours-off schedule, and the three deckhands rotated on 8-hour watches. The captain had been a credentialed master of towing vessels for 15 years, and had worked with Buffalo Marine Service for 18 years. He received firefighting training in tankerman school in 1998. Two of the sleeping crewmembers were volunteer firefighters. According to Buffalo Marine's "Playbook," when responding to a fire, the captain on watch was "responsible for evaluating the degree of emergency and ensuring that appropriate action was taken under the prevailing circumstances."

A diagram of the fire detection system prepared by the company indicated that the *San Gabriel* had nine heat detectors installed: four in the lower engine room, one above each engine, and one above each generator. There were also four smoke detectors located throughout the crew quarters and galley, but the lavatory had no smoke detector. Yet, none of the detectors aboard the vessel activated before the crew noticed the fire. A random check of the smoke detectors and a test of the heat detector in the galley had been satisfactorily conducted on January 29, 2015, during an internal audit. Crewmembers stated that there were five fire extinguishers on board the *San Gabriel*: one immediately outside the lavatory, one in the galley, one in the forward hold, one in the crew quarters, and one in the wheelhouse. The crewmembers were unsure what types of extinguishers they were. According to inspection records, the fire detection system, fixed CO_2 system, and all fire extinguishers were inspected on April 23, 2015. The vessel had seven 100-pound CO_2 cylinders in the fixed system protecting the engine room and seven portable extinguishers (four CO_2 and three dry chemical-type extinguishers).

At the time of the accident, Buffalo Marine was a member of the American Waterways Operators (AWO) and certificated in the Responsible Carrier Program (RCP).[2] The company successfully completed AWO-certified management and vessel audits of the RCP in July 2014 and received a certificate that was valid until September 2017. The *San Gabriel* completed an external inspection on behalf of a major oil company on January 26, 2016, with minor observations, and successfully completed an internal audit three days later on January 29, 2016.

According to crew testimony, the fire pump was unable to be started due to electrical short-circuits in the system wiring resulting from the fire. Crewmembers reported receiving electrical shocks when touching the steel bulkheads, which indicates that electrical conductors were coming in contact with the hull after the cable insulation had been damaged by the heat. The fire pump had been successfully operated with two hose streams during the January internal audit. After the fire pump was unable to be started, the crew released the CO_2 system and monitored the space for about 30 minutes. No calls for shoreside assistance were made during this time.

[2] The RCP is a safety management system for tugboat, towboat, and barge companies that provides a framework for continuously improving company safety performance. AWO members use the RCP to develop company-specific safety and environmental policies and programs tailored to their unique operations. The program complements and builds on existing government regulations, requiring company safety standards that exceed those required by federal law or regulation. Since 2000, compliance with the RCP has been a condition of AWO membership. The RCP, which requires companies to undergo an audit by an independent third-party auditor to verify compliance, incorporates best industry practices in three areas: company management policies, vessel equipment, and human factors.

Investigators recovered the vessel's drill log, which was damaged by the fire. The last fire drill that was logged took place in mid-January. Company requirements indicated that fire drills were to be held on the first and third Tuesdays of each month. None of the crewmembers that investigators interviewed could remember when the last drill was held. A review of the wheelhouse logbook for the month of February revealed that no drills were logged, indicating that, contrary to company requirements, the two most recent dates before the fire for required drills had passed without a crew drill being performed. Additional anomalies regarding drills were apparent with regard to crew mustering. For example, one crewmember told investigators that he mustered on the bow; however, the other crewmembers said they mustered on the stern. The station bill did not identify a muster location for crewmembers.

The effectiveness of the fixed CO_2 system was diminished by the fact that there were no dampers in the engine room's 2-foot-by-2-foot ventilation ducts for the crew to close. The lack of dampers prevented isolation of the engine room from incoming air during the fire suppression attempt. In addition, terminal video recordings revealed that an exterior door on the port side of the vessel was left open when the crew abandoned the *San Gabriel* allowing fresh air (oxygen) to fuel the fire. There was no video footage available of the vessel's starboard side to determine if additional doors were left open.

Although there was no guidance for a fire in port, the captain did not contact any shoreside assistance for over an hour after the fire was reported to him and not until the crew had depleted all of the vessel's firefighting capabilities. Shoreside firefighters with proper firefighting equipment would have been able to provide guidance on re-entering the engine room space and would have been in position to assist if the fire re-flashed. Once they arrived, shoreside firefighting teams effectively extinguished the fire.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard towing vessel *San Gabriel* was an electrical anomaly related to the lavatory exhaust fan located directly above combustible materials. Contributing to the extent of the damage was the captain's excessive delay in requesting shoreside assistance.

Inspection of Towing Vessels

On June 20, 2016, the Coast Guard issued a final rule, "Inspection of Towing Vessels; Subchapter M," that included regulations designed to prevent incidents similar to the fire and damage incurred aboard the *San Gabriel.* These regulations included Title 46 *Code of Federal Regulations:*

- § 142.215(a) requiring the Commandant of the Coast Guard to approve hand-portable fire extinguishers, semi-portable fire extinguishing systems, and fixed-fire extinguishing systems.
- § 142.245(a) requiring that all crewmembers must specifically know how to fight a fire in the engine room, operate all fire extinguishing equipment, and seal all natural openings to a space to prevent leakage of the extinguishing agent.

Vessel Particulars

Vessel	*San Gabriel*
Owner/operator	Buffalo Marine Service, Inc.
Port of registry	Houston, Texas
Flag	United States
Type	Towing vessel
Year built	1990
Official number (US)	965687
IMO number	N/A
Construction	Steel
Length	75 ft (22.9 m)
Draft	10 ft (3.0 m)
Beam/width	30 ft (9.1 m)
Gross and/or ITC tonnage	158 gross tons
Engine power; manufacturer	(2) 1,000 hp (746 kW); Cummins KTA 38 M 1
Persons on board	4

NTSB investigators worked closely with our counterparts from Coast Guard Sector Houston/Galveston throughout this investigation.

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA16FM027.

Adopted: November 3, 2016

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 Title 49 *United States Code*, 1131. This report is based on factual information either gathered by NTSB investigators or provided by the Coast Guard from its informal investigation of the accident.

The NTSB does not assign fault or blame for a marine casualty; rather, as specified by NTSB regulation, "[NTSB] investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person." Title 49 *Code of Federal Regulations*, 831.4.

Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by conducting investigations and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. Title 49 *United States Code*, 1154(b).