National Transportation Safety Board

Marine Accident Brief

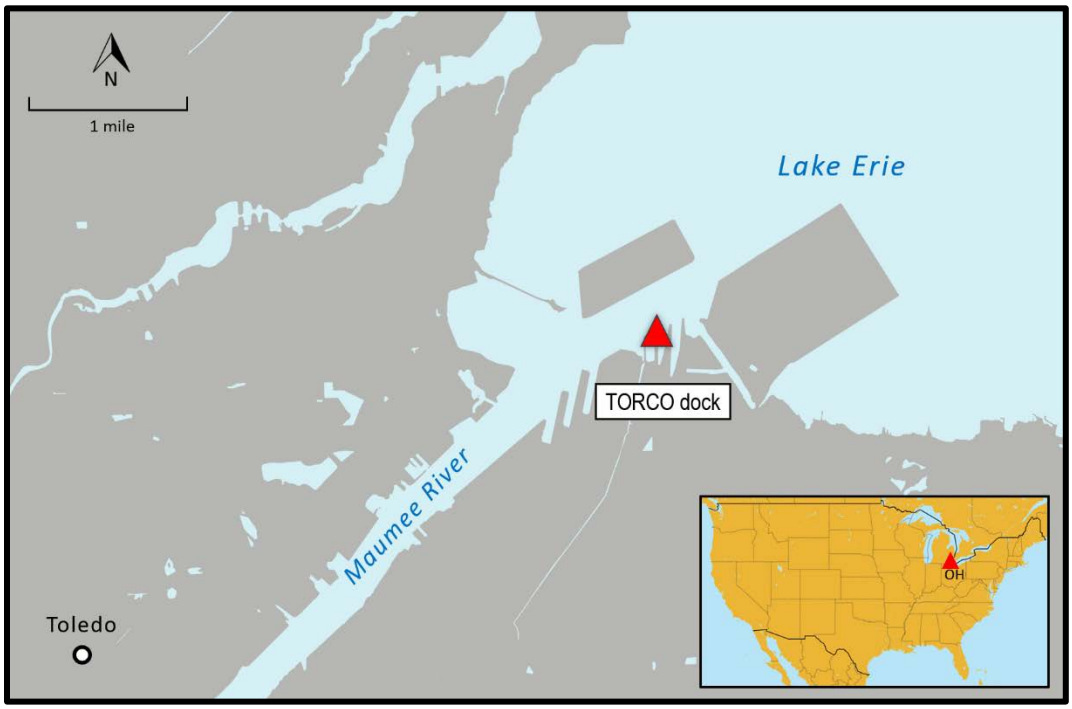
Engine Room Fire aboard Bulk Carrier *St. Clair*

Accident type	Fire/Explosion	**No.** DCA19FM020
Vessel name	*St. Clair*	
Location	CSX TORCO Iron Ore Terminal, Maumee River; Toledo, Ohio 41°41.54' N, 083°27.05' W	
Date	February 16, 2019	
Time	2010 eastern standard time (coordinated universal time – 5 hours)	
Injuries	None reported	
Property damage	>$150 million	
Environmental damage	None	
Weather	Mostly cloudy, visibility 10 miles, winds east 12 mph, air temperature 28°F, water temperature 34°F[1]	
Waterway information	Maumee River flows from northeast Indiana, into northwest Ohio, and then into Lake Erie. The city of Toledo borders the river where it enters Lake Erie.	

About 2010 local time on February 16, 2019, a fire was reported on the bulk carrier *St. Clair* while the vessel was laid-up for the winter at the CSX TORCO Iron Ore Terminal (TORCO dock) at the mouth of the Maumee River in Toledo, Ohio. No one was on board. The fire was extinguished approximately 36 hours later by shoreside firefighters. No pollution or injuries were reported. The estimated property damage exceeded $150 million.

Bulk carrier *St. Clair* before the accident. (Source: American Steamship Company)

[1] All miles in this report are statute miles.



Location where the *St. Clair* caught fire, as indicated by the red triangle. (Background source: Google Maps)

Background

The *St. Clair* was a 770-foot-long bulk carrier built in 1976 by Bay Shipbuilding Company in Sturgeon Bay, Wisconsin. It was owned by Bell Steamship Company and operated by American Steamship Company. Designed to operate exclusively on the Great Lakes, the vessel was referred to as a "laker" within the maritime industry. It was powered by three General Motors diesel engines, each producing 3,500 horsepower and driving a single propeller. The vessel utilized a twin conveyor system, one each on the port and starboard sides, to transport bulk cargo from the cargo holds. The cargo was then carried to cross conveyors that converged to a single inclined conveyor belt located at the stern of the vessel. The inclined conveyor belt elevated the cargo to the deck-mounted boom conveyor located on the main deck that discharged it to a reception facility.

