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December 13, 2024

MIR-24-37

Fire aboard Passenger Vessel *Spirit of Boston*

Commonwealth Pier, Boston Harbor

Boston, Massachusetts

March 24, 2023

Abstract: This report discusses the March 24, 2023, fire aboard the passenger vessel *Spirit of Boston* while it was moored at Commonwealth Pier in Boston Harbor, Boston, Massachusetts. While there were no injuries, the fire resulted in \$3.1 million in damages. Safety Issues identified in this report include the absence of marine crewmembers aboard the vessel during an emergency situation while hospitality staff were still aboard, the improper handling of open-flame devices, and the lack of established mechanisms for City Cruises US, the operator of the *Spirit of Boston*, to identify unsafe practices and fire risks. As a result of this investigation, the National Transportation Safety Board makes four new safety recommendations to the Passenger Vessel Association and City Cruises US. The NTSB also reiterates one safety recommendation to the US Coast Guard.

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Acronyms and Abbreviations

ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
<i>CFR</i>	<i>Code of Federal Regulations</i>
COI	certificate of inspection
NPRM	notice of proposed rulemaking
NTSB	National Transportation Safety Board
PVA	Passenger Vessel Association
SMS	safety management system

Executive Summary

What Happened

On March 24, 2023, about 2252 eastern daylight time, a fire broke out in the deck 1 wait station on the passenger vessel *Spirit of Boston* while it was moored at the Commonwealth Pier in Boston Harbor, Boston, Massachusetts. All 16 persons aboard evacuated the vessel to the pier. The local fire department responded and extinguished the fire. There were no injuries, and no pollution was reported. Damage to the vessel was estimated at \$3.1 million.

What We Found

We found that the fire originated in the deck 1 wait station under a plastic glassware rolling cart and was caused by an improperly extinguished chafing fuel heating canister that was unintentionally dropped in the area. Without a marine crewmember on board, City Cruises US's (the vessel's operator) emergency response plan for a fire aboard the *Spirit of Boston* was unable to be executed as intended. Had a marine crewmember been on board at the time, they likely could have extinguished the fire before it grew and spread.

We found that City Cruises US's lack of documented procedures on how to handle open-flame devices, like chafing fuel heating canisters, on board its vessels increased the risk of a fire. A safety management system (SMS) would have established mechanisms for the company to identify unsafe practices and fire risks on the *Spirit of Boston* and take corrective action before the fire occurred. Further, we found that requiring SMSs on all US-flagged passenger vessels would enhance operators' ability to identify and mitigate safety risks by establishing mechanisms to identify unsafe practices and take corrective action before an accident occurs.

We determined the probable cause of the fire aboard the passenger vessel *Spirit of Boston* was the improper extinguishing and disposal of a chafing fuel heating canister due to City Cruises US's lack of documented procedures for handling open-flame devices, which led to the ignition of a plastic glassware rolling rack. Contributing to the growth and spread of the fire was City Cruises US not requiring a marine crewmember—designated and trained to execute City Cruises US's emergency response plan for a fire aboard a vessel—to remain aboard the vessel until all hospitality staff and other noncrew personnel departed the vessel.

What We Recommended

As a result of this investigation, the NTSB issued four new recommendations and reiterated one recommendation.

We recommended that City Cruises US require at least one marine crewmember—who is properly trained to respond to shipboard emergencies, including fire—to remain on board its vessels until all hospitality staff and other noncrew personnel depart the vessel. We also recommended that City Cruises US develop procedures for, and train crewmembers and hospitality staff on, the proper handling and extinguishing of chafing fuel heating canisters on board its vessels.

We further recommended that City Cruises US implement an SMS for its fleet to improve safety practices and minimize risk. We also reiterated Safety Recommendation M-12-3 to the US Coast Guard to require all operators of US-flag passenger vessels to implement SMSs, taking into account the characteristics, methods of operation, and nature of service of these vessels, and, with respect to ferries, the sizes of the ferry systems within which the vessels operate.

Finally, we recommended that the Passenger Vessel Association share with its members the circumstances of this accident, including the importance of having at least one marine crewmember on board a vessel with hospitality staff or noncrew personnel, having procedures for handling open-flame devices, and implementing SMSs.

1 Factual Information

1.1 Event Sequence

1.1.1 Synopsis

On March 24, 2023, about 2252 local time, a fire broke out in the deck 1 wait station on the passenger vessel *Spirit of Boston* while it was moored at the Commonwealth Pier in Boston Harbor, Boston, Massachusetts (see figure 1).¹ All 16 persons aboard evacuated the vessel to the pier. The local fire department responded and extinguished the fire. There were no injuries, and no pollution was reported. Damage to the vessel was estimated at \$3.1 million.



Figure 1. Passenger vessel *Spirit of Boston* after the fire.

1.1.2 Background

The 192-foot-long, US-flagged passenger vessel *Spirit of Boston* operated as a dinner excursion vessel in Boston Harbor, offering buffet-style dining, DJ entertainment, and dancing for up to 600 passengers (see section 1.6.1 for vessel particulars). The vessel had five decks: the bridge deck, decks 1 through 3, and the hold (see figure 2).

¹ (a) In this report, all times are eastern daylight time. (b) Visit [nts.gov](https://www.nts.gov) to find additional information in the [public docket](#) for this NTSB investigation (case no. DCA23FM022). Use the [CAROL Query](#) to search investigations.

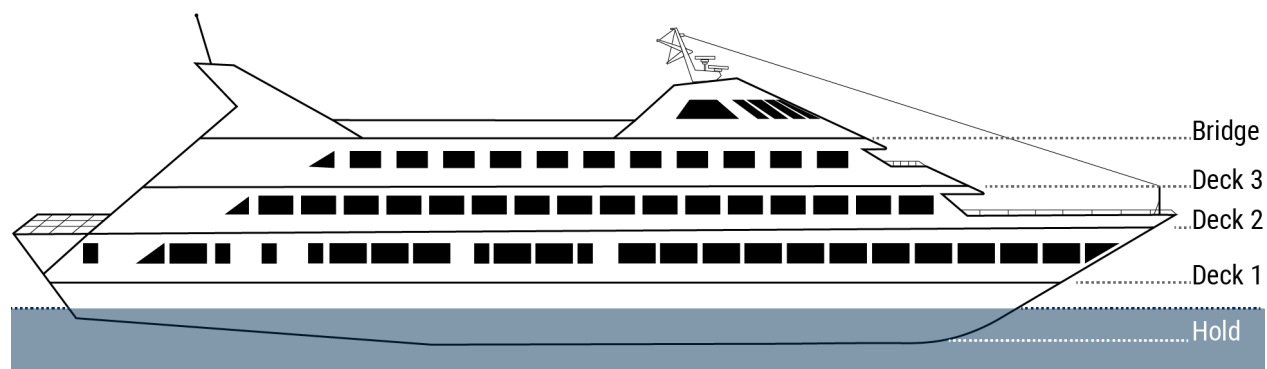


Figure 2. Profile view of *Spirit of Boston*.

The wheelhouse of the *Spirit of Boston* was located on the bridge deck (the uppermost deck of the vessel), which also included an open-deck passenger area behind the wheelhouse.

Below the bridge deck was deck 3, which had dining tables, buffet tables, and indoor and outdoor bars for passenger use. An open, semicircular stairway led down to deck 2, which had dining tables, a buffet station, and a wait station forward of the semicircular stairway. A DJ booth, a dance floor, dining tables, a bar, and restrooms were located aft of the stairway on this deck.

Below deck 2 was deck 1, which contained dining tables, a buffet station, a DJ booth, a bar, and a dance floor. The galley, cold prep room, and deck 1 wait station were located on the port side, aft. The galley contained ovens, warming units, refrigerators, freezers, dishwashers, and a deep fat fryer. The cold prep room contained refrigerators, prep tables, a commercial floor mixer, and several storage racks. The deck 1 wait station contained a coffee maker, sinks, metal racks for coffee equipment, rolling carts for stacking racks of coffee cups and beverage glasses in plastic storage racks, a two-level plastic utility cart for plates and utensils, a plastic trash can, and a plastic laundry bin.²

Below deck 1 was the hold deck, which contained fuel tanks, water tanks, and storage areas. The engine room was also on this level, which housed two 500-hp main diesel engines for propulsion, two 298-hp diesel generators for the vessel's electrical systems, and other equipment, such as pumps, heating and air conditioning systems, and other machinery for the operation of the vessel.

² In regulations applicable to small passenger vessels, a trash can is referred to as a "waste receptacle."

Figure 3 shows the layout of the vessel.

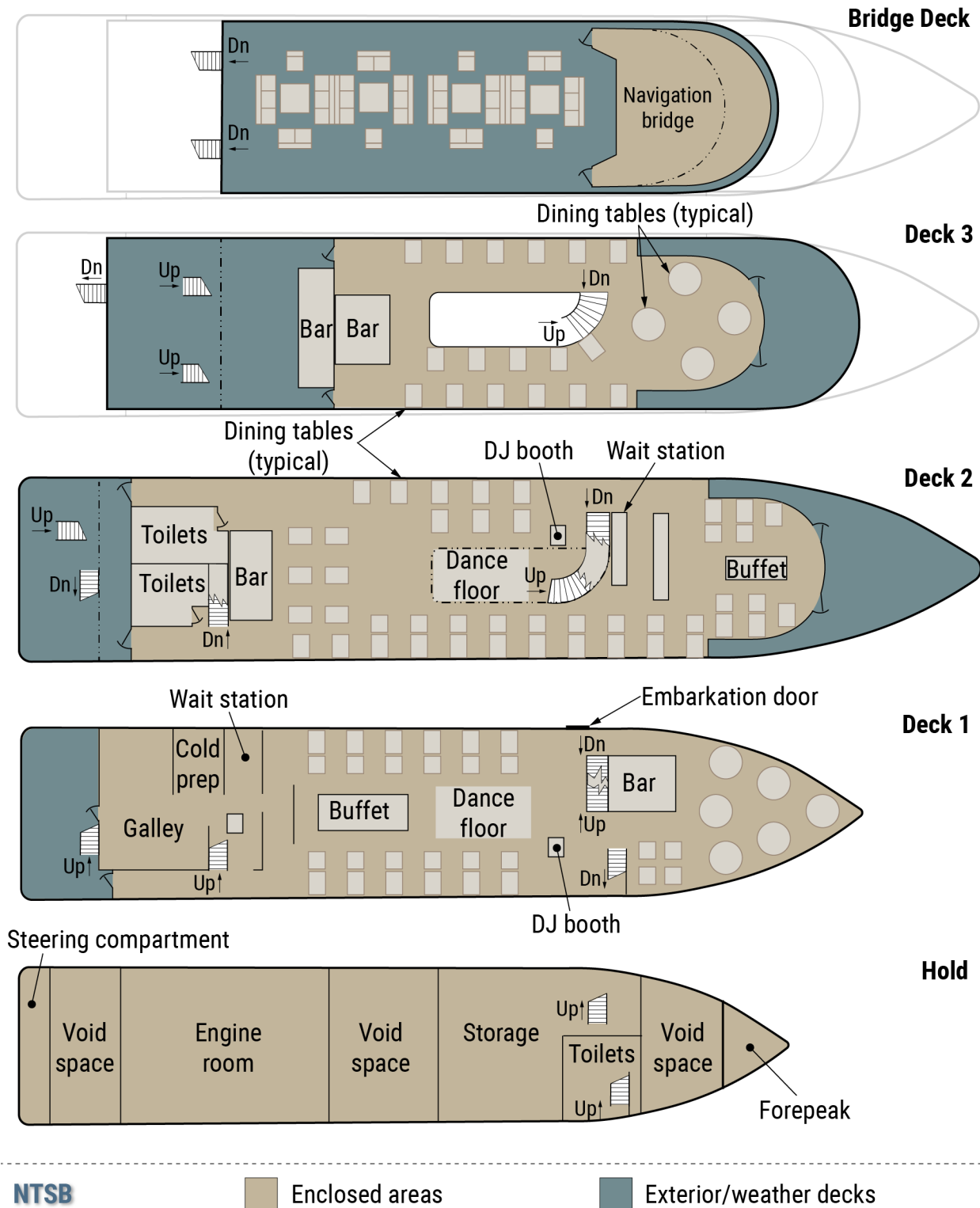


Figure 3. Plan view of *Spirit of Boston* decks (scale approximate).

1.1.3 Precasualty Events

On March 24, 2023, between 1400 and 1530, 6 marine crewmembers, 13 galley staff, 14 hospitality staff, and 2 DJs (35 personnel total) reported to the *Spirit of Boston*, which was docked at Commonwealth Pier (the vessel's home berth) in Boston, Massachusetts, to prepare for the evening dinner cruise scheduled to depart at 1900. The marine crewmembers included a captain, a captain in training (who was operating as a mate), a senior deckhand, and three deckhands. The hospitality staff included two managers (a senior restaurant manager and a restaurant manager), six servers, four server assistants, and two bartenders. The marine crewmembers, galley staff, and hospitality staff were employees of City Cruises US, the vessel's operator; the DJs were contractors (see section 1.6.1 for more details about the vessel's owner and operator).

