# National Transportation Safety Board

Office of Marine Safety

Washington, D.C. 20594

## Group Chairman's Factual Report

## Operations Group

***Caribbean Fantasy***

DCA16FM052

May 4, 2017

## 1 Accident Information

**Vessel:** *Caribbean Fantasy*
**Accident Number:** DCA16FM052
**Date:** August 17, 2016
**Time:** 0726 Atlantic standard time (coordinated universal time – 4)
**Location:** Atlantic Ocean, 2 miles northwest of San Juan, Puerto Rico
18°30.1'N, 66°8.0' W
**Accident type:** Fire

## 2 Operations Group

**Chairman:** Adam Tucker, Investigator in Charge
Office of Marine Safety
National Transportation Safety Board
**Member:** Commander [redacted], Investigating Officer,
US Coast Guard
**Member:** Gustavo Abaroa, Designated Person Ashore,
Baja Ferries S.A. de C.V. (owner/operator)
**Member:** Maikol Pimentel, Nautical Inspector,
Panama Maritime Authority (flag state)

## 3 Accident Summary

The *Caribbean Fantasy* was a roll-on/roll-off (Ro/Ro) passenger vessel operating on a scheduled service between the ports of San Juan, Puerto Rico, and Santo Domingo, Dominican Republic. About 0720 on August 17, 2016, the vessel was approaching the pilot station outside the entrance of the Port of San Juan, Puerto Rico, when a fuel leak started on the port side main engine fuel supply pipe end flange. About 0725, the fuel ignited upon contact with a hot surface, and a fire followed. The master altered the course of the ship away from the entrance to the port and ordered a fire alarm announcement to be made. The safety officer began mobilizing fire teams to fight the fire. At 0737, after determining all engine crew were accounted for, the master ordered the activation of the carbon dioxide ($CO_2$) fixed firefighting system. $CO_2$ was released in the main engine room soon thereafter.

The master contacted US Coast Guard Sector San Juan, located about 4 miles away, reported the fire, and informed watchstanders that he was preparing the vessel for evacuation.[1]

[1] All references to miles in this report are nautical miles (1.15 statute miles) unless otherwise specified.

Search and rescue craft, law enforcement boats, and good Samaritan vessels began arriving on scene about 20 minutes later. The master, concerned about reported explosions and spreading fire and smoke, ordered an announcement to be made on the public address (PA) system at 0746 notifying all passengers that there was a "fire on board." The English-language announcement directed the passengers to go to evacuation stations. A Spanish-language announcement that immediately followed told passengers that they were abandoning ship. There was no roll call conducted of the passengers. Instead, the crew searched accommodation spaces and cabins to ensure that no passengers or crew were left behind.

The ship's three lifeboats and two marine evacuation system (MES) slides were prepared by the crew. Upon word from the master, crew members began loading the lifeboats with passengers and lowering them to the water about 0800. Each lifeboat reported problems with either their releasing mechanism, engine, or bowsing gear.[2] After troubleshooting efforts, two lifeboats were able to launch, and one was hoisted to a position above the water where the passengers and crew were evacuated to a nearby Coast Guard vessel.

All remaining passengers and crew evacuated the vessel via the starboard side MES, sliding down to a landing platform where they were then loaded into liferafts or directly onto nearby vessels. Most passengers and crew were taken ashore to Pier 6 in San Juan harbor, where they were triaged, checked by immigration, and released. A total of 387 passengers and 124 crew were on board the *Caribbean Fantasy* at the time of the accident. At least 5 people were reported to have had serious injuries, while about 50 people were reported to have had minor injuries. There were seven dogs on board. Five were rescued by helicopter and two died from apparent smoke inhalation.

The *Caribbean Fantasy* remained aground outside the Port of San Juan for 3 days, with the fire continuing to burn. On August 20, the vessel was towed into the port, where the fire was extinguished by marine salvage and firefighting crews.

[2] *Bowsing gear* are lines, straps, or other tackle that pull a lifeboat alongside the vessel when the boat is lowered from the stowed position to the embarkation deck, facilitating ease of boarding for passengers.

## 4 Investigation

The US Coast Guard was the lead federal agency in this investigation. On August 18, 2016, investigators from the National Transportation Safety Board (NTSB) arrived in San Juan. After meeting Coast Guard investigators at Sector San Juan headquarters, the NTSB team began conducting interviews with crewmembers and passengers. On August 19, a team member boarded the vessel, which was still grounded outside the harbor, to retrieve the voyage data recorder (VDR) capsule and conduct an initial examination of the bridge.[3] Once the vessel was towed into port, the fire was extinguished, and the atmospheric conditions on the vessel were determined to be safe, the investigation team boarded the vessel on August 23 to examine spaces and equipment and collect documentation. Investigators were unable to enter the engine room until the following day, as the environment was deemed too hazardous. Following this initial phase of the investigation, NTSB staff returned to headquarters on August 26, 2016.

Investigators returned to San Juan September 14–16 to participate in the post casualty examination and surveys of lifesaving systems and the ship's machinery and accommodation spaces.

From October 24 to 28 and from December 5 to 9, investigators travelled to the Coast Guard Cruise Ship National Center of Expertise (CSNCOE) in Fort Lauderdale, Florida, to conduct interviews with passengers, Coast Guard personnel, first responders, classification society representatives, and other witnesses.

On March 20, 2017, the Coast Guard conducted a 9-day district formal hearing into the accident. During the hearing, held in San Juan, Coast Guard and NTSB investigators questioned crewmembers, company management, classification society representatives, and Coast Guard personnel to gain further insight into accident events, vessel maintenance and inspection practices, policies and procedures governing the vessel's operations, and the search and rescue response. A representative from the flag state of Panama was present at the hearing.

[3] *VDR*s maintain continuous, sequential records of data relating to a ship's equipment and its command and control, and capture bridge audio from certain areas in the pilothouse and on the bridge wings. Regulation 20 of the International Convention for the Safety of Life at Sea (SOLAS) Chapter V requires Ro/Ro passenger ships, such as the *Caribbean Fantasy*, to carry VDRs.

# 5 Vessel Information

## 5.1 General

The *Caribbean Fantasy* was built by Mitsubishi Heavy Industries in Kobe, Japan, and completed in 1989 as hull number 1174. Originally named the *Victory,* the vessel sailed with the Higashi Nippon Ferry services in Japan from 1989 to 1998 and with the Grandi Navi Veloci services in Italy from 1998 to 2008. The vessel was purchased in early 2008 by Baja Ferries S.A. de C.V., renamed the *Chihuahua Star*, and put into service under the flag of Mexico on February 8, 2008, in the Gulf of California.

In the spring of 2011, the company began the process of shifting the operations of the vessel from Mexico to scheduled runs between the ports of San Juan and Mayaguez, Puerto Rico, and Santo Domingo, Dominican Republic, under a time charter agreement with America Cruise Ferries, Inc. On October 21, 2011, the company officially changed the name of the vessel to *Caribbean Fantasy* and changed the flag to Panama. Although marketed as a cruise ferry, the company had no affiliation or membership with any cruise industry trade groups.


**Figure 1. Panamanian-flagged Ro/Ro passenger vessel *Caribbean Fantasy*. (Photo by Baja Ferries)**

From August 8, 2011, to April 11, 2014, the *Caribbean Fantasy* was managed by V-Ships Leisure, a maritime service provider that specialized in technical ship management and outsourcing services for cruise ships, passenger ferries, and high value yachts. From April 12, 2014, through the time of the accident, technical management was performed by Baja Ferries S.A. de C.V.

The *Caribbean Fantasy* was classified by RINA SERVICES S.p.A (RINA) as a steel single-hull Ro/Ro passenger ship equipped for the carriage of containers with no navigational

restrictions.[4] It was capable of carrying 130 forty-foot equivalent unit (FEU) containers and 60 cars on three vehicle decks, two of which were continuous.

The *Caribbean Fantasy*'s machinery consisted of two 14,400 hp (10,738 kW) MAN B&W 8L58/64 main propulsion diesel engines produced under license by Mitsubishi Heavy Industries. Each of the engines directly drove one of the ship's twin controllable pitch propellers. The vessel had three electric generators, in a compartment aft of the main engine room, that powered the ship's various electrical systems.

The *Caribbean Fantasy* was subdivided into five main vertical zones (MVZs) that provided both watertight integrity and thermal containment. The thermal containment divisions were rated at "A-60" class, which are designed to limit the thermal transmission of heat to an adjacent or overhead area for a period of 60 minutes.[5] The ship also had two main horizontal zones (MHZs) subdividing the vehicle decks, with A-60 insulation in between. The ship had six watertight doors.

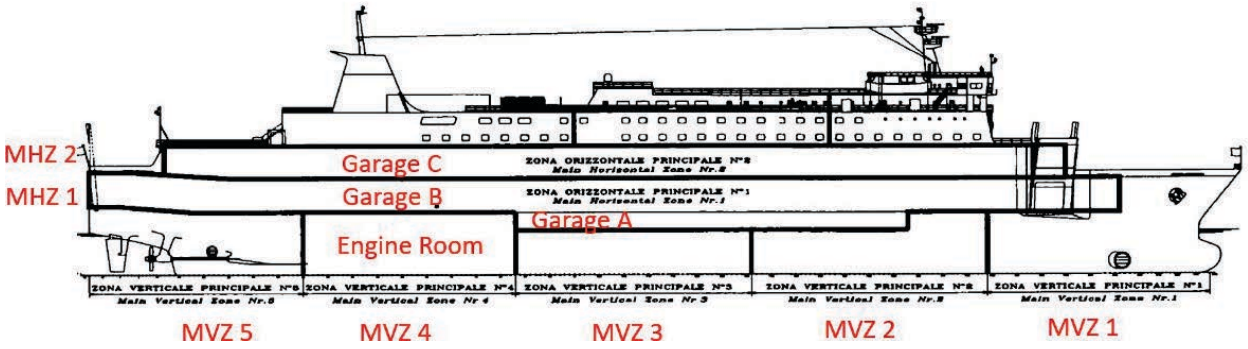



**Figure 2. Profile of the *Caribbean Fantasy* showing MFZs and MHZs. Garages A and B are in MHZ 1 and Garage C is in MHZ 2. The engine room is directly below garage B.**

[4] Classification societies such as RINA SERVICES S.p.A. are nongovernmental organizations that establish and maintain standards for shipbuilding and operation, and they are authorized to perform vessel inspection and certification functions delegated by the Coast Guard.

[5] a) Per SOLAS II-2 Regulation 9.2.2.1.1.1, in ships carrying more than 36 passengers, the hull, superstructure, and deckhouses shall be subdivided into main vertical zones by "A-60" class divisions. b) Per SOLAS II-2 Regulation 3.2., A-60 divisions are to be constructed of steel or equivalent material suitably stiffened. They are to be insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 140°C above the normal temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C above the original temperature within 60 minutes. The construction must be capable to prevent the passage of smoke and flame.