During the winter months when the Great Lakes freeze, making it impractical to navigate the waterway, most commercial vessels stop operating and enter a layup status. In most cases, the crews depart the vessel after it has been winterized, which includes draining water from piping systems and placing heating lamps on critical piping and engineering systems to prevent them from freezing. In addition, it is common for work such as steel repair and engine maintenance to be conducted during this period, which cannot be accomplished when a vessel is in operation.

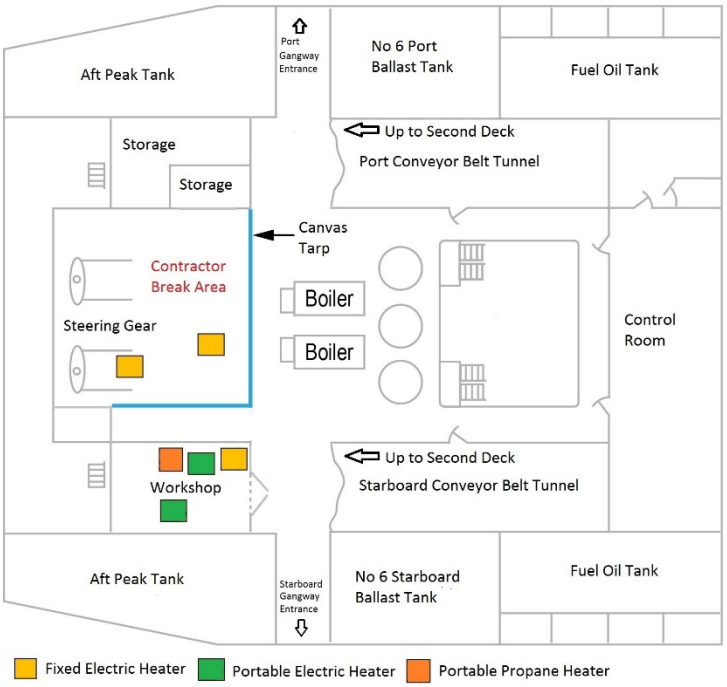
While in a layup condition, a laker like the *St. Clair* would have a shipkeeper assigned for the winter to monitor the vessel and notify the operator if there was water ingress, or if there were any issues with the vessel's heating system or any other conditions that would potentially damage the vessel. A shipkeeper could be assigned to just one or several vessels that were laid-up.

Accident Events

On the day of the incident, February 16, the *St. Clair* was docked at the TORCO dock, located at the mouth of the Maumee River in Toledo, Ohio, for winter layup. The shipkeeper, who was living on board, conducted his routine morning inspection of the vessel. He confirmed that there was no water ingress, the heat lamps were still operating, and the bubblers used to keep the water from freezing in the sea chests had sufficient air pressure.

At 0700, 20 employees from H Hansen Industries (hereafter referred to as H Hansen), a steel fabricator and repair company, arrived at the ship to continue ongoing contracted work and repairs. On that day, the H Hansen crew was going to conduct steel repair in two locations on the ship: (1) the conveyor belt on the port side by the no. 2 cargo hold; and (2) the aft section of no. 6 port ballast tank, which was located within the lower level of the engine room space.

The shipkeeper was planning to depart the vessel in the morning and was not planning to return to the vessel until the following day. Prior to departing, he met with the H Hanson crew foreman and informed him that he was departing the vessel. When the shipkeeper left at 1030, the contractors from H Hanson were engaged in hot work. While the hot work was being conducted in the no. 6 port ballast tank and the port midships tunnel, H Hansen personnel had a fire watch present with fire extinguishers and placed fire blankets and sandbags on the conveyor belt to prevent a fire from occurring.



Drawing (not to scale) of third deck, showing location of heaters and tarp in the engine room.

At 1645, the H Hanson foreman, while checking on the cleanup at each work site within the ship, noted light, white smoke in the engine room near the workshop. The foreman attributed the smoke to burnt paint located on the lower engine room side of the bulkhead of no. 6 port ballast tank, where hot work had been conducted during the day. To remove the smoke, the foreman started the starboard-side engine room exhaust fan, which was a regular practice. After that, the foreman reviewed timecards and departed the vessel at 1800. As he departed, there was still a haze of smoke in the engine room, so he left the exhaust fan on to continue to remove the remaining smoke.