While the galley staff prepared food for the evening and the marine crew prepared the vessel for departure, the hospitality staff prepared the tables and the buffet areas in the passenger areas on all three decks. Throughout the passenger areas, the galley staff placed and lit chafing fuel heating canisters in holders below the chafing dishes on the buffet tables to keep food warm (see figure 4 and figure 5). Coffee for passengers was also kept warm by a chafing fuel heating canister, located in a holder below the dispenser. Members of the galley staff lit the chafing fuel heating canisters using wand-type, multipurpose, butane-filled candle lighters; the canisters typically were lit before each cruise and remained lit for the duration of the cruise (the cruise that evening was expected to take about 3 hours). Typically, members of the galley staff were responsible for lighting and extinguishing the chafing fuel canisters in the dining areas (see section 1.8.2 for more details about the operating company's use of open-flame devices).



Figure 4. Left to right: *Spirit of Boston* chafing dishes (with the chafing fuel heating canisters removed) in passenger areas on deck 2 and deck 3 after the fire. Exemplar coffee maker and dispenser used aboard *Spirit of Boston* with the chafing fuel heating canisters removed from under the dispenser.



Figure 5. Chafing fuel heating canisters used aboard *Spirit of Boston*.

On deck 1, there were several tables in the passenger areas. The hospitality staff set each table with lit disposable liquid wax candles placed inside glass candleholders. Figure 6 shows a sample of the type of disposable liquid wax candles used aboard the *Spirit of Boston* and typical candle placement on a dining table in a passenger area.



Figure 6. Left to right: Liquid wax candle used aboard *Spirit of Boston*. Candle removed from glass candleholder on table in the passenger area on deck 2 after the fire (the hospitality staff were resetting the tables at the end of the March 24 dinner cruise).

Most of the passengers scheduled to board for the evening cruise were high school students on a school-organized trip. As a general practice, City Cruises US took additional safety precautions when large student groups were aboard. For example, the hospitality staff served passengers coffee from the coffee dispenser in the deck 1 wait station, instead of setting up the dispenser in the passenger dining area for self-service (as was typical). Additionally, the hospitality staff did not place liquid wax candles on the dining tables on decks 2 and 3, which had been reserved for the students for that evening cruise.

The marine crew conducted eight “pre-cruise checks” in preparation for the cruise (as was required by City Cruises US’s marine operations procedures). These checks included completing a security sweep; ensuring the steering, gearing system for the main propulsion system, whistle, automatic identification system, radar, radios, and navigation lights were operational; and ensuring there were no oil sheens present in the water. The marine crew verified completion of these checks in the deck logbook in the wheelhouse.

1.1.4 Event Narrative

About 1800, passengers started boarding the *Spirit of Boston* for a 3-hour cruise of Boston Harbor. About an hour later, the vessel departed Commonwealth Pier with 429 passengers (of which about 300 were students) on board—in addition to the 35 crewmembers and staff. During the cruise, hospitality staff served beverages

to customers at their tables and delivered food to the buffet stations, and the students on board were restricted to decks 2 and 3.

At an unknown time toward the end of the cruise, galley staff extinguished the chafing fuel heating canisters on the buffet tables in the passenger spaces. The senior restaurant manager assigned two server assistants (server assistants 1 and 2) to begin cleaning deck 1. According to server assistant 2, about 2145, in preparation for the cruise ending, she extinguished the coffee dispenser's chafing fuel heating canister in the deck 1 wait station and left the canister on the counter to cool. The server assistant said that she was unable to locate the cap of the chafing fuel heating canister, so she believed she blew it out instead of placing the lid on to extinguish the flame (see section 1.8.2 for more details on extinguishing chafing fuel heating canisters).

About 2200, the marine crew of the *Spirit of Boston* docked the vessel with its port side to the Commonwealth Pier. By 2215, all passengers had safely departed the vessel.

The marine crew, galley staff, hospitality staff, and DJs remained aboard the vessel to clean up their individual areas, secure the vessel for the evening, and prepare the vessel for the next day's cruise. The marine crew collected plastic garbage bags, full of trash, from trash cans and brought the bags to the stern. Server assistant 2 stated that, during this time, she believed she threw the coffee dispenser's chafing fuel heating canister into the trash can in the deck 1 wait station after the canister had cooled down "because you can't throw out a hot [chafing fuel heating canister]." She recalled that the trash in the deck 1 wait station had been taken out soon after the cruise ended and new trash bags had been put into the trash can.

About 2230, the marine crew switched the vessel's electrical power from ship's power to shoreside power supply. Shortly after power was switched, the captain-in-training/mate and the four deckhands departed the vessel; the captain remained aboard. The captain dismissed the galley staff, who departed the vessel. The 14 hospitality staff remained aboard to continue cleaning up the passenger areas and prepare for the next day's scheduled cruise. The two DJs also remained aboard to pack up their equipment.

The majority of the remaining hospitality staff were assigned to clean deck 2. While the hospitality staff cleaned the vessel, the senior restaurant manager and the restaurant manager sat at a table on the starboard aft side of deck 1, completing paperwork and counting money from the evening cruise.

The hospitality staff placed garbage collected from the tables into plastic trash cans lined with plastic bags. They extinguished and removed the liquid wax candles on the passenger area tables on deck 1 and brought them up to deck 2 in preparation for the cruise on the following day.

About 2245, server assistant 1 remembered throwing away an empty liquid wax candle into the recently emptied deck 1 wait station trash can. She also recalled throwing a chafing fuel heating canister into the deck 1 wait station trash can; she stated that, before throwing it away, she “picked it [the canister] up, shook it to make sure there was no liquid in it.” She stated that she did not extinguish the chafing fuel heating canister, did not know who had extinguished it, and stated that it was “cold.” Shortly afterward, the captain—the last remaining marine crewmember on board—passed through the galley and then departed the vessel.

About 2250, server assistant 2 entered the deck 1 wait station and saw gray smoke near the wait station’s overhead light. She heard “something down below” described as “nit-nit-nit.” She looked down toward the deck and saw “a spark moving around” under one of the two plastic glassware rolling carts in the wait station (figure 7 shows an exemplar cart). She did not see any flames and notified the senior restaurant manager that “something [was] burning.”



Figure 7. Exemplar plastic glassware rolling cart used aboard *Spirit of Boston*.

The senior restaurant manager and the restaurant manager left their table on the starboard side of the vessel, went with server assistant 2 to the entrance of the deck 1 wait station, and looked into the space. The restaurant manager saw smoke and “a line of fire ... like a snake basically going across the floor,” along with “some minor flames coming from the corner” (see figure 8). He described the “ribbon of fire” pattern as “thin and squiggly,” about 2-3 feet long, 2-3 inches high, and no more than 3 inches wide. He believed it was coming from under one of the plastic glassware rolling carts and was heading in the direction of the window on the outboard bulkhead of the deck 1 wait station.

The restaurant manager stated that the color of the fire was “yellowish/orange” and was contained to the deck; he said that nothing else was burning at the time. He also heard “a very high-pressure noise” that “sounded like basically an air compressor like when you press it, and it shoots out pressurized air.” He did not know what

caused the noise. Server assistant 1, who was in the passenger area forward of the deck 1 wait station, stated that she heard a popping sound “like someone was popping popcorn or fireworks.”

The restaurant manager used his cell phone to call the captain (who had made it as far as a nearby parking garage since departing the vessel a few minutes earlier). The captain did not answer at that time; he later tried returning the restaurant manager’s call a few times but received no answer.

About the same time as the restaurant manager’s call to the captain, the senior restaurant manager saw sparks under the plastic glassware cart break out into flames. The senior restaurant manager knew there was a fire extinguisher on the other side of the vessel and considered using the extinguisher but chose not to because “the flames were too much for [her].” None of the other hospitality staff attempted to extinguish the fire.

Within one minute of when server assistant 2 initially saw gray smoke in the deck 1 wait station, the senior restaurant manager told the restaurant manager to “tell everyone else to get everyone off the boat” because “the flames seemed to be spreading quickly.” The senior restaurant manager directed all personnel on deck 1 to evacuate the vessel through the portside door and down the gangway to the pier. The restaurant manager ran up to deck 2 and told all personnel working on that deck to evacuate the vessel; they also evacuated through the portside stern door. As he exited the vessel, he reported that he heard a fire alarm on the vessel, and he called 911 to report a fire on the *Spirit of Boston*.

Once on the pier, the senior restaurant manager mustered the hospitality staff and DJs to ensure that everyone was accounted for and called (via cell phone) City Cruises US managers to inform them of the fire. A City Cruises US manager called the captain and advised him of the fire. The captain returned to the pier.

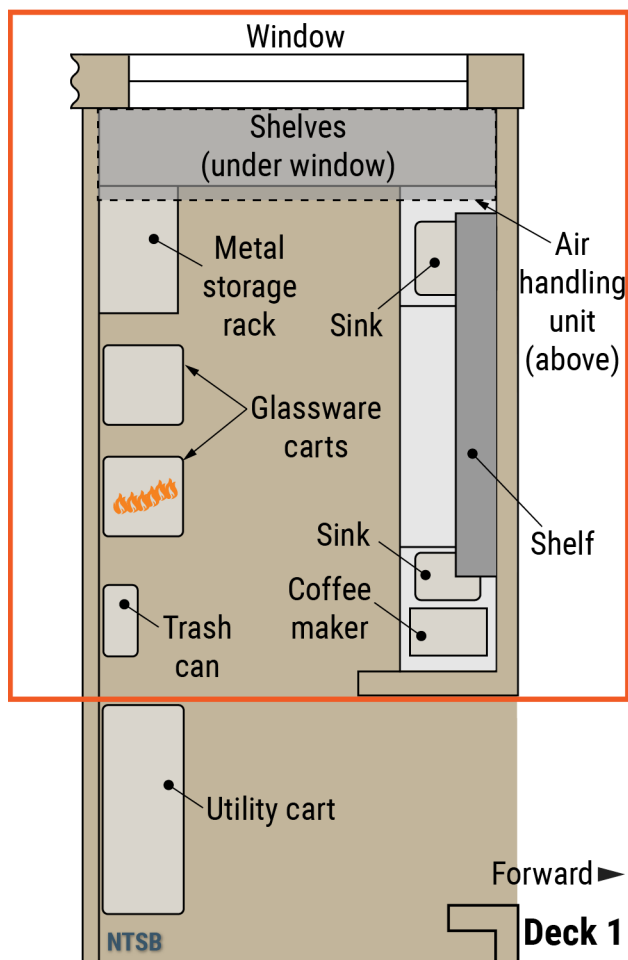


Figure 8. *Spirit of Boston* deck 1 wait station area layout (outlined), including approximate location of fire, indicated by a fire symbol, as reported by the restaurant manager.

Shortly after evacuating the vessel and mustering, one of the DJs went back on board the vessel to retrieve his equipment, which he estimated took about 2 minutes. The DJ stated that while he was on deck 1, he saw “dark” smoke that “got thicker as [he] walked [aft toward the deck 1 wait station].” One server also went back on board and returned to the pier with a lifejacket on. The senior restaurant manager said she attempted to stop both people from reboarding the vessel.

About 2 minutes after the vessel was evacuated, the restaurant manager observed from the pier that the “entire vessel was filled with black smoke, and then it started seeping out of the windows and the door.” He stated, “[The fire] broke through that [wait station] window. And out of that window the flames started following it” (see figure 9).



Figure 9. Screenshot from video taken on the pier at 2307, after hospitality staff evacuated the vessel, showing fire in the *Spirit of Boston* wait station as seen through the wait station window. (Source: *Spirit of Boston* hospitality staff member)

1.2 Response

The Boston Fire Department was notified of the fire aboard the *Spirit of Boston* at 2303. Units were dispatched at 2305, and the first unit arrived on scene at 2309. Numerous Boston Fire Department firefighting assets arrived to fight the fire, including a marine firefighting vessel. The captain provided information about the vessel to the firefighters from the pier.

About 2319, the fire department raised a second alarm.³ Shoreside fire teams deployed hoses and personnel to isolate and fight the fire—primarily in the area of deck 1. They contained the fire to the wait station and adjacent areas on deck 1. Additionally, because of heavy smoke throughout the vessel, they broke windows on all decks to ventilate the vessel and search for possible victims (they found none).

By 2339, the fire was suppressed; firefighters began looking for lingering hot spots and working to ensure the fire was extinguished. At 0106, the Boston Fire Department declared the fire was extinguished.

1.3 Injuries

No injuries were reported.

1.4 Damage

After the casualty, investigators from the US Coast Guard and National Transportation Safety Board (NTSB) examined the damage on the *Spirit of Boston*. The Coast Guard also requested assistance from Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) certified fire investigators, who participated in the examination of the damage.

Most of the fire damage was concentrated in the wait station and the adjacent spaces on deck 1.