## 5.2 Vessel Particulars

| | |
|---|---|
| **Vessel Name** | ***Caribbean Fantasy*** |
| **Owner/Operator** | Baja Ferries, S.A. de C.V. |
| **Port of Registry** | Panama City |
| **Flag** | Panama |
| **Type** | Ro/Ro passenger |
| **Built** | 1989 |
| **IMO number** | 8814263 |
| **Classification society** | RINA SERVICES S.p.A. |
| **Construction** | Welded steel |
| **Draft (at time of accident)** | 20 ft (6.1 m) forward, 22 ft (6.7 m) aft |
| **Length** | 613.9 ft (187.1 m) |
| **Beam** | 88.7 ft (27 m) |
| **Gross tonnage** | 28,112 |
| **Engine power; manufacturer** | Two 14,400 hp (10,738 kW) Mitsubishi MAN B&W 8L58/64 diesel engines |
| **Persons on Board** | 511 (387 passengers, 124 crew) |

# 6 Shipboard Organization

## 6.1 Deck Department

Unlike traditional cargo vessels, the *Caribbean Fantasy*'s deck department organization was more closely aligned with cruise industry standards. Although the ship's master served in a normal capacity as overall in command, the second in command was a staff captain who was responsible for the deck department and all deck operations, including safety. The staff captain did not occupy a watchkeeping position and was typically on the bridge for arrivals, departures, emergencies, or at any time as determined by the master. Reporting to the staff captain was the safety officer, who likewise was a day worker.[6] The safety officer position was responsible for all crew safety training, maintenance and inspection of safety equipment (excluding fixed firefighting systems in the engineering spaces), and compliance with the ship's emergency plan and station bill.

[6] *Day worker* is a term common in the cruise ship industry for a crewmember who does not stand watches and generally works during the daytime only.

The ship had three watchkeeping officers who each worked the traditional watchkeeping periods of 8–12 (AM and PM), 12–4, and 4–8, respectively. Each of the watchkeeping officers had, in addition to their watchkeeping duties, maintenance and inspection duties. One was responsible for lifesaving equipment; one for firefighting equipment; and one for voyage planning, charts, and publications on the bridge. In addition to the officers, there were deck ratings on each watch for lookout and steering duties. The senior deck rating, the bosun, reported to the staff captain and supervised all deck maintenance activities as directed. The deck department was responsible for the maintenance and upkeep of the ship's hull and superstructure, crew emergency duty training and compliance, lifesaving and firefighting equipment maintenance, and operational readiness.

### 6.2 Engine Department

The chief engineer reported to the master and was responsible for the engineering spaces and machinery. He was also responsible for monitoring the condition of fixed and mobile firefighting systems and appliances and ensuring they were in constant readiness. The first engineer was subordinate to the chief engineer and responsible for the maintenance of the main engines and auxiliary equipment. He was a day worker, overseeing all maintenance and repair activities with the engines. The engine foreman, a senior non-licensed rating, reported to the first engineer and carried out any work, maintenance, repair, or inspection as directed by the first engineer.

The main engine room was manned continuously by a watchkeeping engineer on duty in the space. There were three watchkeeping engineers and each worked the traditional 8–12, 12–4, and 4–8 watch schedule in parallel with bridge personnel. A motorman and an oiler were also assigned to each watch and carried out routine inspections, maintenance, and rounds in engine spaces.

Given the complexity of the vessel, the ship had a separate electrical department that was headed by the chief electrician who reported to the chief engineer. There was also an air conditioning (AC) engineer, reporting to the chief engineer, who was responsible for all heating, ventilation, and air conditioning systems. Both the electrical and AC engineers carried out maintenance and inspections for their respective safety critical systems, such as emergency electrical equipment, fire dampers, and fans.

### 6.3 Hotel Department

The largest department on the ship was the hotel department, which was under the supervision of the hotel director. The hotel director reported to the master and was responsible for all hotel operations, such as passenger comfort and accommodations, food and beverage preparation and delivery, restaurant operations, sanitation of accommodations, bar and galley spaces, passenger entertainment, and onboard revenue. During an emergency, the hotel director and his staff were responsible for the evacuation, mustering, and accountability of the passengers. The heads of various operations within the hotel department included the purser who handled all passenger relations, logistics, and funds on board; the housekeeper who handled all duties related to preparation, sanitation, and cleanliness of passenger accommodations and spaces; the executive chef who oversaw all food preparation; the dining room manager who oversaw all restaurant operations; and the bar manager who was responsible for all beverage operations. The security staff, entertainment staff, and ship's doctor also reported to the hotel director.

### 6.4 Emergency Plan and Station Bill

The emergency plan and station bill provided all crew members with their emergency duties and survival craft assignments. It outlined the ship's emergency signals and specific teams that were designated to respond to emergencies such as fire, man overboard, oil spill, security incident, medical emergency, general emergency, and abandonment.

Investigators found two different versions of the emergency plan and station bill on board the vessel following the accident. One was stamped, signed and dated by RINA on February 2, 2016, and the other was stamped and signed with text "provisionally approved" dated July 3, 2016. The latter was approved while the ship was in a shipyard maintenance period in Bizerte, Tunisia.[7] The July 2016 station bill was found on the bridge after the accident, while the February 2016 bill was found posted in the engine control room.

Both emergency plan and station bills differed significantly, with variations in survival craft assignments, code words and signals, and emergency duties of crew members. According to

[7] The *Caribbean Fantasy* was in the shipyard in Tunisia from March 26 to July 4, 2016, and in a shipyard in Cadiz, Spain, from July 15 to 17, 2016.

the staff captain, the February 2 emergency plan and station bill was not yet in effect because the changes required crew training and preparation. There was no time to conduct the preparation and training prior to, during, or after the shipyard period. Most of the ship's hotel staff, which made up a substantial proportion of the crew, was off the ship while it was in the shipyard. They did not rejoin the vessel until August 5 and 6, when it was back in Santo Domingo. This was 3–4 days before a US Coast Guard port state control (PSC) certificate of compliance (COC) examination. According to the staff captain, the crew was familiar with the July 3 provisional emergency plan because it was the same as the plan that had been in place on the ship prior to the shipyard period. It was intended that the July 3 provisional plan would be superseded by the February 2 plan once familiarization and training was completed. Crew drills prior to the port state control inspection were carried out using the provisional emergency plan.

When interviewed by investigators, RINA representatives stated that the July 3 emergency plan and station bill was approved locally by the surveyor in Bizerte, and no further submission of documentation was required. The RINA head office only had a record of the February 2 emergency plan and station bill. (Further references to the ship's emergency plan and station bill in this report are from the July 3 plan.)

### 6.4.1 Command and Control

The emergency plan for the *Caribbean Fantasy* established the duties for various command and control personnel on the bridge during an emergency. During such an event, the bridge was designated as the command center and organized to effectively manage tasks and activities during the response. The master, in overall command, oversaw the safety of navigation, operation of the vessel, and the emergency response. He was also in charge of announcements to guests.[8] The staff captain managed the actual emergency while in communication with the on-scene commander (safety officer) and other emergency teams. One of two second officers was tasked with the ship's intact and damage stability condition and the use of the bilge and ballast system. The other second officer was tasked to relieve the watchkeeping officer on duty and oversaw emergency communications and the operation of the ship's global maritime distress and

[8] Passenger ships commonly use the term guests instead of passengers.

safety system (GMDSS) equipment. In addition to these four deck officers, a quartermaster was also to be on the bridge to assist in steering and lookout duties.

### 6.4.2 Fire Response Teams

The safety officer was designated as the on-scene commander and was responsible for the organization, deployment, and accountability of the fire response teams. Assisting the safety officer were five teams of crew members with specific tasking and equipment for a fire response. The teams would locate themselves in a strategic location near the reported location of the fire, usually separated by an MVZ, a MHZ or both. The teams were organized as follows:

- Quick response team, consisting of the safety officer (on-scene commander) and three crew members.
- Fire squad no. 1, consisting of seven crew members, four with self-contained breathing apparatus (SCBAs) and firefighter's outfits, with area of specialization for firefighting in accommodation spaces.
- Fire squad no. 2, consisting of six crew members, four of which were from the engine department, with area of specialization for firefighting in engine spaces. Four of the six had SCBAs and firefighter's outfits.
- Boundary cooling team, consisting of five crew members, none of which had SCBAs or firefighter's outfits.

### 6.4.3 Engine Control Room Team

According to the emergency plan and station bill, the engine control room (ECR) team was to be led by the chief engineer and manned by seven people responsible for managing all aspects of machinery and propulsion systems, electrical distribution, emergency systems and fixed firefighting systems in machinery spaces, and communications with the command and control team. The chief engineer was responsible for maintaining accountability of personnel in machinery and technical spaces, activating the ship's $CO_2$ fixed firefighting system, and communications with the bridge. The first engineer reported to the chief engineer and was responsible for the activation of both the water mist and drencher systems. A third engineer and oiler relieved both the engineer and oiler on duty in the ECR. The chief electrician and first electrician managed electrical distribution from the main switchboard and the emergency diesel generator (EDG), located on deck 7 at the starboard side lifeboat deck. The AC engineer was

responsible for isolating various spaces from ventilation as directed by the command and control team. This included the operation and shut down of various fans and fire dampers throughout the vessel.

The ECR was in the main engine room and was not separated from that space by any fire protection boundaries. The emergency plan and station bill and supplementing emergency organization instructions did not identify a secondary area for the ECR team to assemble in the event of a fire in the main engine room.

#### 6.4.4 Evacuation Control Team

The evacuation control team was responsible for managing the evacuation of passengers and crew from accommodation spaces, guiding the passengers to their respective muster stations, ensuring that all persons were evacuated from the ship's accommodations, providing crowd control, and the accountability of all on board.

This team was led by the hotel director and had the largest complement of the crew assigned. The chief purser assisted the hotel director by managing the guest reception area and the manifest of all passengers. Each hotel department head or manager on board the ship reported to the hotel director when their respective zone had been searched and cleared: the chief housekeeper had the duty to ensure all cabins were evacuated; the bar manager ensured all public areas were evacuated; the dining room manager ensured all restaurant and buffet areas were evacuated; and the executive chef was responsible for the evacuation of all crew mess rooms and galley.

Each team leader had a checklist to keep track of spaces that were reported clear and was responsible for informing the hotel director of the evacuation progress. The hotel director, in turn, communicated this progress to the command center on the bridge.

# 7 Accident Events

## 7.1 Pre-accident

Prior to getting under way from Santo Domingo, the crew conducted a safety briefing for the passengers in accordance with SOLAS regulations.[9] No records of attendance or participation were found for this safety briefing. Crew members and some passengers interviewed stated that the briefing took place outside the reception area on deck 5 and included instructions on what to do and where to go in the event of an emergency, followed by a lifejacket demonstration. Because the voyage between Santo Domingo and San Juan was scheduled to be less than 24 hours, there was no SOLAS requirement to have the newly embarked passengers muster at their assigned emergency locations.[10]

The *Caribbean Fantasy* departed Santo Domingo on August 16 at 1913 with 387 passengers, 124 crew, and 7 dogs. For cargo, it carried 58 containers and 36 cars. Originally, there were 388 passengers, but one was disembarked from the ship for medical reasons just as the vessel was getting under way. The ship's manifest and notice of arrival (NOA) were updated with this change.[11]

The crossing between the Dominican Republic and Puerto Rico was uneventful. Crewmembers reported nothing unusual with the vessel or its machinery. Because it was an overnight crossing, passengers slept in either cabins or the main salon, which had airline type seating for 467 passengers.

## 7.2 Accident Details

On the morning of August 17, the *Caribbean Fantasy* was approaching the pilot station at the entrance of the Port of San Juan for a scheduled 0730 local time pick up of the harbor pilot. The ship's master arrived on the bridge at 0644 and got an update of the upcoming arrival from the officer of the watch.[12] Shortly thereafter, the staff captain and the safety officer arrived on the

[9] SOLAS III regulation 19.2.3

[10] SOLAS III regulation 19.2.2

[11] A *NOA* is an electronic form sent to the Department of Homeland Security in advance of foreign vessel arriving in a US port. Whenever events cause the NOA information submitted for a vessel to become inaccurate, an update must be submitted in accordance with Title 33 *Code of Federal Regulations* (*CFR*) Part 160.