Smoke was observed coming from the *St. Clair* about 2010 by the chief engineer on board the *Great Lakes Trader*, a laker docked at the TORCO dock across from the *St. Clair*. The *Great Lakes Trader* chief engineer called the H Hanson foreman who had been working on the *St. Clair* earlier in the day to inform him of the smoke. The H Hanson foreman called the *St. Clair* shipkeeper, who was at his house, and told him about the smoke seen coming from the vessel. The *St. Clair*

shipkeeper contacted the shipkeeper on board the *Indiana Harbor*, another laker located near the *St. Clair* that also was owned by American Steamship, to ask him to check on the vessel.

About 8 minutes after the phone call, about 2030, the *Indiana Harbor* shipkeeper arrived at the *St. Clair* and saw smoke and fire on the aft deck behind the deckhouse. The lights were still on, indicating that shore power was still available to the vessel. After going up the only gangway connected to the vessel, which was on the port side near the stern, he entered the vessel through the watertight portside door from the gangway. Both the port- and starboard-side entrances on the third deck led directly into the engine room, on the same level as the steering gear, workshop, and control room. There in the engine room, he saw that stacks of lumber near the hatch were on fire and that the engine room was filled with smoke. Due to the heat and smoke, he returned to the gangway. Next, he re-entered the vessel with the intent to reach the manual pull to activate the engine room's fixed CO_2 extinguishing system located two decks above the entry on the main deck. However, it was not possible to reach it due to the heat of the fire and the effect of the smoke on his ability to see and breathe. He departed the vessel, leaving the portside gangway door open.

While the *Indiana Harbor* shipkeeper was checking on the vessel, the H Hansen foreman called a friend who worked as a firefighter for the local fire department to inform him of a potential fire. The firefighter immediately contacted the 911 dispatcher at 2042 and reported the fire. The first fire truck arrived at the vessel at 2055, 45 minutes after the *Great Lakes Trader* chief engineer first saw the smoke.

Vessel fire at 2209. Billowing smoke pours from the vessel as fire in the aft part of the deckhouse spreads up the conveyor belt on the boom. (Source: *Great Lakes Trader* Chief Engineer)

Since the only access to the interior of the vessel—the portside gangway door—was blocked by the fire, the responding firefighters focused on cooling the exterior of the *St. Clair* and of the other vessels docked nearby. Initial efforts to put water on the vessel were hindered by frozen fire hydrants. Due to the ice, suction could not be taken from the lake water.

Vessel fire about 10 minutes later, at 2220. The cargo conveyor boom is completely engulfed in flames (Source: *Great Lakes Trader* chief engineer)

The fire burned within the engine room spaces, the entire superstructure, and the self-unloading belt throughout the port- and starboard-side conveyor tunnels to the bow, as well as onto the cargo conveyor boom belt above the main deck.

Fire damage to the vessel: (*left*) cargo conveyor boom, (*center*) stern of the deckhouse, and (*right*) the bridge.

After the fire was extinguished, the vessel's engine room was found flooding from the emergency fire pump's strainers and sea chests, which were open for layup. The pump's sea valve was electrically controlled and designed to fail open during a loss of power. During the fire, the vessel lost shore power, which actuated the opening of the valve and thereby allowed a steady ingress of water through open strainers and sea chests. Eleven days passed before divers were able to temporarily plug the main sea chest and close internal valves to stop the flooding. The water that entered the vessel was removed with portable pumps.

As encircled, the seawater duplex strainer to the emergency fire pump in the lower level of the engine room leaking water. (Source: Coast Guard)

Portside gangway entrance following the extinguishing of the fire.

Additional Information

Layup Activity. During the winter layup of an American Steamship Company vessel, several contractors were hired to conduct different types of work within the vessel. The assistant vice president of fleet engineering was responsible for managing the contract work being conducted on the company's vessels. Each vessel in layup status was assigned a shipkeeper and a superintendent to directly oversee the work being conducted on board the vessel. The shipkeeper normally lived on board the ship but was not required to stay for the duration of the layup. While on board, the shipkeeper for the *St. Clair* lived in the chief cook's cabin and ate his meals in the galley adjacent to the cabin.