About 70 windows on both sides of the vessel on all passenger decks were broken. Two vertical stanchions between deck 3 and the bridge deck were distorted,

³ Fire departments typically use an alarm system to call for additional resources—such as more of their own crews, off-duty firefighters, or mutual aid from other fire departments—at the scene of a fire. For the Boston Fire Department, a second alarm meant a response involving two more fire engines with firefighters.

and there was heat and smoke damage throughout the vessel on all passenger decks.

The bulkheads of the 6.5-foot-wide-by-9-foot-long wait station on deck 1 of the *Spirit of Boston* were made up of steel framing covered by metal joiner panels. The overhead had a drop ceiling made of metal panels that were hung from the framing of the deck above. The aft bulkhead joiner panels melted away during the fire, and the steel framing was exposed. Several electrical cables that ran through the bulkhead cavity and in the space above the drop ceiling sustained fire damage. Steel beams in the overhead area were warped and distorted from the heat of the fire, and the steel deck above the wait station warped and buckled the tiled deck above the steel deck.

Equipment located against the aft bulkhead of the wait station, including the plastic glassware rolling carts, stacked glassware storage racks, the trash can, and the inboard side of a two-level utility cart for dishes and silverware, melted into the deck. According to the Boston Fire Department, chafing fuel heating canisters—which were stored on the windowsill of the outboard bulkhead—

... were in a cardboard box that was burned on the top with the bottom of the box remaining. The chafing fuel heating canisters had exterior heat damage but none of the cans were split open or showed signs of boiling liquid expanding vapor explosion.⁴ [See figure 10.]

⁴ A *boiling liquid expanding vapor explosion* occurs when a liquid within a container reaches a temperature well above its boiling point at atmospheric temperature, causing the vessel to rupture into two or more pieces (National Chemical Safety Program).

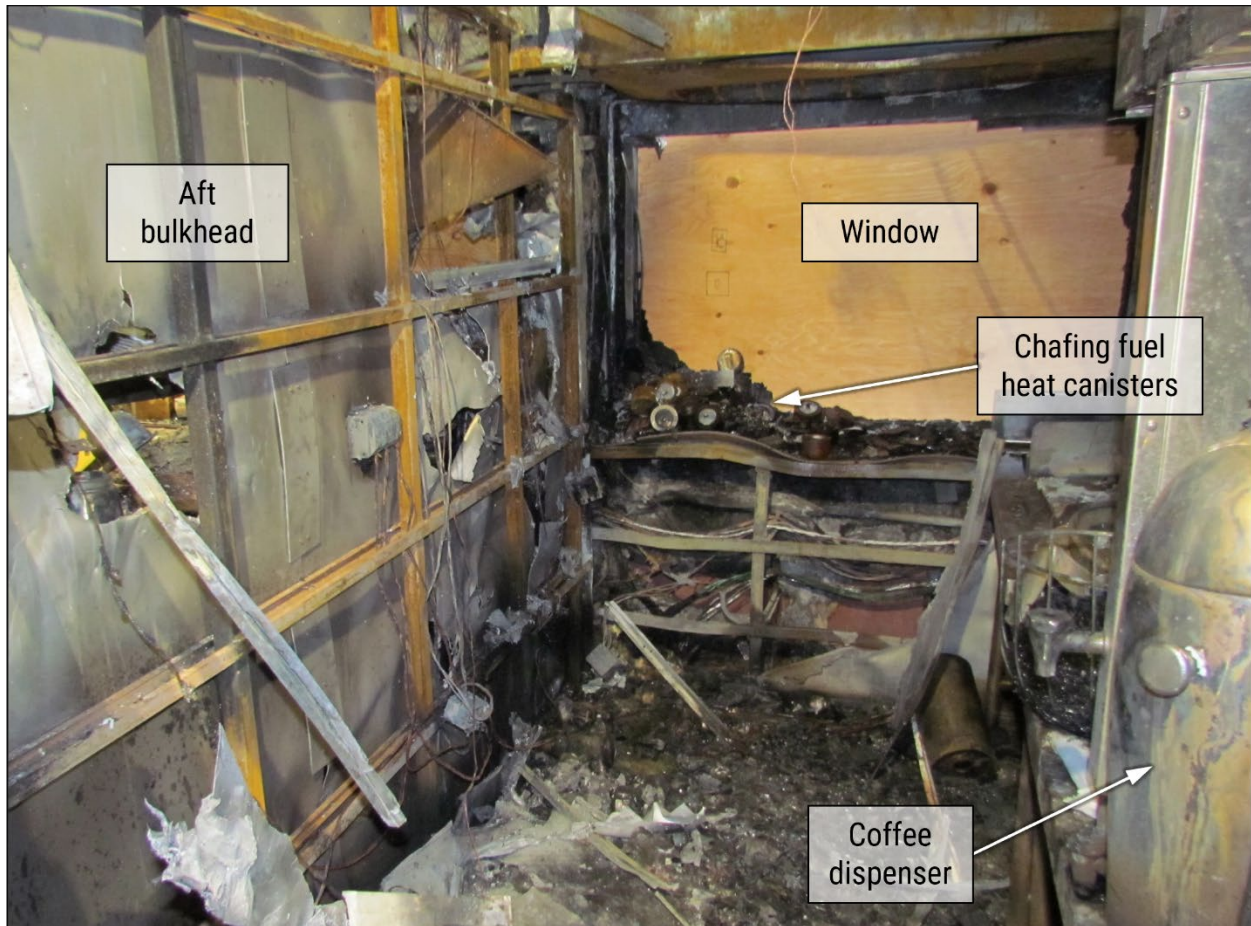


Figure 10. *Spirit of Boston* deck 1 wait station, looking outboard, after the fire. (Source: ATF)

In the cold prep room aft of the wait station, the galley equipment, electrical cables, and some combustible materials on the forward side of the room (adjacent to the deck 1 wait station) sustained fire damage (see figure 11). Several drop ceiling panels in the cold prep room were consumed by fire.



Figure 11. Left to right: Port side of the *Spirit of Boston* cold prep room, aft of the deck 1 wait station, after the fire, looking forward. Port aft corner of the passenger area on deck 1, forward of the wait station, after the fire.

In the passenger area on deck 1, forward of the wait station, in the port aft corner of the space, the drop ceiling panels had been consumed by fire, the electrical cables in the exposed overhead space were damaged, and bulkhead joiner panels were burned (see figure 11). Numerous lifejackets with fire damage were found in the storage bin, which ran along the upper section of the port outboard bulkhead above the windows. Several lifejackets were completely consumed, with only the buckles remaining.

Below the wait station, on the port side of the engine room, the wires of four electrical cables routed into a 24-volt electrical circuit box labeled “engine room alarm junction box” were damaged and discolored due to heat.⁵

1.5 Waterway Information and Environmental Conditions

The vessel fire occurred at Commonwealth Pier in Boston Harbor, where the depth was about 23 feet (see figure 12). According to the Boston Logan International Airport weather station in Boston, Massachusetts, at 2154 on the evening of the

⁵ City Cruises US determined that the electrical cables in the engine room were damaged when the fire spread to a windshield wiper cable that was through the wait station exterior bulkhead area from the engine room, damaging the windshield wiper cable and causing a short circuit, which burned the electrical cables in the engine room that were routed through the engine room alarm junction box.

casualty, north winds were at 9 mph, and there was no current. Skies were overcast, and visibility was 10 miles. The recorded air temperature was 43°F. Sunset occurred at 1901, and civil twilight occurred at 1929.



Figure 12. Area where the *Spirit of Boston* fire occurred, as indicated by a circled X. (Background source: Google Maps)

1.6 Vessel Information

1.6.1 General

The 192-foot-long, steel-hulled small passenger vessel *Spirit of Boston* was built in 1990 in Warren, Rhode Island. Hornblower Cruises and Events LLC owned the *Spirit of Boston*, and its subsidiary, City Cruises US, operated the vessel in Boston Harbor as a dinner excursion vessel. At the time of the casualty, City Cruises US operated 125 vessels, including 60 dinner cruise vessels (other vessels included ferry and water taxi vessels, city sightseeing vessels, and whale-watching cruise vessels). City Cruises US operated 46 vessels in the Boston area at the time of the fire, including four dinner cruise vessels: *Spirit of Boston*, *Odyssey*, *Boston Elite*, and

Seaport Elite. City Cruises US was a member of the Passenger Vessel Association (PVA).⁶

The table below shows vessel particulars for the *Spirit of Boston*.

Table. Vessel Particulars

Vessel	<i>Spirit of Boston</i>
Type	Passenger (Passenger vessel)
Owner/Operator	Hornblower Cruises and Events LLC (Commercial) / City Cruises US (Commercial)
Flag	United States
Port of registry	Boston, Massachusetts
Year built	1990
Official number	954835 (US)
IMO number	N/A
Classification society	N/A
Length (overall)	192.0 ft (58.5 m)
Breadth (max.)	35.0 ft (10.7 m)
Draft (casualty)	10.4 ft (3.2 m)
Tonnage	94 GRT / 975 GT ITC
Engine power; manufacturer	2 × 500 hp (367.7 kW); Caterpillar 3408B diesel engines

⁶ PVA is an organization that promotes the interests and the economic well-being of US passenger vessel owners and operators, and associated businesses, while promoting safety and a secure maritime operating environment for passenger vessels operators, passengers, crew, and the public.

1.6.2 Certificate of Inspection

The *Spirit of Boston* was registered as a US-flagged small passenger vessel per Title 46 *Code of Federal Regulations (CFR)* Chapter I, Subchapter K requirements.⁷

The *Spirit of Boston* held a certificate of inspection (COI), issued in December 2021 by Coast Guard Sector Boston, which was valid for 5 years. The COI listed crew requirements, permitted routes, and conditions of operations, and allowed the vessel to carry 600 passengers and an additional 75 crewmembers or other persons, up to a maximum of 675 persons.

1.6.3 Annual Inspections

Following issuance of its COI, the *Spirit of Boston* was subject to annual inspections by the Coast Guard. In 2020, the Coast Guard issued inspection guidance to Coast Guard marine inspectors for a “Small Passenger Vessel Risk Based Inspection Program” (US Coast Guard 2021).⁸ Under the program, the Coast Guard assessed the potential risk for “an undesirable outcome” for, and assigned one of three corresponding “tier levels” to, each small passenger vessel inspected by the Coast Guard. The Coast Guard determined the *Spirit of Boston* to be a “Tier I” vessel and required “expanded” annual inspections.⁹

⁷ When the *Spirit of Boston* entered service, it was subject to 46 *CFR* Subchapter T, which originally applied to all passenger vessels. In 1996, Subchapter T was revised significantly, and Subchapter K was introduced. Subchapter T was applicable to passenger vessels less than 100 gross tons that carried 150 or fewer passengers; Subchapter K was applicable to passenger vessels less than 100 gross tons that carried more than 150 passengers. New small passenger vessels must meet requirements in the updated “New” Subchapter T regulations or Subchapter K regulations, while existing vessels, like the *Spirit of Boston*, maintain certain regulatory standards from the original “Old” Subchapter T.

⁸ The “Small Passenger Vessel Risk Based Inspection Program” arose as a Coast Guard programmatic initiative after the September 2, 2019, fire aboard the small passenger vessel *Conception*, which resulted in the loss of 34 lives and the loss of the vessel.

⁹ The Coast Guard evaluated numerous factors, including compliance history; vessel type, age, and route; and history of vessels in related operations to place a vessel in one of three tiers (I, II, or III). According to the Coast Guard, tier assignment reflected “the potential outcomes based on analysis of both the specific vessel and vessels with similar activity”; Tier 1 vessels were considered to have higher risk characteristics or operations and required additional and expanded inspections. An expanded annual inspection is similar in scope to a COI inspection and adheres closely to the format for subsequent COI inspections as outlined in subsections 46 *CFR* 115 Subpart H or 176 Subpart H, as applicable, including the completion of satisfactory drills as required in those subsections.

Before the fire, the *Spirit of Boston's* most recent expanded annual inspection was completed on December 1, 2022, after which the vessel was declared "fit for route and service." No deficiencies were issued, and none were outstanding.

Before the December 2022 inspection, Coast Guard inspectors conducted drydock and internal structure exams aboard the *Spirit of Boston* on May 25, 2022, while it was drydocked in Fairhaven, Massachusetts. The Coast Guard identified 77 deficiencies, including excessive hull pitting caused by stray current. Over the next 7 months, with several follow-up visits by Coast Guard inspectors, City Cruises US addressed and cleared all deficiencies. The vessel was declared to be fit for service and route as indicated on the COI.

1.7 Survival Factors

1.7.1 Fire Detection and Firefighting Equipment

The *Spirit of Boston* was outfitted with a fire detection system, although not required by the regulations it was inspected under. There were 16 smoke detectors throughout the passenger areas, one heat detector in the galley, and one heat detector in the engine room. All detectors had visual and audible alarms located in the vessel's wheelhouse. The fire alarm system was connected to the vessel's security system, which was outfitted with motion detectors.