[12] All times are rounded to the nearest minute.

bridge. At 0715, the ship's autopilot was disengaged, and a helmsman took the wheel while the vessel was on a heading of 100 degrees at a speed of 17.4 knots.[13] Five minutes later, the officer of the watch contacted San Juan port control by very high frequency (VHF) radio to report that the ship was 3 miles off the harbor entrance.

Below in the main engine room, the third engineer, a motorman, and a wiper were on watch. Both the motorman and the wiper were carrying out normal rounds and tasks in the engine room, and the third engineer was in the ECR preparing for the arrival in San Juan. The chief engineer stated that he entered the ECR just before 0700 in advance of the arrival.

Between 0715 and 0720, the motorman and the wiper discovered a fuel spray coming from the port main engine near cylinder no. 8 and the engine's turbo charger. The motorman ran to the ECR and informed the chief engineer. The chief engineer returned with the motorman and, upon observing the leak, went back to the ECR. At 0723, he called the bridge to inform them that there was a fuel leak and that the port engine needed to be stopped. The master informed the chief engineer that they were five minutes away from the pilot station. After hanging up, the master stated, "reduce the speed." At that moment, the ship was altering course to starboard toward the pilot station at a speed of 17.3 knots.

The chief engineer took local control of the propulsion and reduced the pitch on the port main engine. He then left the ECR to return to the location where the source of the spray was discovered. Once there, he observed the fuel ignite from contact with a hot surface, starting a fire. Both the chief engineer and motorman, who were on the port side of the engine, ran back to the ECR. The wiper, who was on the starboard side of the engine attempted to go to the ECR, but the smoke and heat prevented him from doing so. Instead, he exited the space via a watertight door access into the auxiliary engine room and then climbed a stairway to garage B on deck 3.

[13] All speeds are based on information from the ship's voyage data recorder (VDR) and are referenced to speed over the ground.

According to the chief engineer, when he got to the ECR, he manually activated the HPN Nebula high-pressure water-mist firefighting system.[14] The third engineer called the bridge to inform them of the fire, while at the same time he stopped the fuel oil supply and boost pumps to the main engines. The third engineer then pulled both propulsion levers to zero pitch from the console in the ECR.

At 0725, a deck cadet standing a training watch on the bridge answered the call from the third engineer.[15] The cadet then announced to the bridge team "fire in the engine room." Immediately after, numerous audible fire detection system alarms sounded on the bridge. When interviewed after the accident, the master stated that he asked the staff captain to go below to check on the situation. Both the staff captain and the safety officer departed the bridge.

The *Caribbean Fantasy* was 2 miles from the entrance of San Juan harbor, with the pilot boat approaching to embark the pilot. The master had the second officer inform the pilot boat by radio of the problem with their engine and that they would require two tugs. Following that, at 0727, he gave the order to announce, "Mr. Skylight." Mr. Skylight was an announcement that was made to the crew via the ship's public address (PA) system that activated the ship's firefighting and response teams. (Passenger ships commonly use coded announcements to avoid panicking or concerning the passengers while the ship's crew is activated to respond to a situation.)

The announcement for Mr. Skylight included the instruction "staging area garage A." To the crew responding, this meant that all fire response teams would stage themselves in garage A (deck 2) to await further instructions from the ship's safety officer who was the on-scene commander. Garage A was the lowest of all the vehicle decks, forward of the main engine room and separated from it by an MVZ.

[14] The HPN Nebula system pipes are normally empty when not in operation. During activation, sorting valves open and a pump group starts, supplying fresh water to the system. the system can be activated both manually and automatically. With manual activation, a panel in the ECR receives the fire presence signal, activates the acoustic and visual alarm devices, and opens the appropriate sorting valves. Personnel then activate the system by pressing the activation button for each pumping group on the activation board. For automatic activation, the ECR panel receives the fire presence signal, authorizes the activator board that starts the pumping group, opens the specific sorting valves, and activates the visual and acoustic alarm devices.

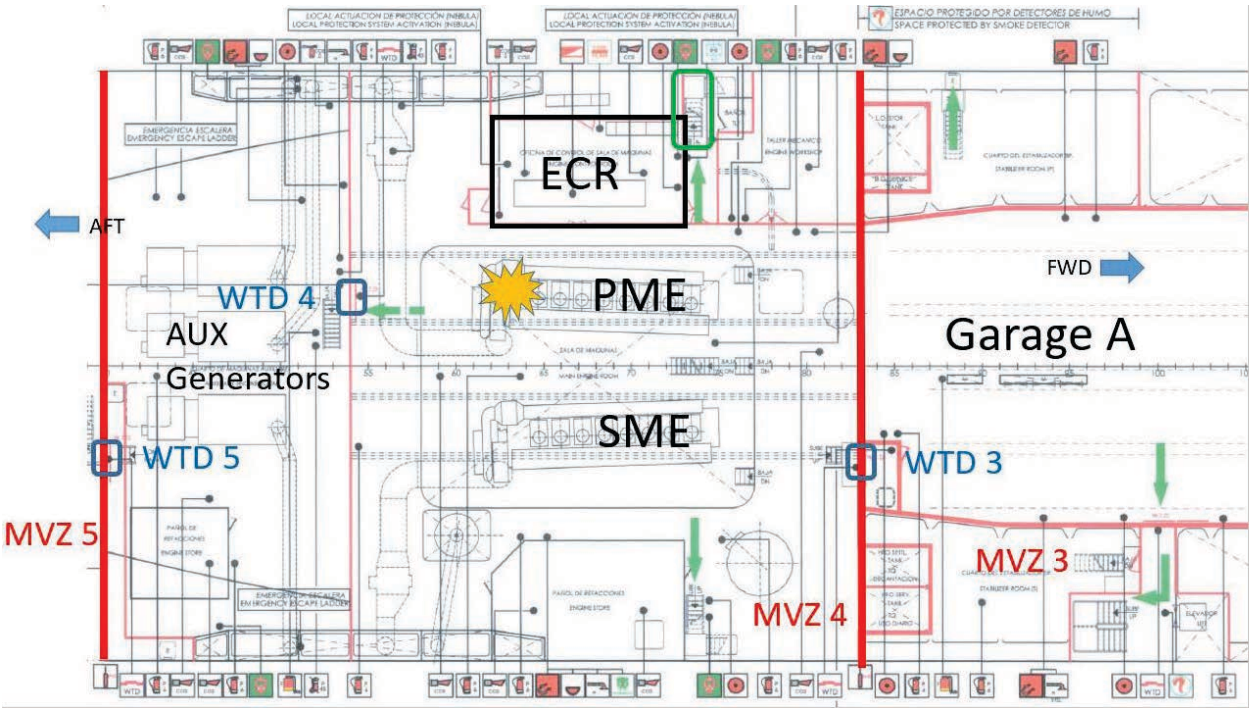



**Figure 3. Diagram of the fire plan of deck 2 from the *Caribbean Fantasy* showing the main engine room and adjacent spaces. The orange shape shows the location of where the fire was reported to have started. Both the port and starboard main engines (PME/SME) are shown as well as the engine control room (ECR). The green rectangle highlights the escape route used by the chief engineer, third engineer, staff captain, and motorman. Forward is garage A, where the fire teams initially staged. Watertight doors are outlined in blue. WTD no. 6 (not pictured), through which the wiper escaped the fire, is on the deck below WTD no. 4 and starboard of the centerline.**

At 0727, the master ordered the helmsman to steer hard to port, from a heading of 120 degrees, to turn the ship away from the harbor entrance. The ship was at a speed of 10 knots but slowing due to the loss of propulsion. Numerous alarms continued to sound on the bridge during this time. At 0729, the master was informed by phone that the engine room was being evacuated. In response, the master ordered the ECR to activate "hi-fog."[16] Right after the call, the master

[15] A *cadet* is an officer in training. Most often, cadets are students at maritime academies who are detailed to operational vessels for a period of time as part of their learning curriculum and to gain experience at sea.

[16] Hi-Fog is the name of a specific type of water-mist fixed fire-protection system that is used on ships in both machinery and accommodation spaces. Hi-Fog is patented and produced by Marioff Oy. The crew of the *Caribbean Fantasy* referred to their water mist system as "hi-fog," both verbally and in documentation, even though this type of system did not exist on board. The system on the *Caribbean Fantasy*, called HPN Nebula, was designed and installed by Ciodue Acqua S.r.l. and was in conformance with IMO Circ. 913(1999) regulations.

informed the San Juan pilot station via VHF radio of the fire in the engine room and that he was preparing for an evacuation of the passengers. He requested support and tugs.

While the master was on the radio, the second officer used the ship's internal radio to inform the on-scene commander (safety officer) that the command center needed to know when all persons were evacuated from the engine room in preparation for the use of the $CO_2$ flooding fixed firefighting system.[17]

Meanwhile, the smoke, heat, and flames were increasing in the main engine room. In the ECR, the chief engineer, third engineer, and motorman were unable to account for the wiper who had exited the engine room via the auxiliary engine room. The chief engineer took an emergency escape breathing device (EEBD) and tried to reenter the main engine room from the ECR but was unable to get far because of the heat and lack of visibility.

The third engineer recalled seeing the HPN Nebula system panel had power to it, but, because of the thick smoke, he was unable to see any water mist through the engine room window in the ECR.

The staff captain arrived in the ECR, where he witnessed the fire on top of the port main engine through the window. He recalled the flames were touching the ceiling of the engine room and that the smoke and heat were "violent." The staff captain said that he informed the master by radio that there was a "big fire" in the main engine room, and he recommended that $CO_2$ be released; however, following that, the chief engineer announced to not release $CO_2$ since he was still unable to account for the wiper. The staff captain departed the ECR and went to the $CO_2$ station in garage B (deck 3) aft on the port side to await further instructions.

Fire response team members began to arrive at the staging area in garage A (deck 2), where they met the safety officer. The safety officer recalled having fire squad no. 1 open water

[17] a) The *Caribbean Fantasy* used handheld VHF radios for internal communications. According to the emergency plan, VHF channel 6 was the designated channel for use. b) The vessel was fitted with a $CO_2$ system in the machinery spaces that consisted of a bank of 110 $CO_2$ cylinders that could be activated from the $CO_2$ room in the aft port quarter of garage B (deck 3). Activating the system would stop the ventilation supply fans and deliver $CO_2$ to both the main engine room and auxiliary engine room. There was no means to separate delivery to each individual space.

tight door (WTD) no. 3, which separated the garage from the main engine room. Upon opening the door, they observed a significant amount of smoke inside the engine room. The smoke began to enter garage A, so she ordered the fire squad to close the door and pull back. Recognizing that it was not possible to fight the fire from garage A, she ordered the fire response teams to move to garage B directly above using the main stairway on the starboard side. However, garage B was also beginning to fill with smoke, so the safety officer established garage C (deck 4) forward as the staging area for the fire teams.

The chief engineer, motorman, and third engineer evacuated the ECR by way of the port side stairway adjacent to and forward of the ECR. All noted the smoke and heat was intense. At the top of the stairway, on a platform which led out to garage B, the chief engineer went to the emergency shutdown panel and opened the pneumatic valve on the panel. This action should have shut down ventilation to the engine rooms and closed eight spring-driven quick-closing valves (QVCs) for the fuel and lubrication oil supply. After activating the pneumatic valve, the chief engineer continued up the stairs and escaped to garage C (deck 4). The third engineer stated that he was the last person to evacuate and that he was overcome by the smoke and heat that he inhaled. At 0732, the chief engineer informed the command center on the bridge via the ship's internal radio that everyone was out of the ECR. The second officer on the bridge responded that they needed to be sure that everyone was out of the engine rooms.