The *St. Clair* went into layup status about a month before the fire, on January 19, 2019. All of the vessel's machinery, pumps, and generators had been shut down; the vessel was connected to shore power in order to operate lighting and electrical outlets, electric heaters, air compressors and to keep the fire pump sea chest valve closed. The manual pull to activate the fixed CO_2 fire-extinguishing system was located on the main deck. Due to the work being performed on the *St. Clair* during winter layup, the watertight doors and access manhole covers to ballast tanks remained open.

Before vessel operations resumed in late March, the following work was to be completed on board the vessel: repairs of the ballast tank; annual inspection of main reduction gearbox and conveyor drive-reduction gearboxes; service of bilge de-oiler, port and starboard steering gear hydraulics, fixed and portable fire extinguishing systems, life rafts, and pilothouse navigation equipment; renewal of the saddlebacks and side shell frame in the no. 2 cargo hold on both the port and starboard sides; partial renewal (frames) of the forward ladder trunk in no. 1 cargo hold and the no. 6 port ballast tank; and major overhaul of the starboard ship service generator (engine Caterpillar D398).

Contractors. The assistant foreman for H Hansen stated that on the day of the accident, personnel from Michigan CAT were on board conducting work on the vessel's starboard generator. However, Michigan CAT stated that its personnel were not on board the vessel the day of the fire.

While conducting the hot work on board the *St. Clair*, the H Hanson employees took their three 15-minute breaks and a half-hour lunch. During these breaks the workers could either go to the vessel's recreational room located on the main deck or to the area of the workshop and steering

gear located in the engine room between both gangway doors. Space heaters were placed at the two break sites on board the vessel to supplement the ship's fixed heaters so the contractors could warm up.

There was a total of six heaters, five electronic and one propane, located in the area of the workshop and the steering gear. A red canvas tarp was hung around the steering gear to help keep the area heated while the workers were taking their breaks. The electronic heaters were routinely left on after the contractors departed the vessel at the end of the day to keep the space warm.

Space heaters located in the engine room break area following the fire: (*left*) an electric heater on the workshop bench, (*center*) a propane heater on the deck of the workshop, and (*right*) a fixed electric heater located forward of the steering gear.

In addition to the placement of the extra heaters on the third deck, there was one propane heater located in the recreational space on the main deck (two decks above) and two electrical heaters in the starboard diesel generator space located in the lower level of the engine room. When examined postaccident, the two heaters in the starboard generator space were found to be unplugged.

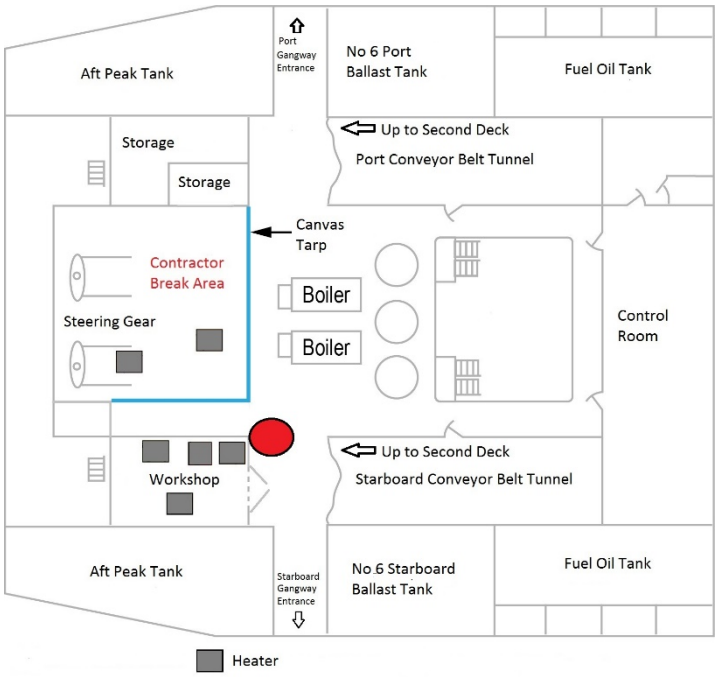
The conveyor belts that transported the cargo to the cargo boom and off the vessel were made of a reinforced rubber material that was strong and flexible enough to transport the bulk cargo, which included rocks and coal. The conveyor belts where hot work was being conducted in the areas next to the no. 2 cargo hold were found by investigators to be covered by fire blankets, sheet metal, and sandbags as a hot-work precaution.