The *Spirit of Boston* was equipped with two fire pumps in the engine room and six fire stations around the vessel. There were 12 fire extinguishers located throughout the vessel. In the area of the galley, one of these fire extinguishers (ABC-type) was bracket-mounted on the bulkhead adjacent to the entrance to the cold prep room, aft of the wait station on deck 1.¹⁰ A fire blanket was mounted on the bulkhead in the passageway across from the cold prep room.¹¹ Figure 13 shows the locations of the ABC-type fire extinguisher and fire blanket in the galley area.

¹⁰ An ABC-type fire extinguisher is filled with a dry chemical and can be used to extinguish combustible materials (Type A fires), flammable liquids (Type B fires), and electrical equipment fires (Type C fires).

¹¹ A fire blanket is a fire-resistant sheet of material that can be used to cover a fire to cut off its supply of oxygen, or to wrap around a person who is on fire.

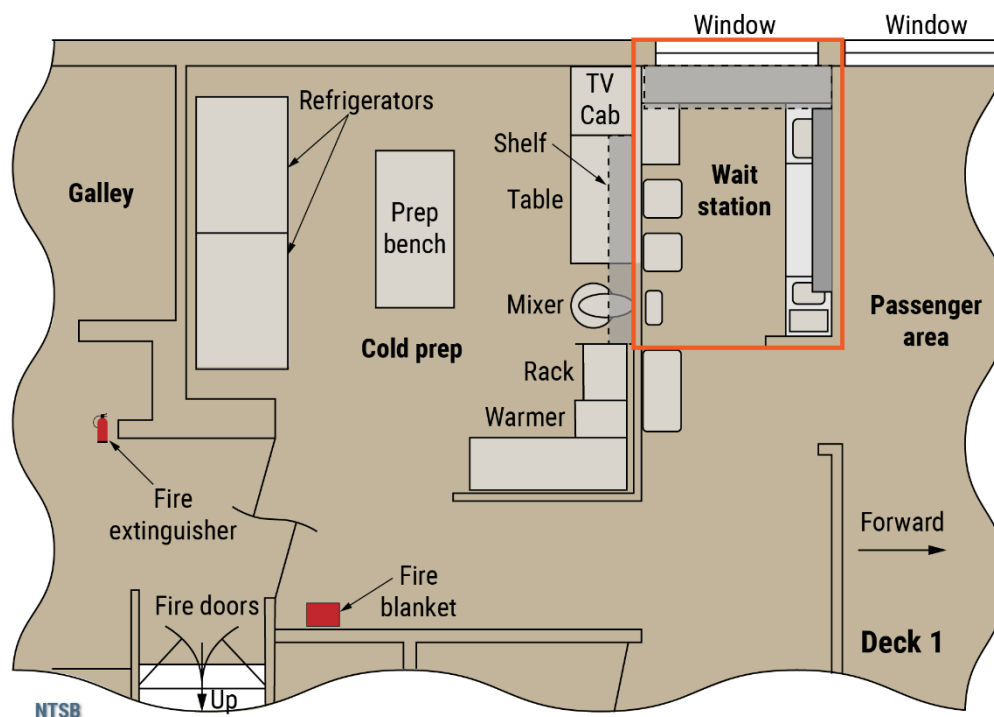


Figure 13. *Spirit of Boston* galley area layout on deck 1. The deck 1 wait station—where the hospitality staff saw the fire—is outlined.

The galley area and other sections of the passenger compartments were equipped with fire doors that could be closed locally or remotely by pulling a control handle above the doors to limit the spread of fire and establish fire boundaries between decks. Fire doors in the galley area were located in the stairway between the galley and deck 2. Additionally, the deep fat fryer in the galley was equipped with a dry chemical fire suppression system.

1.7.2 Emergency Response Plan

City Cruises US had an emergency response plan, applicable to all vessels in its fleet, to “provide emergency response guidance and mitigate the negative effects related to a serious marine incident involving vessels” in the fleet.¹² The plan “provided information and procedures to enable the user to take prompt, appropriate and effective action in the event of an incident affecting the safety of our passengers, shipmates, and property.” A copy of the company’s emergency response

¹² A serious marine incident was defined in City Cruises US’s emergency response plan as a death or serious injury to a person; a vessel fire, grounding, flooding, collision, mechanical failure, structural failure; a pollution incident; and all other events with the potential to negatively impact or disrupt normal operations.

plan was located in the captain's binder in the wheelhouse on the *Spirit of Boston*. The plan contained 27 possible emergency situations—such as fire, flooding, collision, machinery failure, man overboard, abandon ship, or bomb threat—with the corresponding actions expected of vessel personnel, including notification procedures.

In all the emergency scenarios outlined in the plan, the marine crew was directed to mitigate the emergency and take action to control the vessel. The captain was listed as the primary person in charge of all emergency response activities.¹³ The captain's duties were to initiate the response plan by directing the crew and to contact the appropriate authorities and management. The mate (or senior deckhand) was responsible for coordinating and participating in the actions necessary to stabilize the situation as directed by the person in charge.

For each emergency in the plan, the restaurant manager's primary responsibility was passenger safety; the restaurant manager was directed to maintain constant communication with the person in charge, execute and relay orders, and direct the restaurant staff as needed. Other duties for the restaurant manager included coordinating first aid, managing the passengers, accounting for passengers and crew during an evacuation, and completing incident reports. The senior restaurant manager (on duty at the time of the fire) stated that she had not received any training or participated in any drills that exercised an emergency response plan. City Cruise US's Vice President of Operations stated that the restaurant staff "do not fill safety sensitive positions" and received annual safety training that was focused on egress, communications with marine crew, and awareness of safety equipment within their workspaces (see section 1.8.3).

Three placards were posted in the wheelhouse above the forward windows, each providing guidance to the crew for abandoning ship, man overboard, and fire. The captain, mate, deckhands, and restaurant manager each had specific duties listed on the placards. The captain was advised to stay in the wheelhouse and direct the actions of the crew and restaurant manager, shut down ventilation and fire doors, and notify the Coast Guard. The mate was directed to take charge at the scene, maintaining communication with the captain. The deckhands were directed to start the fire pump, report to the scene with fire extinguishers and a fire axe, and operate the fire hose. The restaurant manager was directed to supervise all restaurant staff as

¹³ The person in charge was designated according to the vessel chain of command. On the *Spirit of Boston*, the captain was listed first as the person in charge, followed by the mate/senior deckhand, then a deckhand.

directed by the captain, stay in constant communication with the captain, and be prepared to muster passengers for evacuation.

1.8 Operations

1.8.1 City Cruises US Shoreside Management

City Cruises US was led by a national executive leadership team that was based in Chicago, Illinois. In Boston, City Cruises US's general manager was responsible for the overall operation of four dinner cruise vessels, which were part of City Cruises US's dining division.

The marine crewmembers reported to a director of marine operations (dining division) and an assistant director of marine operations (dining division). The director and assistant director, who both held a Coast Guard-issued credential as a captain, were responsible for operations, training, navigation, engineering support, and security of the four vessels.

The hospitality staff on City Cruises US's Boston vessels reported to a food and beverage director (dining division). The food and beverage director oversaw the operational aspects of the dining fleet such as scheduling, recruiting, hiring, disciplinary, invoicing, budgeting, and forecasting. The associate food and beverage director reported to the director and described his function as a link between the director and upper management to the marine crewmembers. The food and beverage director was responsible for all hospitality and galley operations on the dining vessels.

City Cruises US had an incident management system, which, according to the director of marine operations, tracked incidents and logged lessons learned in that system "to enhance the safety of the operations." Additionally, the company had a vessel management system that it used to track vessel maintenance activities. According to the director of marine operations, the vessel management system also tracked "different operational items on the vessels" and was used "to ensure that systems are maintained and kept up to speed."

City Cruises US did not have a safety management system (SMS) for its vessels, nor was it required to.¹⁴ The director of marine operations stated that although City Cruises US was in the process of developing SMSs for its ferry and excursion vessels, the dining fleet was not included in that effort.

1.8.2 Use of Open-Flame Devices

During dinner cruises aboard the *Spirit of Boston*, two types of open-flame devices were typically used, as was the case on the evening cruise on the night of the fire:

- Disposable liquid wax candles in glass candleholders, and
- chafing fuel heating canisters.

Each of the liquid wax candles had a wick that was submerged in petroleum distillate fuel and was designed to burn for 8 hours. The hospitality staff stated that, after each cruise, they blew out the candles and allowed them to sit on the tables overnight, and the following day, they determined which candles needed to be replaced based on the amount of fuel that remained in the candle. If a candle was empty, it would be thrown away in a trash can.

On the *Spirit of Boston*, spare liquid wax candles were stored in storage racks in the hold deck below deck 1. Safety directions printed on the candle box stated that the liquid wax candles should be stored and locked up, should not be stored or used near ignitable materials, and should not be stored near heat or open flame. The candles were only to be used in well-ventilated areas.

City Cruises US provided two types of chafing fuel heating canisters for the employees to use aboard the vessel: (1) "4-hour Wick Fuel" and (2) "Stem Wick 6-hour Chafing Fuel" (see figure 5). Each was manufactured by a different company.

The 4-hour Wick Fuel heating canister was designed to burn for 4 hours and was filled with ethylene glycol and diethylene glycol, an odorless, colorless liquid fuel mixture. The label stated, "Caution: Combustible," and the directions stated:

¹⁴ Under the International Safety Management Code, companies that own or operate vessels subject to the *International Convention for the Safety of Life at Sea* must develop, implement, and maintain an SMS. Additionally, regulations (33 CFR Part 96) and law (46 United States Code Section 3203) require US-flagged vessels engaged on a foreign voyage that are transporting more than 12 passengers, certain cargo vessels, and mobile offshore drilling units over 500 gross tons to implement an SMS. These requirements do not apply to domestic passenger vessels.

Always place cans in a designated holder or tray before lighting, use upright on a level surface. Light product with long-stemmed match or lighter. Do not burn unattended or near combustible materials, and to extinguish, use cap as snuffer.

The Stem Wick 6-hour Chafing Fuel heating canister was designed to burn for up to 6 hours. The canister was also filled with an ethylene glycol and diethylene glycol mixture. The canister label cautioned that the unit was combustible and stated, "never handle a burning can." The manufacturer's website stated to "ALWAYS use a long handled match or butane lighter to light cans [chafing fuel heating canisters]" after placing them in a designated fuel holder (Sterno, n.d.(b)). The manufacturer's website further stated, "the safest way to extinguish a lit can of fuel is using a snuffer paddle or ceramic saucer" and warned to "NEVER blow out flame to extinguish" (Sterno, n.d.(a) and (b)). Each canister came with a red plastic cap to fit over the wick when not in use, and the label on the canister advised not to use the cap to regulate or extinguish the flame. According to the manufacturer of the stem wick chafing fuel canisters:

Caution should be used with gel chafing fuels: when lit, the can gets very hot; if spilled, the gel will remain lit and could cause proper damage. (Sterno, n.d.(a))

Galley staff typically lit chafing fuel heating canisters at the beginning of each cruise and extinguished and removed them or threw them away at the end of the cruise. Several galley staff reported that they typically extinguished the chafing fuel canisters by dousing them in buckets of water. Guidance to galley staff on how to extinguish chafing fuel heating devices was provided verbally. The galley manager stated that the galley staff was "supposed to take water to the site of where the lit [chafing fuel heating canisters] are," and "put the [chafing fuel heating canisters] out in water."

Chafing fuel heating canisters were stored on the windowsill in the deck 1 wait station and on the counter above a sink in the deck 2 wait station. The Safety Data Sheet for the 6-hour canisters advised to store them in well-ventilated areas, in tightly closed receptacles, and to keep ignition sources away (Sterno 2023).¹⁵

¹⁵ A *Safety Data Sheet* is an informational factsheet that describes the potential hazards associated with a particular product or material and includes instructions for its safe use and spill-handling procedures. Under the Hazard Communication Standard, the Occupational Safety and Health Administration requires Safety Data Sheets to be available for potentially harmful substances handled in the workplace.

The *Spirit of Boston* did not have flammable storage lockers or containers for either the liquid wax candles or the chafing fuel heating canisters, nor were any required.

1.8.3 Training and Drills

1.8.3.1 All Personnel

City Cruises US required every employee hired—both marine crew and hospitality staff—to complete new-hire orientation. The orientation, which was completed as each employee was hired, included viewing a slideshow that contained information about the company’s history, overview, and organization, as well as its mission to provide customer service, safety, security, environmental protection, communication, teamwork, and professionalism.

The safety section included a slide titled, “Your Role in an Emergency,” which directed employees to:

- Follow instructions of captain and crew,
- Guide and assist passengers and crewmembers, and
- Keep guests and crewmembers calm.

The safety section also included slides on safety equipment on board and “fire safety.” The slide on safety equipment showed photos of fire extinguishers, a life ring, personal flotation devices, and a first aid kit. Because the presentation was generalized and not specific to vessels, it did not include specific locations of safety equipment.