From garage C, the safety officer directed fire squad no. 2 to prepare for boundary cooling one deck below in garage B. She attempted to call the chief engineer on the radio to confirm that the main engine room was evacuated but could not get a response. Concerned about this, she donned an SCBA and, together with fire squad no. 1, proceeded aft toward the port side stairs that led to the engine room. She recalled that they were not able to make it to the engine room because of the smoke and heat.

The chief engineer went to garage C where he was able to meet up with fire squad members and obtained an SCBA. With that, he tried to re-enter the main engine room by way of the same stairway, to confirm everyone was out of the space, including the wiper. He was not able to make it down the stairs because of smoke and heat intensity. While on the stairway, he opened the refilling valve for the air reservoir for the QCV and ventilation shut downs as an

assurance that there would be adequate air supply for everything to close. He then exited to garage B.

While in garage B, he met members of fire squad no. 1 and was informed that the wiper was out of the engine space. The wiper later told investigators that while he was in garage B, he overheard fire squad members state that they were looking for the wiper, to which he replied, "No; I am here." He then confirmed his presence firsthand with the chief engineer. For about 2 minutes, communications continued with both the safety officer and the staff captain regarding confirmation of the engine room evacuation and the closing of fire dampers.[18] The safety officer requested all fire doors for MVZ4 and MVZ5 be closed to prevent the spread of smoke. The bridge responded that they would close all vertical zones and sound the general alarm. At 0733, the staff captain reported that he was at the $CO_2$ station.

At 0734, the master contacted the reception desk and informed them that there was a fire in the main engine room. He requested that they start to gather all passengers and bring them to their muster stations, and he told them that he would make an announcement.

At 0736, a VHF broadcast was made from the *Caribbean Fantasy* to all ships in the local area stating that the vessel was not under command.[19] Immediately following this broadcast, the chief engineer confirmed to the command and control team on the bridge that all persons were out of the engine rooms. Upon hearing that, the master gave the order to release $CO_2$. The staff captain, who was at the $CO_2$ station in garage B, complied by operating the two valves needed to activate the system. At 0737, the staff captain informed the bridge by radio that $CO_2$ had been released. The staff captain remained at the $CO_2$ station and was joined by the chief engineer shortly thereafter. The staff captain verified that he heard the $CO_2$ bottles discharge, and he and the chief engineer noted frost on the valves and piping (a common indicator of movement of gas through discharge lines). They then departed the $CO_2$ station.

[18] Fire dampers are used in ventilation and air conditioning ducts to prevent the spread of smoke and fire and to stop the supply of air to a fire. They can be closed either manually or automatically and, when closed, also prevent the escape of firefighting agents such as $CO_2$ from the space.

[19] The International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS), defines *not under command* as a vessel, which through some exceptional circumstance, is unable to maneuver as required by the regulations and is therefore unable to keep out of the way of another vessel.

Both the safety officer and staff captain communicated to the bridge that there was a high concentration of smoke building in both garages B and C. At 0738, the safety officer announced to the command center that she had relocated the staging area to Garage C forward due to the smoke and directed fire squad no. 1, fire squad no. 2, and the boundary cooling team to that location.

At 0740, the command and control center requested that the boundary cooling be conducted in garage B directly above the engine room. The staff captain replied that there was "too much smoke in garage B and C" and requested to open the forward main ramp/door to clear the smoke out. The master denied this request as he did not want to add wind and air to the car deck. None of the boundary cooling teams had SCBAs or fire protective equipment, and thus they were unable to access the area in garage B above the engine room.

At 0742, Coast Guard Sector San Juan contacted the *Caribbean Fantasy* on VHF channel 16 and requested that they change frequency to channel 22A. Before switching stations, the second officer on the bridge reported to the Coast Guard that there was a fire in the engine room, that $CO_2$ had been released, and that the vessel was not under command just north of the entrance to San Juan. About three minutes later, the second officer communicated to the Coast Guard stating that that they were going to make an "announcement for evacuation; we need assistance immediately."

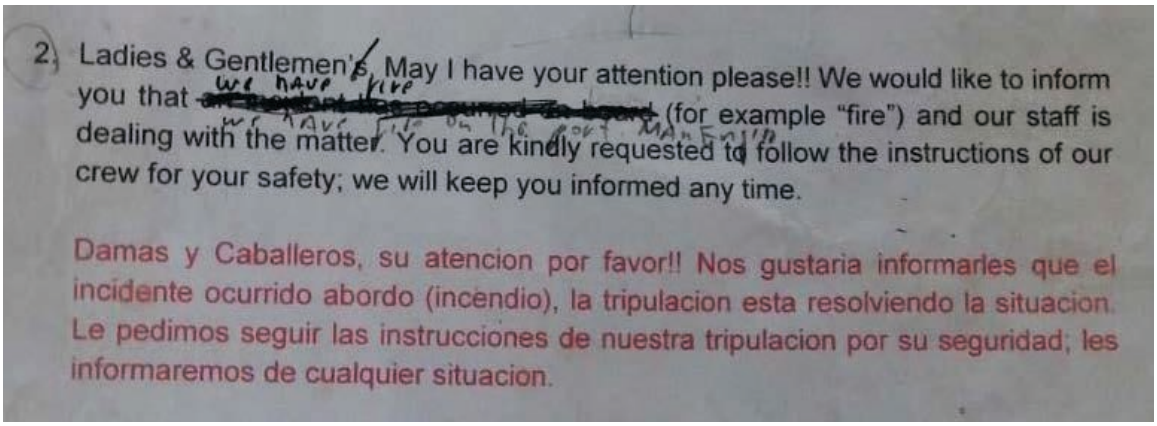
At 0742, the master, who was concerned about smoke in the garages, asked the staff captain if he thought activating the garage drencher system would help. The staff captain replied the "drencher was empty; almost finished."[20] The master requested the drencher for garage B be activated. The staff captain went to the drencher room on deck 5 port side aft, near the crew mess, where he was met by the first engineer and third officer who had been directed by the safety officer to that station.

[20] The *Caribbean Fantasy* was fitted with a deluge/drencher system that was capable of providing a protective water spray to the vessel's three vehicle decks (garages A, B, and C). Two supply pumps provided water from either a sea chest or from fresh water tank nos. 8 port (8P) and 8 starboard (8S). The system was operated manually from a control station located on deck 5 aft near the ship's port side MES embarkation station. The drencher system had 18 individual zones which were subdivided by each deck; garage C: zones 1–7, garage B: zones 8–15, and garage A: zones 16–18.

About a minute later, a security guard, who had been standing by at the starboard side pilot door ready to embark the pilot, called the bridge and informed them there was a fire near the starboard side pilot door located in garage B midship.

For about four minutes, between 0744 and 0748, there were multiple radio calls to the command center on the bridge from various personnel and teams throughout the ship. Alarms from the fire detection system also continued to sound. During that time, none of the calls were answered or acknowledged. At 0745, one of the second officers radioed the bridge in a second attempt to report heavy smoke on the port and starboard sides of deck 5 aft, which were the crew accommodation and one of the main passenger areas. Immediately following that, a signal of one long could be heard on the bridge. At 0746, the safety officer relayed information that there was smoke in garage B and that there was oil coming from the port side bunker station on that same deck, again with no response from the bridge. The medical team also checked in, but the call was unanswered. At the time the radio calls went unanswered, the master, second officer, and cadet were occupied with communications with the Coast Guard and announcements to the passengers.

The master ordered PA announcements to inform the passengers of the fire and to direct them to follow the instructions of the crew. At 0746, the announcement was made in English by the deck cadet to all areas of the vessel. This announcement was made following a prewritten script (see figure 4).


2. Ladies & Gentlemen's, May I have your attention please!! We would like to inform you that we have fire (for example "fire") and our staff is dealing with the matter. You are kindly requested to follow the instructions of our crew for your safety; we will keep you informed any time.

Damas y Caballeros, su atencion por favor!! Nos gustaria informarles que el incidente ocurrido abordo (incendio), la tripulacion esta resolviendo la situacion. Le pedimos seguir las instrucciones de nuestra tripulacion por su seguridad; les informaremos de cualquier situacion.

**Figure 4. Photograph of the pre-written announcement, made in English by the cadet, to inform the passengers of the fire onboard.**

Immediately following the announcement made by the deck cadet, the second officer made an announcement in Spanish. The announcement followed a different prewritten script that

informed the passengers that the crew were fighting the fire, but it was not under control. The announcement stated that "it has been decide[ed] to abandon the vessel" and to follow the instructions of the crew. It further directed all crew to their survival craft embarkation stations (see figure 5).

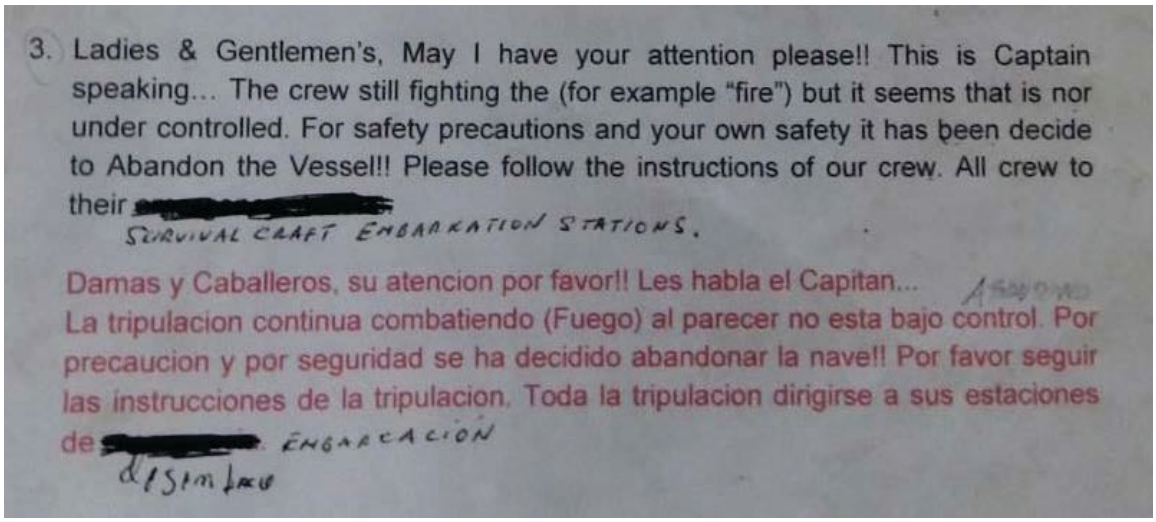



**Figure 5. Photograph of the pre-written Spanish announcement made by the second officer to inform the passengers to abandon the vessel.**

When the master was interviewed by investigators, he stated that he ordered the English announcement made by the cadet and not the announcement in Spanish to abandon the vessel. He further stated that, because he did not speak Spanish, he would not have understood the second announcement.

According to the ship's emergency plan, the sounding of seven short followed by one long signal on the ship's alarm bell accompanied by sounding the ship's whistle three times was the indicator to be used for all passengers to go to their muster stations and for crew to go to their emergency stations. It activated the ship's evacuation control crew, mostly consisting of hotel personnel, who were to begin directing passengers to their assigned stations. There were conflicting statements as to whether the general alarm was sounded. There was no recording of the general alarm found on the VDR. Although the master stated that the general alarm was sounded, he could not recall when it was sounded or who activated the alarm. The only alarm heard on the VDR was a one long blast on the ships alarm system just prior to the announcement.