Contract workers were reported to have been seen smoking in the area of the workshop and the steering gear on previous days prior to the fire. There was no policy in place, either by the owner of the vessel or any of the contractors working on the vessel, that prohibited cigarette smoking or limited smoking to certain locations on the vessel. It was also reported that smoke regularly collected in the engine room following hot work. To remove the smoke, the ventilation blowers were turned on within the engine space.

Vessel Monitoring. The superintendent for the *St. Clair* visited the vessel two days prior to the fire, and the assistant vice president of fleet engineering the following day (the day prior to the fire). There was no company policy for American Steamship personnel to conduct a safety

inspection at the conclusion of work each day when the vessel was in winter layup, nor was there a written policy defining the responsibilities of a shipkeeper for fire safety. Once the H Hansen employee departed the *St. Clair* at 1800, there was no onsite monitoring on the vessel to detect and warn of smoke, water ingress, or failure of the heating systems for the critical equipment, considering that the shipkeeper departed the vessel early that morning. In addition, there was no remote monitoring of the vessel.

Fire Damage. The investigation into the fire identified a significant amount of damage within the vessel. The engine room, the second deck (where the port- and starboard-side tunnel conveyor belts, port- and starboard-side cross belts, and incline conveyor belt were located), and the entire deckhouse were severely damaged by fire. All the conveyor belts within the vessel were completely burned. Investigators noted that the smoke and fire damage was also located with the forward ladder trunk and all the cargo holds. The most extensive fire damage discovered were fractures in the overhead of the third deck, which was the second deck. These fractures were located just outside and above the workshop.



A red circle identifies the structural fire damage on the third deck (not drawn to scale).

Analysis

Although the H Hansen employee had identified smoke within the engine room at 1645, he assumed it was residual smoke from the hot work that occurred in the no. 6 port ballast tank and therefore did not investigate it further. This smoke was most likely emitting from a smoldering hotspot, possibly from a burning piece of wood or trash, which eventually developed into the fire that severely damaged the vessel. By turning on the starboard exhaust fan in an effort to remove the smoke, and leaving it on when he departed at 1800, the movement of air within the engine room may have assisted with accelerating the growth of the smoldering hotspot into a fire.

With no company policy or procedure requiring continuous active monitoring of the vessel while it was in layup status, the fire was able to expand for approximately 3 hours before the fire department arrived. Since most watertight doors and access manhole covers to ballast tanks remained open, there was nothing in place to stop or hinder the passage of smoke and fire.

While there was extensive damage throughout the engine room, the fire pattern and damage on the lower level noted by NTSB investigators indicated that the fire did not start within or by the no. 6 port ballast tank where the hot work was being conducted the day of the casualty. In addition, the fire pattern and damage on the lower level also indicates that the fire did not start within the starboard generator space where maintenance was previously conducted.

Given the location of the hot work and based on the structural damage found during the investigation, the fire appeared to have originated just outside the workshop on the third deck on the starboard side of the engine room where the contractors regularly took their breaks. While numerous possible sources of ignition were identified in this area—including the propane heater, permanent (hardwired) and portable electric heaters, and heat lamps, as well as cigarette smoking in the break area—the exact source could not be determined. However, there was a lot of combustible material in this area, including wood and the lubricants used in the engine room. As the fire grew and became stronger, heat was transferred through the steel deck above and into the spaces on the second deck. At some point as the fire grew, the conveyor belt on the second deck was ignited. After the conveyor belt caught fire, it provided a path for the fire to expand forward to the bow and up into the deckhouse and onto the cargo boom.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the bulk carrier *St. Clair* was the ignition of combustible material in the vicinity of an engine room workshop likely due to the use of portable space heaters or smoldering smoking materials, which spread to other areas of the vessel. Contributing to the extent of the fire damage was the lack of operating procedures for continuous active monitoring of the vessel while in layup status.

Vessel Particulars

Vessel	*St. Clair*
Owner/operator	American Steamship Company
Port of registry	Philadelphia, Pennsylvania
Flag	United States
Type	Bulk cargo vessel
Year built	1976
Official/IMO number	571875 / 7403990
Classification Society	American Bureau of Shipping
Construction	Steel
Length	770 ft (234.69 m)
Beam/width	92 ft (28.04 m)
Draft	30 ft (9.14 m)
Tonnage	27,482 GRT
Engine power; manufacturer	Three 3,500 hp (2,610 kW); General Motors diesels (10,500 hp / 7,830 kW total)
Persons on board	0

NTSB investigators worked closely with our counterparts from Coast Guard Marine Safety Unit Toledo, Ohio, throughout this investigation.

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA19FM020.

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