The slide displaying “fire safety” contained information about fire extinguisher operation and listed actions the employees were to take in the event of a fire: report fires immediately, identify the location and source of the fire, evacuate the area, extinguish the fire (if possible), and to listen to the captain’s instructions.

According to the vice president of operations, every employee was also required to take “RESPECT Orientation” training each year, which was typically conducted at the beginning of each season and included “a portion that’s dedicated to safety.”¹⁶ According to the vice president/general manager of City Cruises US, this

¹⁶ RESPECT orientation is a Hornblower-provided presentation; the name is an acronym for Respect, Environment, Safety #1, Professionalism, Exceed, Communication, and Teamwork.

training was scheduled for April 11, 2023, aboard the *Spirit of Boston*; after the fire, the training was rescheduled for April 24 on another City Cruises US dining vessel.

1.8.3.2 Marine Crew

The director of marine operations (dining division) stated that he provided newly hired marine crewmembers with an initial orientation that covered all areas of day-to-day operations, focusing on vessel familiarization. The company also required marine crewmembers to watch a slideshow titled, "Marine University." This presentation included training on regulatory requirements, marine casualty reporting, credential suspension and revocation, crew safety and training requirements, credentials and documentation, drug and alcohol testing, and security.

The marine crew received hands-on training, typically from the captain on board the vessel to which they were assigned. The senior deckhand stated that during the hands-on training he received (from the assistant director of marine operations, who also held a credential as a captain), he was shown how to properly extinguish a fire and operate all the fire systems; how to respond to a man-overboard situation; and how to handle lines.

City Cruises US also required deckhands to be able to identify classes of fires, perform appropriate firefighting techniques, and operate firefighting equipment. Additionally, deckhands were required to be familiar with vessel fire detection and alarm systems (if outfitted), evacuation routes, mustering procedures and locations, and station bill assignments and duties. Deckhands also were required to know the location of and how to operate power and ventilation shutdowns, fire doors, watertight doors, hatches, and vent dampers.

In compliance with City Cruises US's policies and Coast Guard regulations, the marine crew routinely conducted safety drills on the *Spirit of Boston* for emergencies such as fire, man overboard, and abandon ship. City Cruises US required the captain to conduct fire drills once per month so that each marine crewmember would be familiar with their duties in case of a fire. As part of each fire drill, the captain was required to summon the marine crew to report to their assigned stations and demonstrate their duties, and to instruct crewmembers on the use of firefighting equipment, fire extinguishers, fire alarms, and any other related equipment. The drills were logged in the company computer system and in the vessel's logbook (as was required by the company). According to the *Spirit of Boston* captain, the mates and the captains were qualified to run drills aboard the vessels, and "that just comes with experience." He stated that he liked to run a fire drill about every 2 weeks with the crew that was aboard the vessel, and when new crewmembers came aboard, he

would run a drill to make sure that they understood how the fire pump worked, where the seven fire stations were located, and how to operate a fire extinguisher.

1.8.3.3 Hospitality Staff

The senior restaurant manager, restaurant manager, and server assistant 2 each recalled viewing the new hire orientation slideshow when they were hired. The senior restaurant manager stated that, as part of her orientation, a marine crewmember demonstrated how to use a fire extinguisher by showing how to pull the pin (the crewmember did not dispense any extinguishing agent). The restaurant manager and server assistants 1 and 2 did not recall being shown how to use a fire extinguisher. None of the hospitality staff recalled being shown how to use a fire blanket.

Hospitality staff did not participate in the vessel familiarization orientation or shipboard drills that were required of the marine crew. According to the food and beverage director (dining division), they were expected to report emergencies, such as a fire, to the captain. The restaurant manager believed the marine crew was responsible for firefighting, and the senior restaurant manager stated that the hospitality staff “weren’t trained to handle [a fire].” The senior restaurant manager stated that, in the event of an emergency on the vessel, she would contact the marine crew via handheld radio, since “they are in charge of handling any emergency situations on board.”

Server assistant 1 recalled being told that if there was a small fire to use a fire extinguisher, but if it was a “big fire” to tell the marine crew. She believed the marine crew was responsible for her safety unless they were off the vessel, then the managers were in charge. Server assistant 2 stated that, “when something goes wrong, we get the [marine] crew.”

Galley staff from the *Spirit of Boston* were interviewed after the fire; none of the galley staff recalled participating in fire drills or being trained how to use fire safety equipment, such as a fire extinguisher.

1.9 Personnel Experience

1.9.1 Marine Crew

The captain on duty during the evening cruise held a credential as master of self-propelled vessels of less than 100 gross register tons upon inland waters. He began working for City Cruises US as a deckhand in 2008, became a mate in 2010,

and began serving as the captain on City Cruises US's vessels after obtaining his credential in 2019.

The captain in training, who was operating as a mate on the March 23, 2023, *Spirit of Boston* evening cruise, held a credential as a master of self-propelled vessels less than 100 gross register tons upon near coastal waters since 2018. He started working for City Cruises US in May 2022. As part of his training program, he was learning how to operate the *Spirit of Boston* (on the evening cruise before the fire broke out) under the supervision of the captain before he was able to operate a vessel on his own as captain.

1.9.2 Hospitality Staff

The senior restaurant manager had been with City Cruises US for about 6.5 years and had worked aboard the *Spirit of Boston* throughout her career. She had been promoted to restaurant manager about a year before the fire.

The restaurant manager had been employed with City Cruises US for about 10 months and had worked aboard the *Spirit of Boston* for the majority of the time (the remaining time was spent on the other three dinner cruise vessels operated by the company). Before working with the company, he had worked at shoreside restaurants and a meal preparation company for about 7 years.

Server assistant 1 had worked for City Cruises US for about 15 years and had mostly worked aboard the dinner cruise vessel *Odyssey* throughout her career. She had completed three or four trips aboard the *Spirit of Boston* in 2023.

Server assistant 2 had worked for City Cruises US for about 10 months and had mostly worked on other vessels in Boston.

1.10 Fire Investigation

1.10.1 Vessel Examination

The NTSB worked with Coast Guard investigators, ATF fire investigators (whose assistance was requested by the Coast Guard), marine surveyors, and other private fire investigators to determine the origin and cause of the fire.

Investigators examined the deck 1 wait station as an area of interest due to the extent of damage in this space and statements from hospitality staff and the responding fire department about the location of the fire. Investigators removed and inspected the remains of the trash can that was located against the aft bulkhead of

the wait station. Several utensils and unburned combustible items—including a coffee filter, a sugar packet, and straws—were found at the base of the melted trash can. The plastic trash bag that had been at the bottom of the trash can was still intact. Investigators did not find a chafing fuel heating canister nor a liquid wax candle in the remains of the trash can. The trash can melted, turning into a mass of debris directly below where it had been located. The melted mass had an outline of the base of the trash can—visible when the mass was inverted—enabling investigators to determine the trash can’s exact location in the deck 1 wait station during the fire (see figure 14).

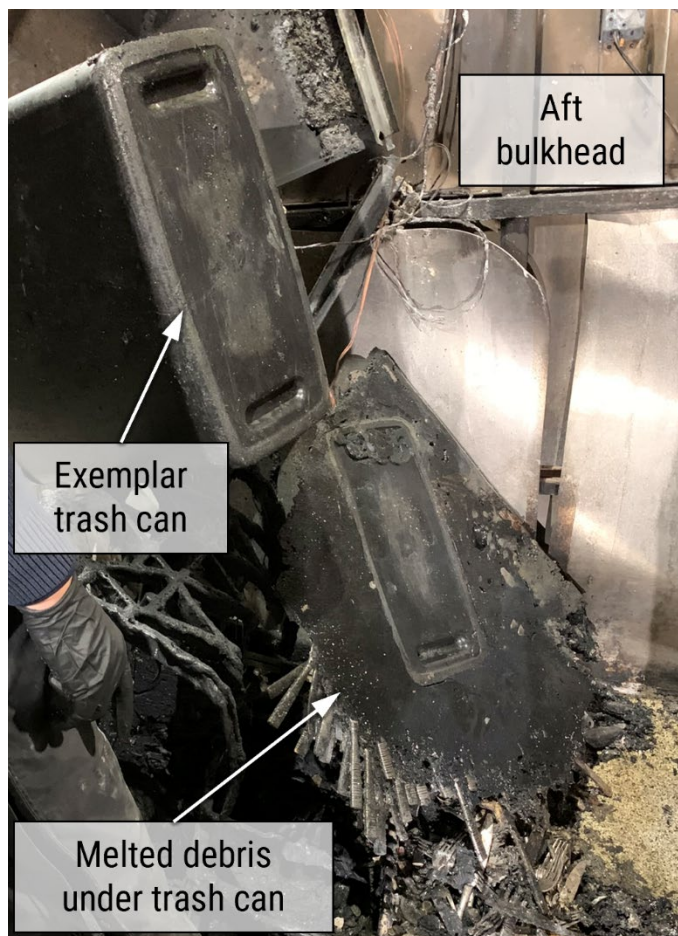


Figure 14. Underside of melted mass of debris (remains of trash can) in the deck 1 wait station on the *Spirit of Boston* after the fire, showing imprint of the trash can’s base compared to an exemplar trash can.

Investigators pried another melted single piece of debris from the steel deck of the wait station where the plastic glassware rolling carts had been located outboard of the trash can in the deck 1 wait station (see figure 15). A visual examination of the bottom of the removed mass of debris revealed melted plastic glassware rolling carts, drinking glasses, coffee cups, plastic spray bottles, and other debris.



Figure 15. *Left to right:* Location of the melted mass of debris—comprising the remains of the plastic glassware rolling carts—removed from the deck 1 wait station on *Spirit of Boston* after the fire. Bottom of the melted mass of debris from the wait station after flooring material was removed. (Figure 8 shows the deck 1 wait station layout before the fire.)

On May 11, 2023, ATF fire investigators X-rayed the second melted mass of debris that was removed from the area where the plastic glassware rolling carts had been. They found several metal utensils, such as knives and spoons, throughout the mass. They also found a chafing fuel heating canister; they determined the canister was located on its side, up against the aft bulkhead, under the plastic glassware cart nearest to the trash can (see figure 16).

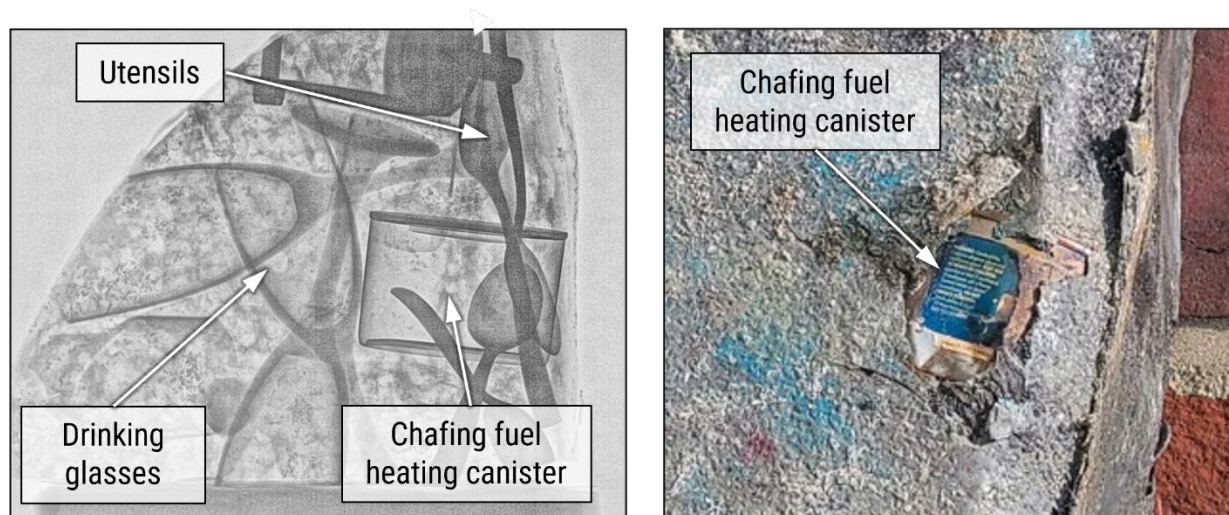


Figure 16. Left to right: X-ray image of debris removed from the *Spirit of Boston* deck 1 wait station showing chafing fuel heating canister. Closeup of chafing fuel heating canister found in the same debris. (Background sources: ATF, Coast Guard)

1.10.2 Fire Pattern Analysis and Fire Research Testing

The ATF also conducted fire pattern analysis and fire research testing, during which they recreated the fire scene and ran several tests and scenarios with the chafing fuel heating canisters in different positions, to determine the origin and cause of the fire aboard the *Spirit of Boston*.