This alarm could either be manually activated or automatically by the ships fire detection system when fire alarms are not acknowledged or silenced within two minutes.

Upon hearing the announcement from the bridge to abandon the vessel, the fire teams evacuated the staging area and proceeded to their respective survival craft embarkation stations. No firefighting or boundary cooling efforts were made past this point. The safety officer, when interviewed by investigators, said this all happened in a "real short time" period. The time from when Mr. Skylight was announced to the announcement to abandon the vessel, was about 20 minutes.

The San Juan pilot boat, which was originally approaching the *Caribbean Fantasy* for the pilot to board, remained near the ship to render assistance as needed. Given that the pilot and crew of the pilot boat had local knowledge of the Port of San Juan, they worked to bridge communications between the ship and Coast Guard where needed. The pilot also confirmed tugboats had been ordered from the port.

At 0747, the Coast Guard asked by radio how many people were on board. The response from the ship was that there was "five one two" passengers and crew on board. There were, in fact, 511 people on board. The previous evening, as the ship was departing Santo Domingo, a passenger had to be disembarked for medical reasons. The officer communicating on the radio was unaware of the disembarkation and was referencing a dry erase board on the bridge which had written in marker that there was 512 people on board. The Coast Guard then asked if the *Caribbean Fantasy* had any personal floatation devices (PFDs) and liferafts on board; and if so, what color the PFDs and rafts were. The ship replied that they did have them. The number of lifeboats onboard was also communicated to Coast Guard, who again requested the color of the liferafts.

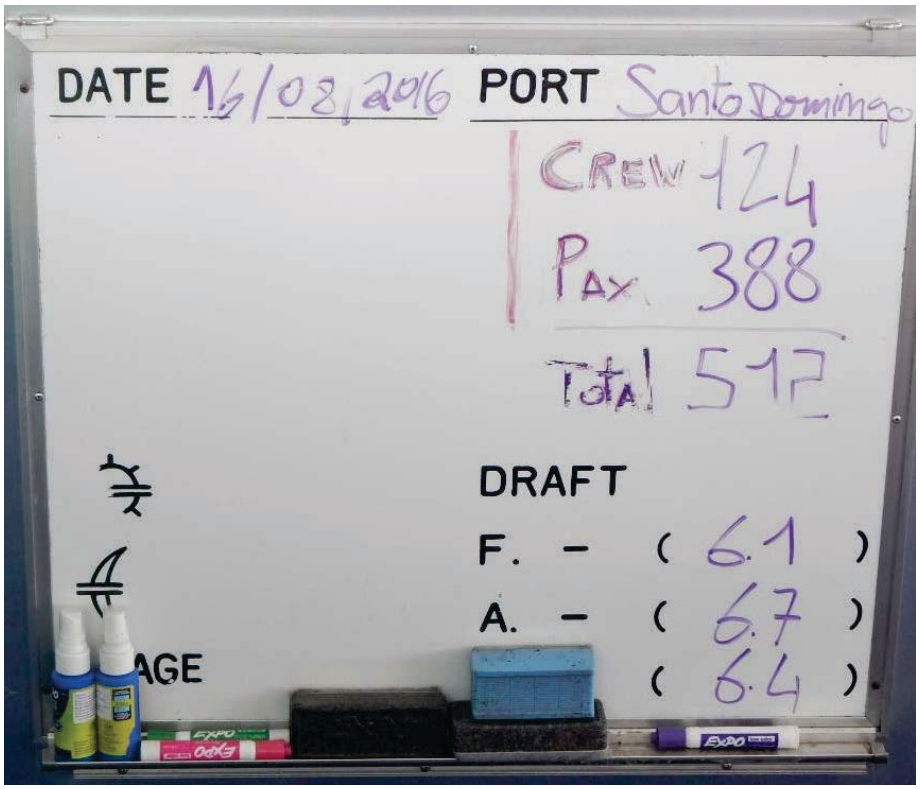



**Figure 6. Photograph of the bridge status board incorrectly showing 512 persons on board.**

At 0749, the safety officer, speaking through an SCBA, reported to the bridge command center that there was a "big explosion" in garage B. The master requested to know if the drencher was working. The staff captain replied that he had started the pump but could not verify that it was working. The safety officer then reported that there was "nothing coming in garage B." About three minutes later, the chief engineer called the master on the radio and stated the drencher system was working. The staff captain told investigators that he opened the valves for all of garage A and garage B. The first engineer who was also at the drencher station told investigators that operated the valves for garage C.

At the same time, communications continued between the *Caribbean Fantasy* bridge and the Coast Guard as they sorted out confusion regarding the number and capacities of lifeboats and liferafts on board. The Coast Guard asked if the liferafts were filled. The second officer on the radio responded that they had not yet been ordered to abandon ship by the master and that the passengers were at their evacuation stations.

Following this radio exchange, the master asked the safety officer if the fire was under control. She replied that there were three big explosions and oil in garage B. The master then ordered her to continue use of the drencher system.

At 0754, the master ordered the MES teams to deploy the system.

From his viewpoint on the bridge wing of the *Caribbean Fantasy*, the master could look aft and see that most of the passengers that were arriving at their muster stations did not have lifejackets on. Upon seeing this, he shouted from the bridge window and made an announcement over the PA system for the crew to ensure all passengers donned lifejackets.

At 0756, Coast Guard Sector San Juan issued an urgent Pan-Pan message to all vessels on VHF radio channel 16 about the engine room fire on board the *Caribbean Fantasy*.[21] The message requested mariners assist if possible and make reports to Sector San Juan.

At 0756, the bridge command center was informed by phone that all passengers and crew had been evacuated from the ship's internal spaces. However, about a minute later, the safety officer called the bridge by radio and requested that one long signal be sounded on the ship's alarm system because there were still people on deck 5. The second officer then directed the deck cadet to sound the signal which was recorded on the VDR at 0758. This signal, according to the ship's emergency plan, was the "prepare for abandon ship signal" and was to direct all persons on board to go to their survival craft embarkation stations, where upon verbal command from the master, the abandonment of the ship would take place.

Following the one long signal, an instruction was given from the command center to prepare lifeboat no. 2 for launching.

The command center attempted to reach both the port and starboard MES operators by radio to give them instructions to prepare each for deployment. These multiple calls went unanswered. Therefore, the second officer on the bridge asked the third officer to go and prepare

[21] A *Pan-Pan* message is a VHF radio transmission that indicates there is an urgent situation, but there is no immediate danger to a person's life or to the vessel. The vessel or station transmitting the message begins by saying "Pan-pan, Pan-pan, Pan-Pan" and follows with the urgent message.

the port side MES. When interviewed by investigators, the safety officer and staff captain stated that they also went to the MES stations to help with launching preparation.

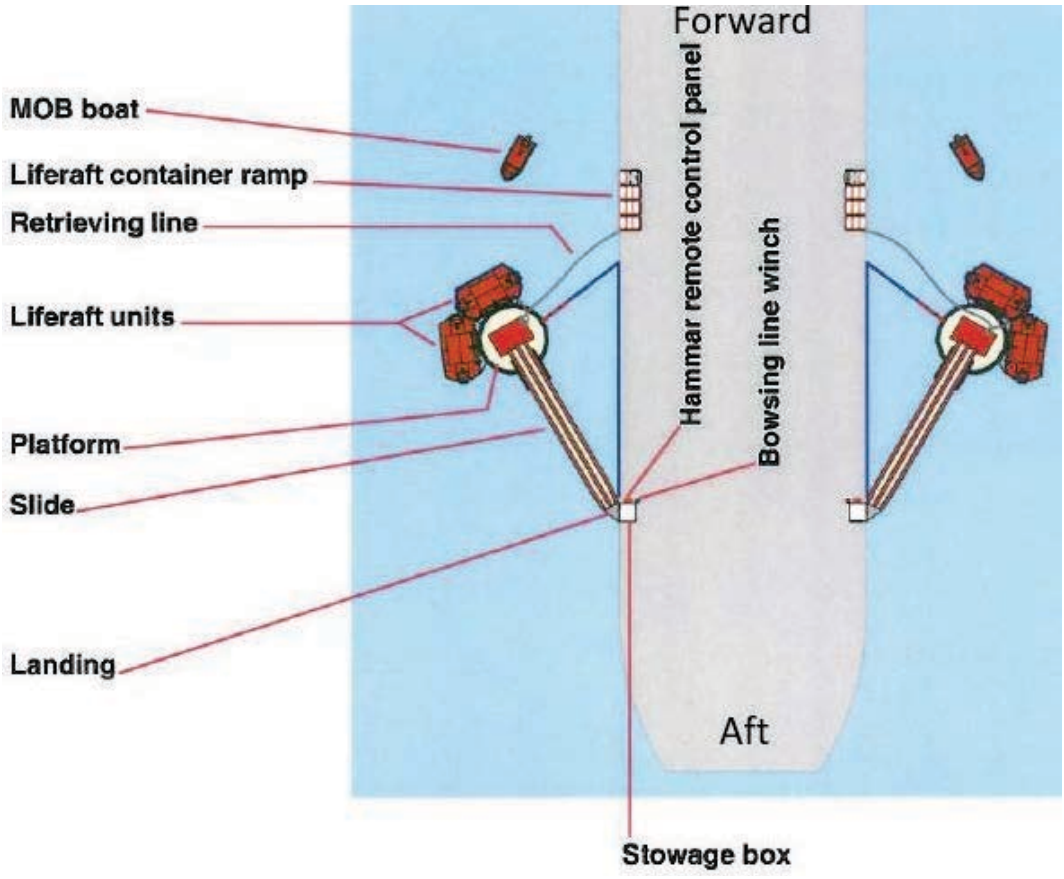



**Figure 7. Overhead diagram of the port and starboard MES systems for the *Caribbean Fantasy*, with names of the main system components. Note the alignment of the liferaft units, with their large entrance ways, alongside the platform. (Source: Viking Marine Evacuation System Manual, 1999)**

At 0759, the second officer informed the master that a Coast Guard small boat was on scene. According to coast guard records this small boat had hull number 45751.

At 0802, the second officer on the bridge announced that the port side MES was on the water and asked the master if they should launch the fast rescue boat to provide assistance to the rafts and the MES platform. The master declined and stated that they would ask the Coast Guard to assist. The master then radioed a Coast Guard small boat to request assistance with gathering the liferafts and bringing them to the MES on the port side. The boat crew responded that they would stand by on the port side of the ship. Following that, the master ordered the launch of all 12 liferafts from the port side rack.

The *Caribbean Fantasy* had one fast rescue boat on the port side of the ship that was designated for use in emergencies such as a man overboard (MOB) or oil spill. There were no instructions found in the emergency plan for use of the fast rescue boat during abandonment; however, there were instructions for lifeboat no. 3 to be positioned in the vicinity of the MES to assist in marshalling liferafts. According to the operating instructions for the MES, the fast rescue boat (referred to as MOB boat in the instructions) was tasked with keeping the launching area clear of any obstructions or obstacles, hauling rafts to the embarkation platform, and hauling liferafts and/or containers.[22] When the master was asked by investigators why he did not order the fast rescue boat lowered, he stated that it was because of the presence of Coast Guard response vessels and that he needed to keep the crew that normally operate it on board to continue to help with the emergency.

In the midst of radio communications with the Coast Guard, the master announced, "Stop the drencher." This was passed to the safety officer, who stated she would stop it. When later asked by investigators why he had ordered the drencher to be stopped, he recalled that the vessel was starting to list to port. He said he was concerned with the amount of water on the car decks and its effect on the ships stability. The wind at the time was on the starboard beam of the ship which induced a heel to port. As a result, the water from the drencher pooled at the port side of the garages.

At 0803, the ship was about 2 miles north-northwest of the entrance to San Juan harbor on a northerly heading and drifting with the wind (easterly at 13 knots with gusts to 17 knots) at about one knot over the ground to the west-southwest.

[22] VIKING LIFE-SAVING EQUIPMENT A/S, *Manual, VIKING Marine Evacuation System, M/V Caribbean Fantasy*, 1999.

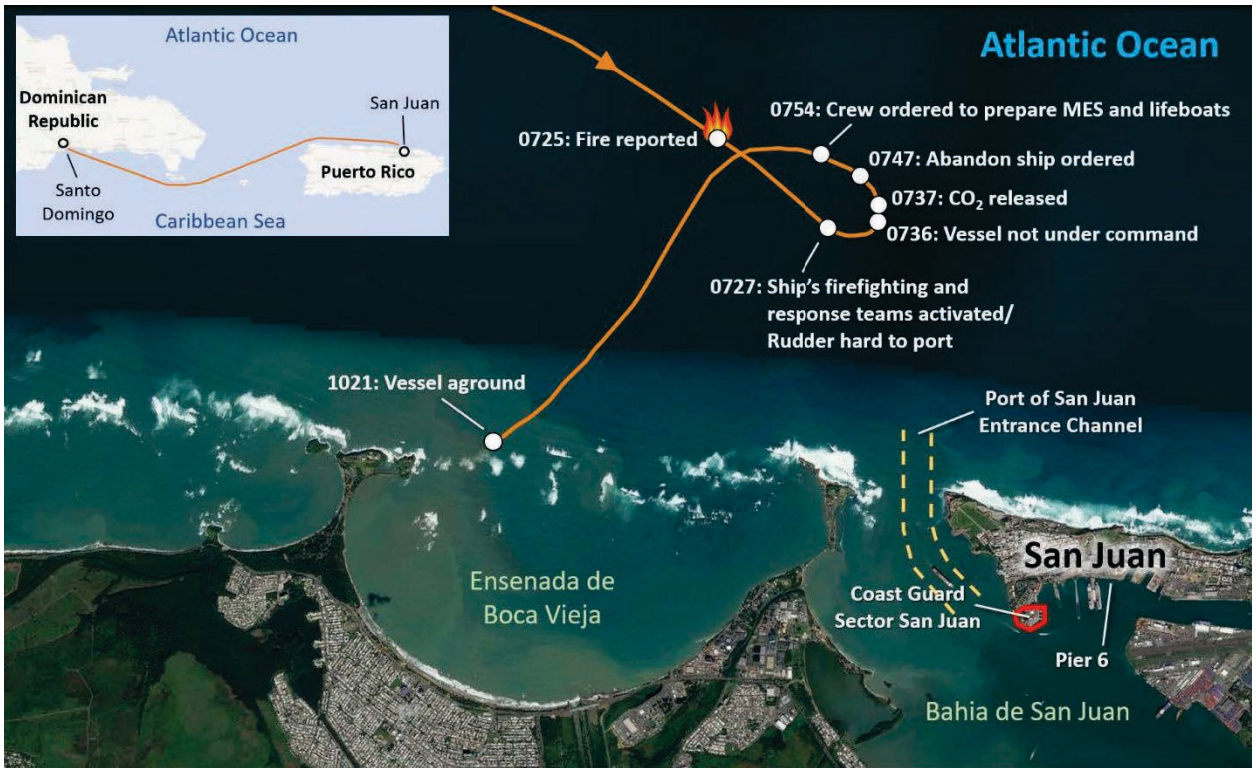



**Figure 8. Automatic identification system (AIS) track of the *Caribbean Fantasy* and timeline of events. (Background by Google Earth)**

The master stated that his original intention was to use the port side MES for the evacuation. Given the ship's heading, which put the wind and seas on the starboard side, the lee (calmest sea conditions) was on the port side. However, the staff captain reported smoke from the port side that was blowing onto the port side MES station. When interviewed, the staff captain stated he considered this to be a risk if persons were to evacuate to that side. Additionally, the staff captain stated that there was a problem with the MES and that the slide angle was too steep— "near vertical" —for passengers and crew to slide down. Additionally, a Coast Guard small boat contacted the bridge recommending the starboard side MES be used since the ship was drifting down on the port side MES.

Based on the information from the staff captain, at 0804, the second officer on the bridge requested the safety officer to prepare the starboard side MES. Accordingly, the safety officer ordered all MES preparation teams, who were also tasked with lifeboat preparation and launching, to the starboard side MES. About this time, more small boats from the Coast Guard arrived on scene.

The bridge command center also ordered the liferaft preparation teams to release all the rafts on the port and starboard side. When interviewed, the staff captain told investigators that he had activated the remote releases for the liferafts on the port side of the ship before proceeding to the starboard side. Even though he stated he did this, only 1 of the 12 liferafts dropped from the rack to the water where it remained attached to the ship by its painter line, uninflated in its container.

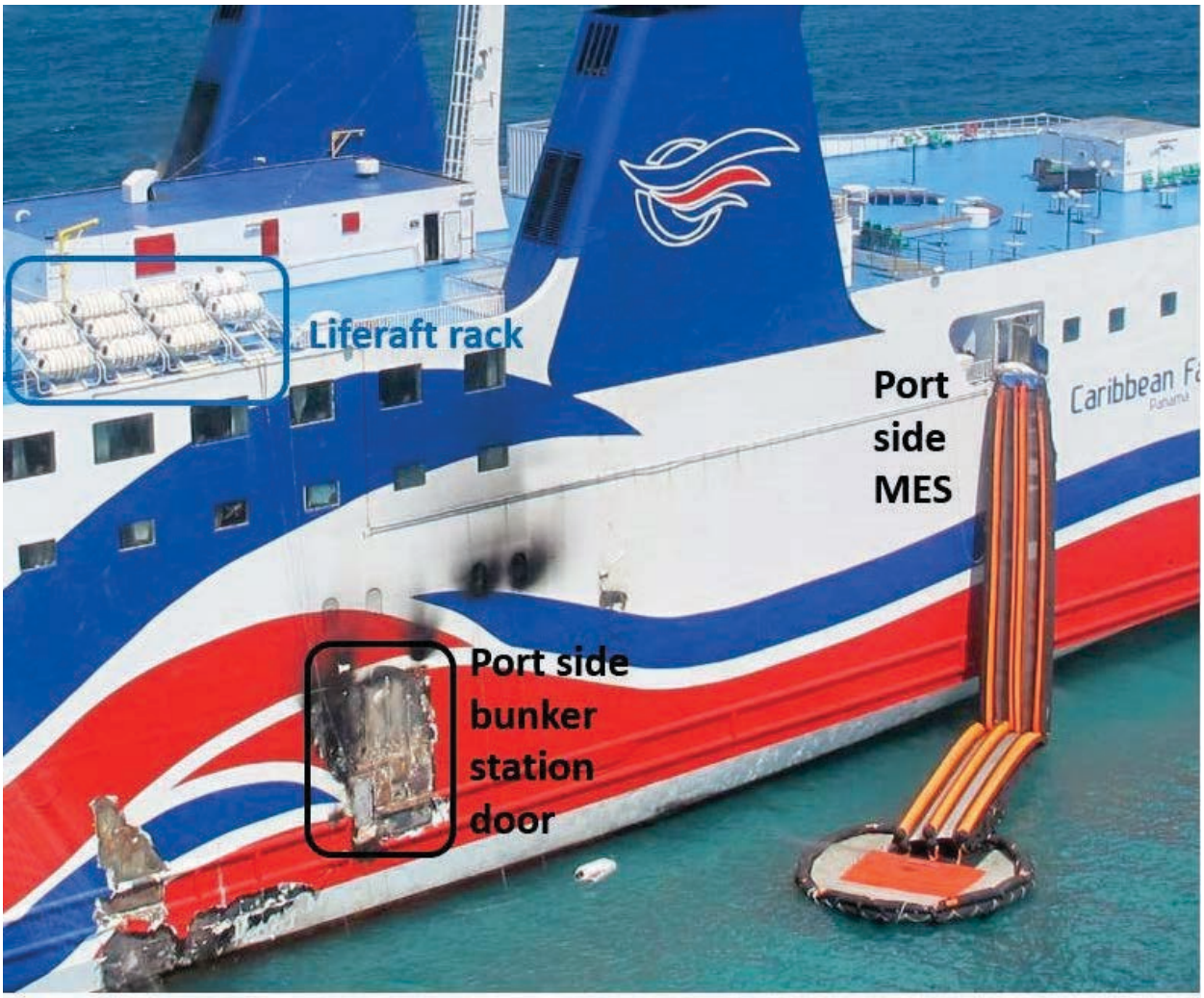



**Figure 9. Aerial photograph of the port side of the *Caribbean Fantasy* taken on August 19. A black rectangle highlights the location of the port side bunker station shell door. Note the burned paint in the surrounding area and the soot stains around some of the ventilation louvers. A blue rectangle outlines the main rack housing the 12 liferafts. All rafts remain in the rack except for one, which floats uninflated in the water. Also note the steep angle of the MES slide.**

At 0808, the bridge was informed that the starboard side MES was not yet prepared. The master ordered the lowering of the lifeboat no. 2 on the port side of the ship and lifeboat no. 1 on the starboard side to prepare for embarkation. According to crew members interviewed, once lifeboat no. 2 was lowered to the embarkation deck, there was a gap between the lifeboat and the ship's side because the ship was listing an estimated 4 degrees to port. This gap was too wide to embark passengers, so the crew heaved the boat back up and adjusted the forward and aft bowsing/tricing straps to the correct length and tension. (Bowsing/tricing gear is designed to hold the boat in to the embarkation deck for conditions of ship movement or list.)[23] When lifeboat no. 2 was lowered back to the embarkation deck, the gap was closed, allowing passengers to embark.

At 0810, a Coast Guard small boat stationed on the ship's starboard side asked via radio how many passengers were on board. Once again, the bridge replied incorrectly that there were 512 persons on board. The small boat further requested to know if the lifeboats had capacity for 512 persons. Not understanding what the small boat was asking, the second officer responded by asking to repeat the question. There was no reply. During that communication, a loud one long alarm sounded on the bridge.

Recognizing at 0812 that the liferafts had not yet been released on the starboard side, the cadet requested by radio from the command center to release the liferafts from the starboard side.

The chief engineer arrived on the bridge at 0814 and began to brief the master about the status of the fire in the engine room. The master asked if the fire was out. The chief engineer told him that he had stopped everything, and the engine was stopped, but he could not confirm that the fire was out. He told the master he saw the leak. At that point the master, who had been busy with managing the evacuation, told the chief engineer to stop talking and then redirected his attention back to ordering the launching of liferafts and the preparation of lifeboat no. 3.

[23] Tricing and bowsing were fitted between the main davit arm and the floating block. This was designed to hold the survival craft into the ship's side ensuring easy access after survival craft was swung out. Source: *Schat-Harding, Installation, Operation and Maintenance Manual, VIP Davits/W-winches*, ed. 971117, page 10.

Upon hearing the master's orders to prepare lifeboat no. 3, the second officer asked who should command lifeboat no. 3, because he was the assigned commander. In response, the master ordered the second officer (not on watch) to take lifeboat no. 3.