During the postcasualty examination of the vessel, ATF fire investigators observed an oxidation pattern on the aft bulkhead of the deck 1 wait station's sheet metal bulkhead covering—aft of the plastic glassware rolling carts and trash can. Additionally, they found that a two-level utility cart located in the outboard corner of the deck 1 wait station was directionally damaged, meaning the damage increased on the inboard side of the cart and decreased on the outboard side of the cart. Together, the directionally damaged cart and oxidation pattern created a "V" fire pattern on the aft bulkhead of the deck 1 wait station (see figure 17).¹⁷ Aft of the deck 1 wait station, in the cold prep room, there was a "V" fire pattern on the forward portside bulkhead that abutted the wait station. On both sides of the bulkhead, the

¹⁷ A "V" fire pattern is a common fire pattern created when flames spreading upwards and outwards create a V-shaped burn pattern on vertical surfaces. For example, a fire that starts at an outlet against a wall would leave a V-shaped pattern, with the bottom of the "V" pointing to the outlet as the origin.

“V” pattern rose upward and outward from the deck from the area behind the inboard plastic glassware rolling cart in the deck 1 wait station.

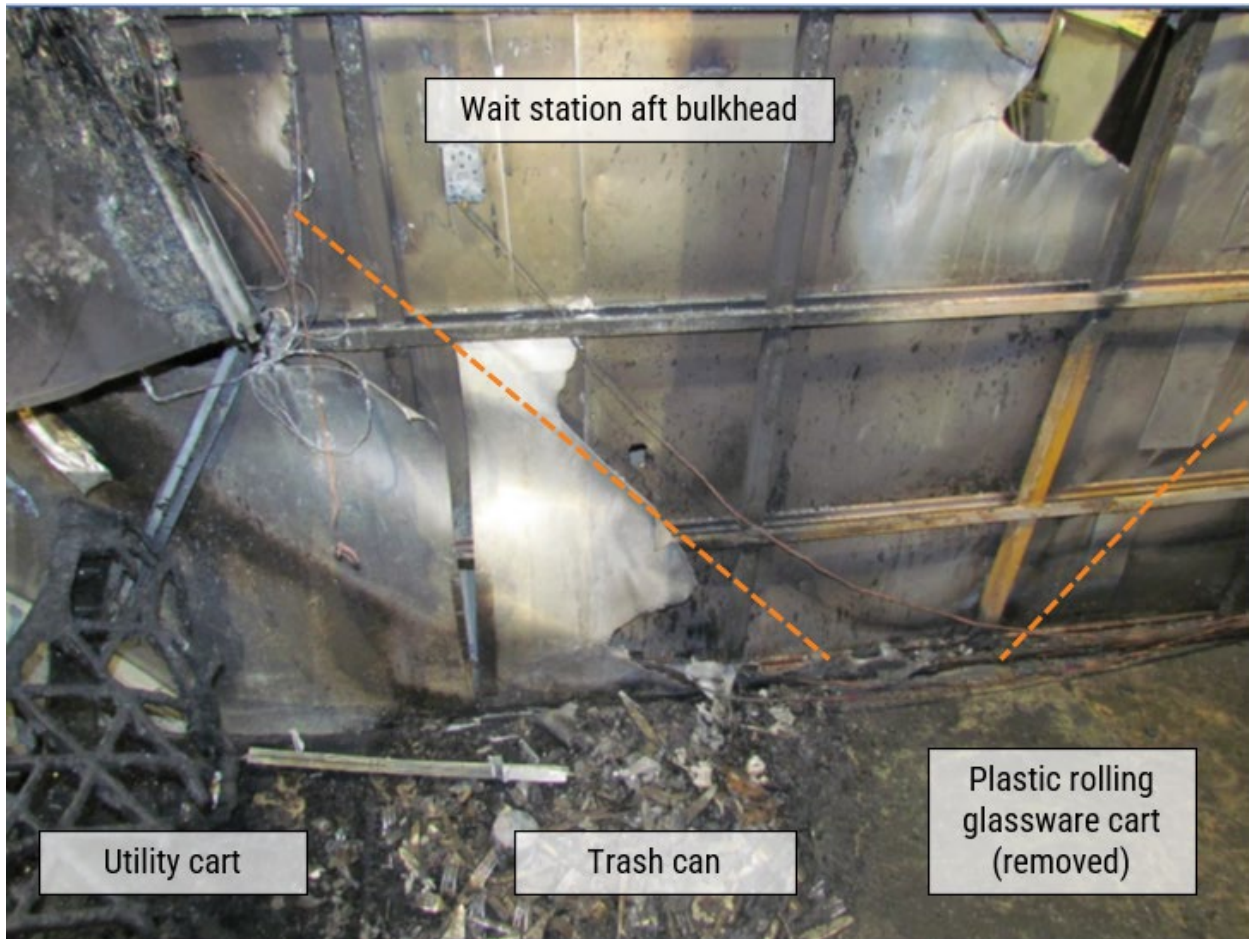


Figure 17. “V” pattern (shown as orange lines) as observed by ATF on aft bulkhead of deck 1 wait station near utility cart, waste trash can, and plastic rolling glassware carts. (Background source: ATF)

ATF fire investigators conducted experiments to understand the burning characteristics of chafing fuel heating canisters and evaluate the ignitability of spilled chafing fuel. They found that an empty chafing fuel canister (with only residual fuel in the canister) would burn for about 10 minutes.

To document the propensity of lit chafing fuel heating canisters to remain lit after being dropped to the deck, ATF fire investigators dropped lit chafing fuel canisters from a height of about 40 inches (the height of the countertops in the deck 1 wait station) onto the deck. They completed this test 45 times; in 71% of the cases, the canisters remained lit after falling.

The ATF found that, when exposed to the flame of a chafing fuel heating canister that was upright, a plastic glassware rolling cart would take 30 to 54 seconds to ignite. A chafing fuel heating canister placed on its side ignited a plastic glassware rolling cart about 2 to 18 minutes after exposure to the flame.

The ATF constructed a “test structure” to replicate the deck 1 wait station of the *Spirit of Boston*, based on measurements taken while on scene by ATF fire investigators. Items consumed in the fire aboard the vessel, such as trash cans, plastic glassware rolling carts, and glass racks, were purchased and placed within the test structure to simulate/replicate the configuration of the vessel’s deck 1 wait station on the evening of the fire.

Several tests were conducted within the test structure by placing a lit chafing fuel canister on its side under the inboard plastic glassware rolling cart, as found in the X-ray of the melted mass of debris. About 8 minutes after ignition of the plastic glassware rolling cart, visible or “light” smoke emanating from behind/underneath the plastic glassware rolling cart in the test structure was observed for about 14 minutes, and about 9 minutes after ignition of the plastic glassware rolling cart, “heavy” smoke was reported for about 14 minutes.¹⁸ About a minute after heavy smoke was observed, the smoke began to turn dark, and intermittent flames could be seen between the vertical gap in the forward bulkhead and the drop ceiling.

Throughout the test scenarios, a video camera was placed outside the window of the test structure to simulate the position of the witness recording the fire aboard the *Spirit of Boston* (see figure 9 for a screenshot of the witness video taken at 2307 on March 24, 2023). According to the ATF, video taken during testing showed a “snake’ of fire, determined to be flaming dripping plastic from the rolling cart and/or glassware racks,” that was “consistent with witness observations and descriptions.” The ATF determined that the video taken during testing demonstrated a “fire consistent with the observed fire event” due to the “consistent flame vectoring and liquified plastic pool to the left of the flames” (see figure 18).

¹⁸ *Light smoke* in a fire refers to visible smoke that appears white or light grey in color and typically indicates a low-heat, early stage of combustion where the fuel is burning relatively cleanly with minimal soot production, often seen during smoldering or initial ignition phases of a fire. As a fire grows, smoke will increase and will become *heavy* and dark, which signifies a hotter, more intense fire.



Figure 18. Screenshot of video looking through window of ATF test structure in replicated deck 1 wait station showing flame vectoring and liquified plastic pool (to left of flames) in the area where the plastic glassware rolling cart was located. (Source: ATF)

Based on their testing and analysis, as well as physical evidence, witness statements, and video recordings, the ATF released an origin and cause report in July 2024. In its report, the ATF concluded that the fire area of origin was the aft side deck of the deck 1 wait station under a plastic glassware rolling cart stored next to a trash can along the aft bulkhead outboard. The ATF report stated that the fire was caused by “the accidental disposal of a ... chafing fuel container under the rolling plastic glassware rack in the port aft wait staff station.” The report stated that the fire consumed the plastic glassware rolling carts and progressed from the deck 1 wait station, ignited the stored portable flotation devices, and spread heat, smoke, and fire throughout deck 1. The ATF classified the fire as accidental.

1.11 Postcasualty Actions

1.11.1 US Coast Guard

In April 2023, the Coast Guard issued Marine Safety Information Bulletin 05-23, “Fire Safety on Small Passenger Vessels” (US Coast Guard 2023a). The bulletin stated that fires on several small passenger vessels over the previous year had “highlighted the need for a renewed focus on fire safety,” and, as a result, the Coast Guard was initiating an effort that included—

- a focused self-assessment by owners and operators of all small passenger vessels (the bulletin included a checklist of assessment tasks to complete), and
- a Coast Guard-led concentrated inspection campaign that involved additional inspections of some small passenger vessels initially certificated before 1996 that carry 100 or more passengers (including the *Spirit of Boston*).

In June 2023, the Coast Guard issued Marine Safety Alert 7-23, “Critical Insight from Ongoing Investigations into Small Passenger Vessel Fires” in response to ongoing Coast Guard and NTSB investigations, including the fire aboard the *Spirit of Boston* and the 2022 engine room fire aboard the *Spirit of Norfolk*, to provide the maritime industry with best practices on board vessels (US Coast Guard 2023b).¹⁹ This safety alert focused on the dangers of open flame use aboard dinner cruises and advised of the dangers associated with chafing fuel heating canisters and combustible trash cans. The safety alert also suggested adding markings to engine room escape hatches that had coverings that could make the hatches difficult to locate and advised vessel operators to inspect machinery spaces to ensure that combustible materials are properly stored as far away as possible from potential sources of ignition, including the vessel’s engines and machinery, both of which were safety issues in the *Spirit of Norfolk* casualty.

1.11.2 Hornblower Cruises and Events LLC

In June 2023, after reviewing the Coast Guard’s Marine Safety Alert 7-23, Hornblower management sent an email to its general managers and directors of marine operations throughout the fleet to establish new policy requirements, described as “immediate actions.” Management restricted the use of open flames on board their vessels, stating that “no open flames will be used on board, [including] votives, candles, cold fireworks, sparklers, etc.” The exception to this was chafing fuel heating canisters and approved installed propane burners and ovens. According to the vice president of marine operations, the company limited the quantity of additional chafing fuel heating canisters on its vessels and provided receptacles for storage of chafing fuel heating canisters “to enhance safety and decrease fire risk” associated with the use of chafing fuel heating canisters. Additionally, crews were

¹⁹ The NTSB investigated, and determined the probable cause of, the 2022 engine room fire aboard the passenger vessel *Spirit of Norfolk*, a vessel also owned and operated by City Cruises US. Safety issues identified in this investigation included a lack of fire detection and fixed fire extinguishing systems in the engine room, and ineffective response communications. See <https://www.nts.gov/investigations/AccidentReports/Reports/MIR2322.pdf>.

directed to shift to battery-powered and/or rechargeable votive candles, and butane burners were to be replaced with induction burners.

To ensure that a potential fire in a trash can would be contained to the trash can, all combustible trash cans aboard vessels were required to be replaced with receptacles made of noncombustible materials with no openings in the sides or bottom. Management also directed crews to remove combustible materials from machinery spaces.

2 Analysis

2.1 Introduction

On March 24, 2023, about 2252, a fire broke out in the deck 1 wait station on the passenger vessel *Spirit of Boston* while it was moored at the Commonwealth Pier in Boston Harbor, Boston, Massachusetts. All 16 persons aboard evacuated the vessel to the pier. The local fire department responded and extinguished the fire. There were no injuries, and no pollution was reported.

This analysis evaluates the following safety issues:

- Absence of marine crewmembers aboard the vessel during an emergency situation while hospitality staff were still aboard (section 2.3)
- Improper handling of open-flame devices (section 2.4)
- Lack of established mechanisms for City Cruises US to identify unsafe practices and fire risks (section 2.4)

Having completed a comprehensive review of the circumstances that led to the casualty, the investigation excluded the following as a casual factor.

- *Mechanical equipment or electrical systems.* There was no evidence to suggest the vessel's mechanical equipment or electrical systems were not functioning properly.

Thus, the NTSB concludes that neither the ship's mechanical equipment nor its electrical systems were factors in this casualty.

2.2 Origin and Cause of the Fire

While cleaning up the *Spirit of Boston* after the March 24 dinner cruise, server assistant 2 entered the deck 1 wait station and saw gray smoke near the overhead light and a spark on the deck. She notified the restaurant manager, who went to the deck 1 wait station and saw a line of fire on the deck; the restaurant manager believed it was coming from under one of the plastic glassware rolling carts. Additionally, when responding to server assistant 2's report of the fire, the senior restaurant manager saw sparks under the inboard plastic glassware rolling cart that broke out into flames. After evacuating the vessel, the hospitality staff on the pier saw fire in the wait station through a ship's window; the restaurant manager stated the fire "broke through" the wait station window.