At 0817, a power interruption on the bridge triggered the activation of numerous alarms and caused the radar to power down. This was due to a transition of power from the electrical generators to the emergency diesel generator (EDG).

Following that event, starboard side MES station reported by internal radio that the "line is broken." Investigators later determined that it was the starboard MES's bowsing line that had parted. The bowsing line was a rope made of synthetic material that ran from the MES to a winch on the ship. It was designed to adjust tension on the slide and platform therefore enabling the system to be in the best position for use. Soon after receiving the report from the starboard MES station, the bridge was informed by the staff captain that the port MES was not able to be used.

At 0819, the bridge was informed that lifeboat no. 1 was ready to be lowered with 100 people on board. The master gave the order to do so. The master shouted from the bridge wing at the first engineer, addressing him specifically by name, who was on lifeboat no. 1 with luggage and no lifejacket.[24] According to the emergency plan, the first engineer was to be the second commander of lifeboat no. 2. When interviewed, he stated that lifeboat no. 2 could not be boarded because of the gap between it and the ship side. So, he, along with the other people at lifeboat no. 2, were directed by the master to go to lifeboat no. 1. (He also recalled hearing the EDG running when he was at lifeboat no. 1 but did not know if it had been started automatically or by a crew member.)

At 0823, the master asked the safety officer by radio if the fire was under control to which he received a response that the garages were still full of smoke. Upon receiving the report, he called Coast Guard Sector San Juan on VHF channel 16 and stated "I'm sending all the

[24] When interviewed by investigators, the first engineer stated that he had only a small bag of personal belongings with him. Of all crew members interviewed, he was the only one wearing his personal clothing. All other crew, when interviewed, were wearing clothing that was donated because their personal effects were still on board.

passenger[s] on the evacuation now by the lifeboats. I cannot control the fire." The pilot boat, still next to the ship, relayed the message to the Coast Guard small boats in the area.

About 0825, the master went back to the starboard bridge wing where he and the second officer observed the launching of lifeboat no. 1. When on the water, the commander of the lifeboat reported that he was unable to operate the release hooks. The master replied, "The release works; you don't know how it works, but it works." The lifeboat no. 1 commander was then given instructions over the radio to break the glass on the release mechanism which was an override of the hydrostatic interlock system.[25] At 0826, the VDR captured the first sound of a helicopter near the ship.

As the problem with the gap between the ship side was resolved with lifeboat no. 2, the master was informed that the boat's commander (the third officer) and second commander (the first engineer) were missing. In response, the master directed the chief engineer via the ship's internal radio to have someone from the engine crew go to lifeboat no. 2; he did not receive a reply. The second officer on the bridge then called the third officer, who was on the starboard side embarkation deck and directed him to lifeboat no. 2.

At about 0829, with lifeboat no. 1 still unable to release the release hooks to clear away from the ship, an unidentified person either jumped or fell in the water. Video taken from a passenger's mobile phone captured a second person jumping in the water from the lifeboat. The master requested assistance in recovering the people, and both were recovered by a Coast Guard small boat.

At 0830, the master, observing from the port bridge wing that lifeboat no. 2 was not at its 150-person capacity, ordered the safety officer who was at that station to put more passengers into the lifeboat.

[25] The U-hook system, installed on all of the lifeboats on *Caribbean Fantasy* in May 2016, was a RINA-approved release mechanism for survival craft. The system could be released off-load, meaning the there was no load on the fore and aft release hooks because the lifeboat was floating in the water. It could also be released on-load when there was a load on the hooks. There was a hydrostatic system that activated when the boat was waterborne that moved an interlock mechanism to an open (red) position. This allowed the boat to be released using the release handle. If there was a problem with the hydrostatic interlock, if the boat was not waterborne or there was load on the fall wires and hooks, the interlock could be overridden and opened. Source: BC Service Group, *U-Hook 3 – 6 – 10 – 15 ton Operation and Maintenance Manual*, rev. 4, February 2016.

**Figure 10. Lifeboat no. 1, at 0838 on the day of the accident, in the water and unable to release the release hooks. (Photo provided to Coast Guard by a *Caribbean Fantasy* passenger)**

At 0836, the master received a report that the engine for lifeboat no. 1 was not running, to which he replied that he would ask for assistance from the Coast Guard. A minute later, he gave orders to lower lifeboat no. 2, send the remaining people on the port side over to the starboard side, and release all liferafts. According to the commander of lifeboat no. 2, once the boat was in the water, he was unable to release the hooks using the release handle, so the crew had to manually remove each lifting eye from the closed hook by hand. Once clear of the blocks and the ship, lifeboat no. 2 was escorted under its own power by a Coast Guard small boat into the port of San Juan. The commander estimated he had 105 passengers on board, together with four crew.

Lifeboat no. 1 was eventually able to release from the release hooks by manually removing each lifting eye from the closed hook by hand. According to the first engineer who was in the lifeboat, the engine started but did not have any thrust. Because he did not have any tools, he was not able to troubleshoot the problem. The lifeboat had no propulsion and was taking on water, so one of the arriving tugboats, the *Diane Moran*, was asked by a Coast Guard small boat to transfer people from the boat to the deck of the tug. The empty lifeboat no.1 was later towed into San Juan harbor by a Coast Guard small boat.

At 0841, the pilot boat reported to Sector San Juan that there were 300 people remaining on board the *Caribbean Fantasy* and there were two liferafts deployed in the water. A Coast Guard small boat was requested to assist in gathering the rafts.

At 0842, the master asked what the delay was with the embarkation of lifeboat no. 3 on the starboard side; he received a response that there was no commander for the boat. The master acknowledged this and ordered the second officer (the commander for lifeboat no. 3), who was on the bridge, to go to lifeboat no. 3. From then on, only the master and the cadet remained on the bridge.

With lifeboat no. 2 away, all remaining persons on board were ordered to the starboard side of the ship. Passengers and crew lined up on the outer deck 7 aft of lifeboat no. 3 as it was prepared for lowering. The master ordered all 11 starboard side liferafts launched for the MES and then requested the staff captain to assign a crew member to go down the slide and work on gathering the rafts around the platform. The staff captain responded that the slide was not opening as it should and if anyone was sent down, it may result in an accident. The master told the staff captain that from his point of view on the starboard bridge wing the slide looked fine and to send someone.

More response vessels and aviation assets arrived on scene. These included a boat from Customs and Border Protection (CBP), two police boats, five tugboats, a boat from the fire department, a Marine Spill Response Corporation (MSRC) boat, a second pilot boat, and good Samaritan vessels. In addition to the Coast Guard small response boats, a 55-foot aids to navigation (ATON) boat, CG 55115, arrived on scene. Two Coast Guard MH-65 Dolphin helicopters from Air Station Borinquen, Puerto Rico, and a Fuerzas Unidas de Rapida Acción (United Forces of Rapid Action—FURA) Bell 429 helicopter from Isla Grande airport in San Juan were also on scene.

The rapid action forces helicopter was first to arrive about 0826. Directly behind the bridge of the *Caribbean Fantasy* on deck 8 was an unobstructed area with circular markings for helicopter evacuation operations. In addition to the markings, painted in large letters was “winch only” clearly visible from the air. Despite this marking, the rapid action forces helicopter landed on deck at least three separate times and deployed shore-based firefighters, a Puerto Rico police

rescue unit, and Puerto Rico Emergency Management Agency (PREMA) personnel on board. Between 0840 to 0925, a of total 14 persons were landed on board with SCBAs and personal protective equipment.

Once on board, the firefighters and shore-based personnel staged themselves near the EDG room on the starboard side of the ship on deck 7 forward. According to one of the firefighters interviewed, on at least two occasions, firefighters made attempts to gain access to the main engine room. The chief engineer was asked to accompany the firefighters since he was most familiar with the location of the fire and how to get around the ship. On the first access attempt, a firefighter reported seeing fire on the way down to the engine room. Given the conditions of visibility, the exact location where the fire was sighted could not be confirmed. During the second access attempt, the firefighter explained that they were able to make it down about two decks via a stairway near the galley on deck 5 but were then forced back because of the smoke and heat. The firefighter also noted that smoke conditions in the accommodation spaces required them to wear SCBAs during the second attempt. The smoke in the accommodation spaces was black in color but was not so dense as to significantly affect visibility.

The master informed investigators that he did not authorize, nor was he aware of, the landing of shore-based firefighters and first responders on board. Coast Guard command center personnel were also unaware of the placement of the three shore-based fire teams on board. According to the captain of the port (COTP) for Sector San Juan, he learned of this only after speaking to the fire chief when they were at pier 6, the receiving site for passengers and crew evacuated from the ship.

In addition to the vessels and aircraft already on scene, the Coast Guard fast response cutter (FRC) *Joseph Tezanos* (WPC 1118) was dispatched from Sector San Juan with orders for the commanding officer to act as search and rescue on-scene coordinator (OSC).[26] The vessel got

[26] The *OSC* is a person designated to coordinate search and rescue operations within a specified area. The OSC should be the most capable person available, taking into consideration SAR training, communications capabilities, and the length of time that the unit the OSC is aboard can stay in the search area. Source: International Maritime Organization (IMO), *International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual*, Resolution A.894(2), November 29, 1999.

under way at 0830 and arrived on scene at 0850 according to the vessel's log. Although the crew logged that the cutter's commanding officer assumed duties as OSC, no one from the cutter or Sector San Juan announced this to the *Caribbean Fantasy*'s master or other vessels in the area.

The *Joseph Tezanos* was equipped with a pan, tilt, and zoom camera that was manned by a crewmember. At 0858, the camera captured thick black smoke coming from the stacks of the ship. During the vessel's time on scene, the camera recorded other events that helped investigators determine the facts and timeline of on-scene activities.


**Figure 11. US Coast Guard fast response cutter (FRC) *Joseph Tezanos* (WPC 1118) on the day of the accident. (Photo by Coast Guard)**

At 0845, a one long signal sounded on the ships alarm system. Two minutes later, the master ordered lifeboat no. 3 to be lowered when ready and told the commander in the boat to be aware of the liferafts below. About six minutes later, when the boat was at the water, the boat commander reported to the master that he was unable to operate the release hooks. In response, the master ordered the commander to try to release the hooks manually. At 0854, the commander informed the master he could not manually release the hooks. A one long signal again sounded in the background on the ships alarm system. The master asked the commander if either of the hooks had been released; he received a reply that neither were. With that, the master directed the deck cadet and the safety officer, on two separate occasions, to request Coast Guard assistance

with lifeboat no. 3. After all attempts to release the hooks failed, the commander reported that the boat was getting damaged from the waves pushing it against the ship's side.

Although the starboard side MES had been deployed, no passengers had yet descended to the platform and embarked the liferafts. The master ordered the staff captain, who was near the starboard side MES landing (the location where people would get on the slide), to place a crew member at the platform at the bottom to pull in liferafts. This was necessary before any passengers started down the slide.

All the liferafts were interconnected by a rope that was designed to allow personnel at the MES platform to pull in the uninflated liferaft containers. The rafts could then be inflated at the platform and secured alongside, allowing two rafts to be embarked simultaneously. The system was only designed for two rafts to be inflated and embarked at a time. Since the rafts were inflated before getting to the platform, it was difficult for the crew to pull them in by hand. Thus, the master requested at multiple times that the Coast Guard position the rafts at the platform using their boats. The deck cadet also requested via radio that all vessels near the *Caribbean Fantasy* pick up any liferafts and bring them to the platform for embarkation of passengers.

According to Coast Guard records, the first report of people going down the starboard side slide was at 0853.