A postcasualty examination of the vessel by the ATF, Coast Guard, and NTSB found extensive fire damage in and near the deck 1 wait station. The plastic glassware rolling carts in the wait station were melted into the deck, and the steel beams in the overhead area were warped and distorted from the heat of the fire. Additionally, the steel deck above the deck 1 wait station had warped and buckled the tiled deck above the steel deck. There was additional fire damage in the cold prep room aft of the deck 1 wait station, in the passenger area forward of the wait station, and on electrical cables on the port side of the engine room below. However, the damage in these areas was less extensive than the damage in the deck 1 wait station.

Investigators observed an oxidation pattern (“V” fire pattern) on the aft bulkhead of the deck 1 wait station—aft of the plastic glassware rolling carts and trash can—as well as a similar “V” pattern on the other side of the bulkhead (the forward portside bulkhead in the cold prep room aft of the deck 1 wait station). On both sides of the bulkhead, the “V” pattern rose upward and outward from the deck.

In the area of the deck 1 wait station where the “V” fire pattern originated, two plastic glassware rolling carts and a trash can were positioned against the aft bulkhead at the base of the “V” pattern. Because the plastic trash bag and several items were found unburned in the trash can, investigators determined the fire likely did not originate in the trash can. Investigators also examined the fire patterns on the aft bulkhead where the plastic glassware rolling carts were located. According to the ATF’s analysis, the fire patterns indicated that the fire originated in the deck 1 wait station under the inboard plastic glassware rolling cart stored along the aft bulkhead.

Therefore, based on the postcasualty fire investigation and examination of the vessel, the ATF’s fire pattern analysis, and hospitality staff observations, the NTSB concludes that the area of origin for the fire aboard the *Spirit of Boston* was in the deck 1 wait station under a plastic glassware rolling cart.

During the postcasualty investigation of the vessel, investigators found a melted mass of debris (the remains of the plastic glassware rolling carts) in the deck 1 wait station. ATF fire investigators X-rayed this melted mass and found a chafing fuel heating canister, which was located on its side up against the aft bulkhead under the inboard plastic glassware rolling cart (nearest to the trash can).

Interviews with the hospitality staff revealed two instances in which chafing fuel heating canisters could have ended up in this location. First, while the hospitality staff were cleaning the vessel after the cruise had ended, server assistant 2 believed that she had thrown the coffee dispenser chafing fuel heating canister into the trash can near the inboard plastic glassware rolling cart. Second, about the same time, server

assistant 1 believed that she had also thrown away a chafing fuel heating canister in the same trash can.

About 45 minutes to an hour before throwing a chafing fuel heating canister away, server assistant 2 had attempted to extinguish the canister in the deck 1 wait station by blowing it out. She then left the canister on the counter to cool. The manufacturer of the chafing fuel heating canister explicitly instructed, “NEVER blow out [the] flame to extinguish” a canister. The amount of airflow that results from attempting to blow out the flame on the wick is likely insufficient to disrupt the flame long enough to result in complete extinguishment. In addition, it does not provide sufficient cooling to remove residual heat remaining inside the chafing fuel heating canister, stop the vaporization of the fuel in the canister, or isolate the wick from oxygen in the air. This could result in the reignition of the wick, since all three components for combustion are still present.

Server assistant 1 also threw away a chafing fuel heating canister. She stated that the canister was “cold,” and she recalled shaking the canister to ensure no liquid was in it before throwing it out. Both server assistants believed the chafing fuel heating canisters were extinguished when they threw them out. However, alcohol-based wick chafing fuels, like those that fueled the chafing fuel heating canisters used aboard the *Spirit of Boston*, offer a long burn time and consistent heat output, and their containers remain cool to the touch externally even while lit. Even if no liquid remains, the wick still is soaked with the fuel and, therefore, could remain lit even with little or no fuel remaining. Wick chafing fuels also produce a small, narrow blue flame that can be difficult to see. Therefore, the server assistants may not have been aware if the chafing fuel heating canisters they threw away remained lit or reignited.

During the postcasualty examination of the damage, investigators did not find any chafing fuel heating canisters in the remnants of the trash can. However, ATF fire investigators did find a canister in a melted mass of debris—comprised of the remains of the plastic glassware rolling carts—located in the deck 1 wait station. If one of the server assistants had missed the trash can when trying to throw out a chafing fuel heating canister, it could have landed on its side where investigators discovered it.

ATF postcasualty research included 45 tests in which lit chafing fuel heating canisters were dropped from a height of 40 inches. Chafing fuel heating canisters remained lit in 71 percent of the cases. Based on the ATF’s research, the chafing fuel heating canister dropped by a server assistant likely remained lit after it landed on the deck of the wait station. Additionally, ATF postcasualty experiments found that a chafing fuel canister placed on its side would ignite a plastic glassware rolling cart about 2 to 18 minutes after exposure to the flame. Further, a lit chafing fuel canister placed on its side under a plastic glassware rolling cart (similar to the ones used on

the *Spirit of Boston*) produced visible smoke 8 minutes after ignition. About 2 minutes later, intermittent flames could be seen. Based on these timeframes combined, the time from the cart's exposure to the chafing fuel heating canister flame to the production of visible smoke and intermittent flames would have been a minimum of 12 minutes and a maximum of 28 minutes. This timeline matches the hospitality staff's recollection of the event sequence: they observed smoke in the deck 1 wait station and "minor flames coming from the corner" about 20 to 30 minutes after server assistant 2 attempted to throw away a chafing fuel heating canister. Although server assistant 1 also threw away a chafing fuel heating canister, the timing was closer to the discovery of smoke in the wait station (about 4 minutes) and did not match the ATF's timeline, making it more likely that the chafing fuel heating canister thrown away by server assistant 2 could have caused the fire. Therefore, the NTSB concludes that the cause of the fire was an improperly extinguished chafing fuel heating canister that was unintentionally dropped by a hospitality staff member (likely server assistant 2 as they attempted to throw it away) onto the deck in the deck 1 wait station and ignited a plastic glassware rolling cart.

2.3 Vessel Personnel Fire Response

Less than 1 minute after the hospitality staff on board the *Spirit of Boston* discovered the fire, the senior restaurant manager ordered the staff to evacuate. A fire blanket aft of the deck 1 wait station near the cold prep room and a fire extinguisher at the entrance to the galley could have been used to fight the fire early on, but none of the hospitality staff attempted to use them. According to the senior restaurant manager, the flames were "too much" for her to attempt to extinguish.

When hired by the operating company, hospitality staff completed a new-hire orientation, which included a digital slideshow presentation. In addition to information about the company and its mission, the presentation included basic information about safety and an employee's role during an emergency. This safety section of the slideshow directed employees to "Follow instructions of captain and crew." Similarly, the hospitality staff on board at the time of the fire stated that, in an emergency situation, they were supposed to inform the marine crew, who would respond to the emergency. This was consistent with the company's emergency response plan applicable to the *Spirit of Boston*, which provided procedures to follow when responding to a fire (among other emergencies) and listed the captain as the primary person in charge of emergency response activities. The plan stated that the captain was responsible for initiating the response plan by directing the crew and contacting the appropriate authorities and management. As written, the plan relied on the actions of marine crew to mitigate any emergency situation. However, there were no marine crewmembers on board the *Spirit of Boston* at the time of the fire,

and there were no additional instructions for company personnel to follow when such a situation occurred.

Additionally, hospitality staff did not participate in the more thorough orientation and training—including vessel walkthroughs and drills—that the marine crewmembers completed. As such, the senior restaurant manager and other hospitality staff had no practical experience in locating and using the vessel's fire safety equipment to fight a fire and were unfamiliar with vessel firefighting systems or procedures. Thus, the NTSB concludes that without a marine crewmember on board, City Cruises US's emergency response plan for a fire aboard the *Spirit of Boston* could not be executed as intended.

As part of their new-hire orientation, marine crewmembers received hands-on training for the vessel to which they were assigned. This training included how to properly extinguish a fire and operate all fire systems and fire suppression and ventilation systems on board the vessel. Additionally, the operating company required deckhands to be able to identify classes of fires and be able to perform appropriate firefighting techniques and operate firefighting equipment. The marine crewmembers were therefore familiar with the vessel and the locations of fire safety equipment.

The marine crewmembers also regularly participated in safety drills for emergencies such as fire, man overboard, and abandon ship. The company required the crew to conduct these drills once a month. The captain stated that he completed drills every 2 weeks. Further, the captain and captain-in-training both held Coast Guard-issued credentials as masters, which required them to pass an examination, administered by the Coast Guard, to display proficiency on subjects including emergency procedures, fire and damage control, organization of fire drills, and firefighting systems. The marine crewmembers were trained to respond to a small fire like the one the hospitality staff discovered in the deck 1 wait station, and therefore were much more capable of handling the emergency.

Unlike the marine crewmembers, hospitality workers are not credentialed mariners with standardized firefighting training requirements. Additionally, they are typically not familiar with shipboard firefighting systems and are often seasonally employed and are largely trained on the job for hospitality-related work. The NTSB concludes that, had a marine crewmember been on board at the time of the fire, the marine crewmember likely could have extinguished the fire before it grew and spread. Marine crewmembers are better prepared to handle emergencies due to their firefighting training as compared to hospitality workers with limited shipboard knowledge. Therefore, the NTSB recommends that City Cruises US require at least one marine crewmember—who is properly trained to respond to shipboard

emergencies, including fire—to remain on board its vessels until all hospitality staff and other noncrew personnel depart the vessel.

2.4 Handling of Open-Flame Devices

City Cruises US's galley staff used open-flame devices (chafing fuel heating canisters) to keep food and beverages warm throughout dinner cruises. Galley staff and hospitality staff on board at the time of the casualty stated that they were verbally instructed on how to handle the canisters, including lighting and extinguishing them. In some cases, the verbal instructions contradicted manufacturer guidance for handling open-flame devices. For example, according to the galley manager, the galley staff was supposed to extinguish chafing fuel heating canisters in water. However, the manufacturer's guidance stated the canisters should only be extinguished by snuffing them out (either using the cap as a snuffer or with a snuffer paddle or ceramic saucer, depending on the type of canister). Notably, the hospitality staff did not consistently extinguish chafing fuel heating canisters in accordance with the galley manager's or manufacturer's instructions—one server assistant reported blowing out a canister to extinguish it, and none of the servers stated that they used snuffers. These contradictions demonstrate a lack of direction, inconsistent guidance/practices, and confusion among the hospitality staff on how to properly extinguish a chafing fuel heating canister.

Using open-flame devices, like chafing fuel heating canisters, on a vessel poses a fire risk. Given the dynamic environment of a vessel, open-flame devices can move or shift, and their open flames can ignite combustible materials. Improperly extinguishing or disposing of chafing fuel heating canisters further increases the risk of fire. If such devices must be used—for instance, to keep food and beverages warm—the risk of fire can be mitigated by having documented procedures for how to handle such devices. However, City Cruises US did not have any such procedures for the *Spirit of Boston* (or its other dinner cruise vessels). Therefore, the NTSB concludes that City Cruises US's lack of documented procedures on the proper handling—including extinguishing—of open-flame devices, like chafing fuel heating canisters, on board its vessels increased the risk of a fire. Therefore, the NTSB recommends that City Cruises US develop procedures for, and train crewmembers and hospitality staff on, the proper handling and extinguishing of open-flame devices, including chafing fuel heating canisters, on board its vessels.

2.5 Identifying Fire Risks and Unsafe Practices

Documented procedures—such as procedures for handling open-flame devices and requirements for crewmembers to be on board—would typically be

included in an SMS. An SMS is a comprehensive, documented system to enhance safety for a company and its vessels, and, when properly implemented, is an effective tool for safety oversight. Regardless of the size of the company, an SMS ensures standardized and unambiguous procedures for each crewmember to follow during both routine and emergency operations. It specifies crewmember duties and responsibilities and delineates supervisory and subordinate chains of command. An SMS also requires the company to identify risks and plan responses for a range of possible emergency situations, specifying crewmember duties and responsibilities. Finally, an SMS requires procedures for identifying and correcting nonconformities and includes an audit process for management to ensure policies and procedures are being followed.

Coast Guard regulations require that US-flagged vessels engaged in oceangoing international service have an SMS, but there is no SMS requirement for the domestic passenger vessel fleet. Thus, City Cruises US was not required to have an SMS for its vessels. The company had elements of an SMS already in place, including an emergency response plan, training/orientation program, marine operations procedures, and vessel management system (to track vessel maintenance). However, it did not have procedures for identifying and correcting nonconformities—such as not properly extinguishing chafing fuel heating canisters—nor did it have an audit process. Further, although the company did have an incident management tracking system, which included logging lessons learned from incidents, it did not require procedures to be developed to prevent future casualties.

Having an SMS in place at City Cruises US would have required the company to identify risks, like those posed by the use of chafing fuel heating canisters and not having employees trained in firefighting aboard, and create policies and procedures to mitigate those risks. Additionally, the SMS would have had a company-involved audit process for identifying and correcting nonconformities. The NTSB concludes that an SMS would have established mechanisms for City Cruises US to identify fire risks and unsafe practices on the *Spirit of Boston* and take corrective action before the fire occurred. Therefore, the NTSB recommends that City Cruises US implement an SMS for its fleet to improve safety practices and minimize risk.

The NTSB has long advocated for the implementation of SMSs for passenger vessels. Following the 2010 contact of the passenger ferry *Andrew J. Barberi* with a terminal at Staten Island, New York, in which 50 people were injured, the NTSB issued Safety Recommendation [M-12-3](#) to the Coast Guard:

Require all operators of U.S.-flag passenger vessels to implement a safety management system taking into account the characteristics, methods of operation, and nature of service of these vessels, and, with

respect to ferries, the sizes of the ferry systems within which the vessels operate.²⁰

After the Coast Guard initially responded that it was developing appropriate regulations for all US-flagged passenger vessels (as part of Public Law 111-281, also known as the Coast Guard Authorization Act of 2010), the NTSB classified Safety Recommendation M-12-3 Open—Acceptable Response in May 2013.²¹ However, in April 2014, following the release of our marine accident report on the 2013 contact of the passenger vessel *Sea Streak Wall Street* with a pier in Manhattan, New York, in which the recommendation was reiterated, and after more than 3 years since Congress authorized the Coast Guard to mandate SMSs, the NTSB classified the recommendation Open—Unacceptable Response.

The recommendation has been reiterated twice—following the NTSB’s investigations of the 2018 fire aboard the *Island Lady*, which resulted in 14 injuries and one fatality, and the 2019 fire aboard the small passenger vessel *Conception*, which resulted in two injuries and 34 fatalities (NTSB 2018 and 2020). In 2021, the Coast Guard issued an advance notice of proposed rulemaking seeking public comment on the scope, content, benefits, and costs of an SMS rule for US passenger vessels (US Coast Guard “Safety Management Systems”). In November 2022, the Coast Guard informed the NTSB that it anticipated taking the next step to issue the recommended regulation, publishing a notice of proposed rulemaking (NPRM), by March 2023; as a result, the NTSB classified the recommendation Open—Acceptable Response. In April 2024, after over a year passed without any further action taken by the Coast Guard to address the recommendation, the NTSB classified M-12-3 Open—Unacceptable Response. In July 2024, the Coast Guard informed the NTSB that it “is committed to completing this NPRM with all due haste.” However, as of the issue date of this report, the Coast Guard has not yet published the NPRM. Pending the Coast Guard issuing a requirement for all operators of US-flagged passenger vessels to implement an SMS, Safety Recommendation M-12-3 is currently classified Open—Unacceptable Response.

The Coast Guard has encouraged passenger vessel operators to voluntarily develop and implement an SMS. PVA, in cooperation with the Coast Guard, developed its Flagship SMS, a resource tailored to domestic passenger vessel operators that members who elected to voluntarily implement SMSs could use as a

²⁰ As a result of the 2010 contact of the *Andrew J. Berberi* with a Staten Island terminal, Staten Island Ferry (the operator of the *Andrew J. Barberi*) voluntarily established an SMS for its fleet; its SMS was audited by the American Bureau of Shipping.

²¹ The Coast Guard Authorization Act of 2010 directed the Coast Guard prescribe regulations to require SMS for passenger vessels and small passenger vessels.

guide. In 2017, the Coast Guard recognized Flagship SMS as meeting the objectives and functional requirements for an SMS as described in 33 *CFR* Part 96 and stated that the voluntary program could be accepted by the Coast Guard as it endeavored to enhance regulatory compliance and safety on domestic passenger vessels (US Coast Guard 2017). The Coast Guard also issued Marine Safety Information Bulletin 03-20, "Resources for Voluntarily Establishing a Safety Management System," in 2020. The bulletin encouraged passenger vessel operators to voluntarily implement SMSs and provided resources for developing an SMS (US Coast Guard 2020). However, encouraging vessel operators to voluntarily implement an SMS has proven insufficient. In this instance, City Cruises US, a company with 125 vessels and a PVA member, has not voluntarily implemented PVA's Flagship SMS nor any other SMS.

The NTSB continues to believe that an SMS, scalable to the size of every operation and vessel group/type, is an essential tool for enhancing safety on board all US passenger vessels. Additionally, the Coast Guard remains the appropriate authority to ensure implementation of such a system. In the case of the *Spirit of Boston* and City Cruises US, a Coast Guard requirement for an SMS would likely have ensured the development of risk mitigation measures, such as procedures for handling chafing fuel heating canisters and ensuring appropriately trained crewmembers were on board to address the fire. The NTSB concludes that requiring SMSs on all US-flagged passenger vessels would enhance operators' ability to identify and mitigate safety risks by establishing mechanisms to identify unsafe practices and take corrective action before an accident occurs. Therefore, the NTSB reiterates Safety Recommendation M-12-3.

The circumstances of this accident make clear that it is critical to ensure that passenger vessel owners and operators are aware of the increased risk of fire aboard a vessel if personnel do not have documented procedures, implemented by the owner or operator, on the proper handling of open-flame devices. Additionally, owners and operators should be aware of the risk to vessels, hospitality staff, and other noncrew personnel if they are allowed to work on board without marine crewmembers present to respond to emergencies. Further, owners and operators should understand the benefits and importance of implementing an SMS, which may include elements to mitigate these risks. As an industry representative, PVA is well positioned to inform members about this accident and share information about implementing documented procedures for handling open-flame devices, ensuring safe operations while working with noncrew personnel, and implementing SMS. Therefore, the NTSB recommends PVA share with its members the circumstances of the *Spirit of Boston* accident, including the importance of having at least one marine crewmember on board a vessel with hospitality staff or noncrew personnel, having procedures for properly handling open-flame devices, and implementing SMSs.

3 Conclusions

3.1 Findings

1. Neither the ship's mechanical equipment nor its electrical systems were factors in this casualty.
2. The area of origin for the fire aboard the *Spirit of Boston* was in the deck 1 wait station under a plastic glassware rolling cart.
3. The cause of the fire was an improperly extinguished chafing fuel heating canister that was unintentionally dropped by a hospitality staff member (likely server assistant 2 as they attempted to throw it away) onto the deck in the deck 1 wait station and ignited a plastic glassware rolling cart.
4. Without a marine crewmember on board, City Cruises US's emergency response plan for a fire aboard the *Spirit of Boston* could not be executed as intended.
5. Had a marine crewmember been on board at the time of the fire, the marine crewmember likely could have extinguished the fire before it grew and spread.
6. City Cruises US's lack of documented procedures on the proper handling—including extinguishing—of open-flame devices, like chafing fuel heating canisters, on board its vessels increased the risk of a fire.
7. A safety management system would have established mechanisms for City Cruises US to identify fire risks and unsafe practices on the *Spirit of Boston* and take corrective action before the fire occurred.
8. Requiring safety management systems on all US-flagged passenger vessels would enhance operators' ability to identify and mitigate safety risks by establishing mechanisms to identify unsafe practices and take corrective action before an accident occurs.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of the fire aboard the passenger vessel *Spirit of Boston* was the improper extinguishing and disposal of a chafing fuel heating canister due to City Cruises US's lack of documented procedures for handling open-flame devices, which led to the ignition of a plastic glassware rolling rack. Contributing to the growth and spread of the fire was City Cruises US not requiring a marine crewmember—designated and trained to execute City Cruises US's emergency response plan for a fire aboard a vessel—to remain aboard the vessel until all hospitality staff and other noncrew personnel departed the vessel.

4 Recommendations

4.1 New Recommendations

As a result of this investigation, the National Transportation Safety Board makes the following new safety recommendations.

To the Passenger Vessel Association:

Share with your members the circumstances of the *Spirit of Boston* accident, including the importance of having at least one marine crewmember on board a vessel with hospitality staff or noncrew personnel, having procedures for properly handling open-flame devices, and implementing safety management systems. (M-24-10)

To City Cruises US:

Require at least one marine crewmember—who is properly trained to respond to shipboard emergencies, including fire—to remain on board your vessels until all hospitality staff and other noncrew personnel depart the vessel. (M-24-11)

Develop procedures for, and train crewmembers and hospitality staff on, the proper handling and extinguishing of open-flame devices, including chafing fuel heating canisters, on board your vessels. (M-24-12)

Implement a safety management system for your fleet to improve safety practices and minimize risk. (M-24-13)

4.2 Previously Issued Recommendations Reiterated in This Report

The National Transportation Safety Board reiterates the following safety recommendation.

To the US Coast Guard:

Require all operators of U.S.-flag passenger vessels to implement safety management systems taking into account the characteristics, methods of operation, and nature of service of these vessels, and, with respect to ferries, the sizes of the ferry systems within which the vessels operate. (M-12-3)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

JENNIFER HOMENDY

Chair

MICHAEL GRAHAM

Member

THOMAS CHAPMAN

Member

ALVIN BROWN

Member

J. TODD INMAN

Member

Report Date: December 13, 2024

Appendixes

Appendix A: Investigation

The US Coast Guard was the lead federal agency in this safety investigation and convened a District Formal Investigation on March 27, 2023. The National Transportation Safety Board (NTSB) learned of this casualty from the Coast Guard on March 25, 2023, and an NTSB marine accident investigator arrived on scene in Boston, Massachusetts, on March 27. An NTSB fire and explosion specialist arrived on scene on March 28.

The Coast Guard and Hornblower Cruises and Events were parties to the investigation.

Appendix B: Consolidated Recommendation Information

Title 49 *United States Code* 1117(b) requires the following information on the recommendations in this report.

For each recommendation—

(1) a brief summary of the Board’s collection and analysis of the specific accident investigation information most relevant to the recommendation;

(2) a description of the Board’s use of external information, including studies, reports, and experts, other than the findings of a specific accident investigation, if any were used to inform or support the recommendation, including a brief summary of the specific safety benefits and other effects identified by each study, report, or expert; and

(3) a brief summary of any examples of actions taken by regulated entities before the publication of the safety recommendation, to the extent such actions are known to the Board, that were consistent with the recommendation.

To the US Coast Guard

M-12-3

Require all operators of U.S.-flag passenger vessels to implement SMS taking into account the characteristics, methods of operation, and nature of service of these vessels, and, with respect to ferries, the sizes of the ferry systems within which the vessels operate.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.5, Identifying Fire Risks and Unsafe Practices. Information supporting (b)(1) can be found on page 2 41-42; (b)(2) can be found on pages 42-43; and (b)(3) can be found on pages 43-44.

To the Passenger Vessel Association

M-24-10

Share with your members the circumstances of the *Spirit of Boston* accident, including the importance of having at least one marine crewmember on board a vessel with hospitality staff or noncrew personnel, having procedures for properly handling open-flame devices, and implementing safety management systems.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.5, Identifying Fire Risks and Unsafe Practices. Information supporting (b)(1) can be found on pages 41–42; (b)(2) can be found on pages 42–43; and (b)(3) can be found on pages 43–44.

To City Cruises US

M-24-11

Require at least one marine crewmember—who is properly trained to respond to shipboard emergencies, including fire—to remain on board your vessels until all hospitality staff and other noncrew personnel depart the vessel.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.3, Vessel Personnel Fire Response. Information supporting (b)(1) can be found on pages 39–41; (b)(2) and (b)(3) are not applicable.

M-24-12

Develop procedures for, and train crewmembers and hospitality staff on, the proper handling and extinguishing of open-flame devices, including chafing fuel heating canisters, on board your vessels.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.4, Handling of Open-Flame Devices. Information supporting (b)(1) can be found on page 41; (b)(2) and (b)(3) are not applicable.

M-24-13

Implement a safety management system for your fleet to improve safety practices and minimize risk.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.5, Identifying Fire Risks and Unsafe Practices. Information supporting (b)(1) can be found on pages 41–42; (b)(2) can be found on pages 42–43; and (b)(3) can be found on pages 43–44.

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Casualty Summary

Casualty type	Fire/Explosion
Location	Boston Harbor, Boston, Massachusetts 42°21.00' N, 71°02.37' W
Date	March 24, 2023
Time	2252 Eastern Daylight Time (coordinated universal time -4 hours)
Injuries	None
Property damage	\$3.1 million est.
Environmental damage	None
Persons on board	16

NTSB investigators worked closely with our counterparts from **Coast Guard District 1 Formal Marine Board of Investigation** throughout this investigation.

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in the other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident 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* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents 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* section 1154(b)).

For more detailed background information on this report, visit the [NTSB Case Analysis and Reporting Online \(CAROL\) website](#) and search for NTSB accident ID DCA23FM022. Recent publications are available in their entirety on the [NTSB website](#). Other information about available publications also may be obtained from the website or by contacting –

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