At 0906, the master observed from the starboard bridge wing that there were still not enough rafts at the starboard side MES platform. He ordered the staff captain to hold off on sending any passengers down because it was "dangerous" and to only send the crew down to pull the liferafts to the platform.

At 0912, the master contacted the Coast Guard by radio and identified himself as the master. He was answered by the *Joseph Tezanos*. He told the cutter that he had two problems for which he needed assistance. The first problem was lifeboat no. 3, which was still at the water and unable to release the hooks. The second problem was the starboard MES. He said the liferafts at the MES were not aligned with their main entrances toward the platform, which hampered the expeditious boarding of the passengers. He requested that the liferafts be "turned to the good

side" and noted that the wind conditions were preventing his crew at the platform from doing that.[27]

The accent of the master and use of technical language was not initially understood by the cutter crew, but they responded that they were going to send a small boat to assist with lifeboat no. 3 and that they were going to help turn the raft to allow people to board faster.

**Figure 12. Picture of a liferaft at the starboard side MES platform with the main access opening facing away from the platform.**

At the same time that the master was on the radio with the Coast Guard, the safety officer also radioed the Coast Guard and requested assistance with lifeboat no. 2, which was taking on water. The call went unanswered.

At 0914, the master ordered the staff captain to send the maximum amount of people to the liferafts via the MES. He then radioed the Coast Guard and requested emergency assistance to lifeboat no. 3, stating that there are "close to 100 pax" (passengers) inside the boat and that the release hooks could not be let go. As a result, the boat was hitting the ship's side and taking on water. The *Joseph Tezanos* responded that they were sending a 33-foot small boat.

[27] The *Caribbean Fantasy* was fitted with 50DKS throw overboard (self-righting) liferafts that were manufactured by VIKING Life-Saving Equipment A/S. Each raft had capacity for 51 people. They measured about 24 feet in length and 13.4 feet wide and had their main access openings along the length of the raft. Refer to figure 8 for alignment diagram alongside the platform.

About 0916, according to video taken from the Coast Guard cutter, lifeboat no. 3 was hoisted back out of the water. During the hoist, the winch tripped off line, leaving the boat suspended about six feet above the water.[28] With the boat at that height at the ship's side, none of the Coast Guard small boats were able to be effectively positioned to remove people from the lifeboat. The master, who was monitoring this situation from the starboard side bridge wing, requested assistance from the nearby ATON boat CG 55115, which had a higher freeboard. The commanding officer of the *Joseph Tezanos* responded by directing the CG 55115 to assist those trapped in lifeboat no. 3. From video and photos taken by the Coast Guard, the CG 55115 began extracting people from the lifeboat about 1000. The height of the lifeboat, the motion of the ATON vessel, and the effect of wind required each person be helped off individually from the aft door of the lifeboat while the Coast Guard coxswain maneuvered to carefully maintain position. It took about an hour and a half to transfer all passengers and crew from lifeboat no. 3 to the ATON boat and onward to nearby vessels.


**Figure 13. *Caribbean Fantasy* during the final stage of evacuation, with its starboard anchor down. Note ATON boat next to lifeboat no. 3 on the ship's side and Coast Guard**

[28] The prime mover was powered to lift the lifeboat with a crew of six only, not a fully-loaded lifeboat. Source: *Schat-Harding, Installation, Operation and Maintenance Manual, VIP Davits/W-winches*, ed. 971117, page 6.

**small boat operating in astern propulsion with a line pulling on the MES platform. The Coast Guard MH-65 hovering over the ship is engaged in passenger hoist operations. (Photo by Coast Guard)**

Evacuation of the remaining passengers by MES continued as vessels in the area brought liferafts to the platform. There was confusion in the radio communication between the deck cadet, whose first language was French, and the Coast Guard when the cadet requested multiple times "to close the liferafts to our platform." Although the cadet meant to have the inflated and empty liferafts near the ship brought to the platform, the commanding officer of the *Joseph Tezanos* did not understand. Although the *Joseph Tezanos* asked the cadet to clarify what he meant, the cadet repeated "need a boat to close all the liferafts" and bring all the rafts that were full of people clear away from the ship. At 0919, the one long signal sounded on the ships alarm system.

At 0922 the master reported to the Coast Guard that one of the liferafts that was filled with people was let go from the platform and was drifting away from the ship toward the shore line. The *Joseph Tezanos* responded by sending a pilot boat to recover the raft. Following that, the master told the staff captain, still at the starboard side MES station, to not release any liferafts from the platform unless there was a boat to take them away.

From then on, as each liferaft was filled at the platform one at a time. When a liferaft was full, it was towed away from the ship by a Coast Guard small boat. When one of the rafts was being pulled away, the master had to issue instructions to the crew of a Coast Guard small boat to cut the retrieving rope. (This should have been the task of the crew assigned to the liferaft or on the platform, but there was no crew to do this). Once a raft was clear of the platform, the passengers and crew were transferred to another vessel as assigned by the OSC. The passengers and crew were then taken by boat to the Port of San Juan. At San Juan's pier 6, the receiving area designated by the Coast Guard mass rescue operation (MRO) plan, the passengers were accounted for, triaged, and processed by CBP.


**Figure 14. Passengers and crew from *Caribbean Fantasy* lifeboat no. 2 being received by Coast Guard personnel, CBP personnel, and other first responders at Pier 6, Port of San Juan. (Photo by Coast Guard)**

At 0948, the *Joseph Tezanos* asked how many persons remained on board. The master replied that he did not have a complete count but approximated that there were 70 people remaining, including crewmembers. He requested assistance in getting the two nearby liferafts to the platform and stated that, once delivered, he could have everybody off in five minutes. He also requested to have a small boat pull the MES platform forward (toward the *Caribbean Fantasy* bow) to make a better angle for the slide, noting that there were injuries because of the existing angle. The cutter replied that vessels were hooking up tow lines for the rafts and would bring the rafts to the platform.

The *Caribbean Fantasy* was still adrift, setting in a southwesterly direction at about 1 knot, with the wind blowing on to the starboard side from the east. At 0954, recognizing that the vessel was drifting toward shoal water, the tugboat *Diane Moran* made up to a mooring line from the ship in an attempt to hold the vessel. However, the captain of the *Diane Moran* voiced concern over the radio about towing the ship ahead and the effect it would have on the angle of the MES slide and platform: if he pulled the ship ahead, the MES platforms would move aft. He recommended to the *Joseph Tezanos* that the *Caribbean Fantasy* drop anchor. The cutter relayed this recommendation to the master.

At about 1009, a Coast Guard small boat attached a line from its bow to the starboard side MES platform. Operating in astern propulsion, the small boat pulled the platform in a forward direction (in the direction of the bow of the *Caribbean Fantasy*) to achieve a better angle

on the slide. About 2 minutes later, upon seeing an improvement in the angle of the slide, the master ordered the staff captain to send the remaining passengers and crew down.

**Figure 15. Bow of Coast Guard small boat as it began to pull the starboard side MES platform forward with another holding a liferaft to the platform. (Photo by Coast Guard)**

1015, the master ordered the starboard anchor to be let go to six shackles in the water.[29] At that time, the one long signal again sounded for about 42 seconds. The ship continued to drift, however, and its stern grounded on a sandy bottom at 1021.

About the same time the anchor was dropped, a Coast Guard MH-65 helicopter, which had been orbiting the ship on guard for persons in the water, was directed by Sector San Juan to evacuate as many people as possible from the ship via hoist operations. The helicopter came into a hover over the designated hoist area and lowered a rescue swimmer to the deck. The rescue swimmer then directed the recovery of predominantly elderly and disabled passengers to the helicopter via basket hoist. When the helicopter was at full capacity with four passengers, it

[29] One *shackle* is 90-feet (27.4 meters).

departed with the rescue swimmer to take the passengers to Isla Grande airport, about 4 miles away. Another Coast Guard helicopter then arrived to continue hoist operations. A total of eight persons and one dog were recovered by Coast Guard helicopters.

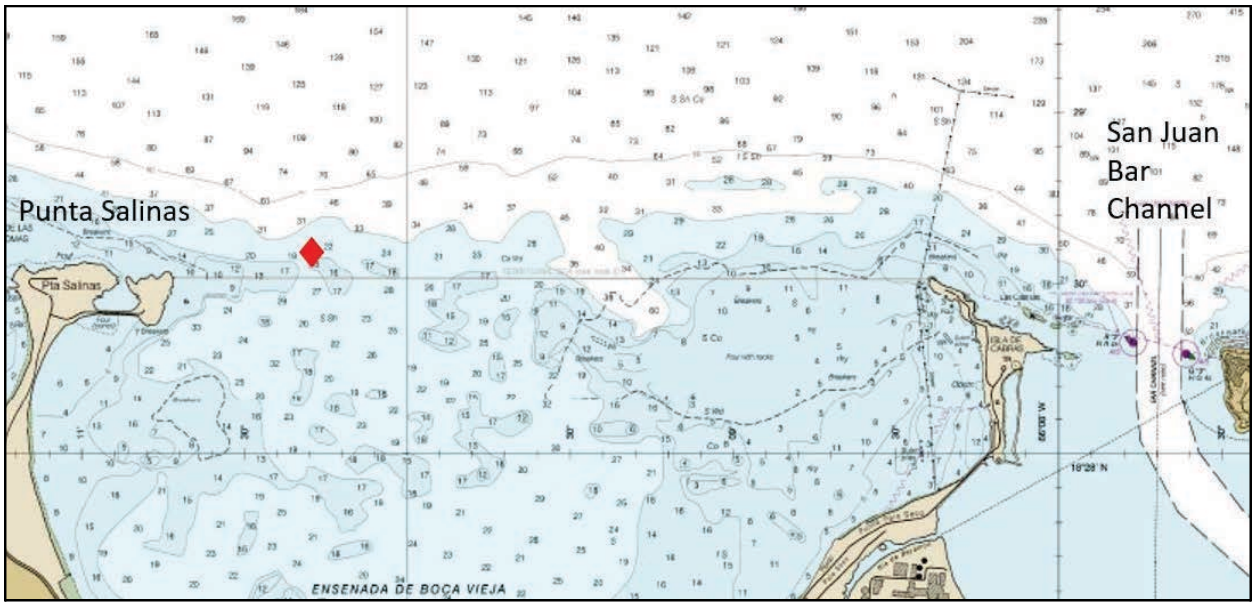



**Figure 16. Section of NOAA chart 25668 showing the grounding position of the *Caribbean Fantasy*, as indicated by a red diamond, about a half mile from the eastern most part of Punta Salinas.**

At 1023, the master made three attempts to hail the "Coast Guard commander" on VHF channel 16. After each call, the Coast Guard cutter responded, "cutter *Joseph Tezanos*" and each time stated, "request to know your POB [persons on board]." After the third response from the cutter, the master then asked, "are you the Coast Guard commander?" The response he received was "Yes, we are the Coast Guard cutter located off the starboard side of your ship." This was the master's first-time learning that the *Joseph Tezanos* was the OSC. (When the master was later asked by investigators if he knew that the *Joseph Tezanos* was the OSC, he stated he recalled hearing the *Joseph Tezanos* over the radio but thought it was someone's name being mentioned in the communications.) The master then requested the OSC send a small boat to help with the rafts at the MES platform and informed the Coast Guard that the ship was grounded. The cutter crew informed the master that they could still see people going down the slide and that tugboats could not pull the ship due to the risk of displacing the slide.

Around the same time one of the local pilot boats attempted to hail the *Joseph Tezanos*, referring to the cutter as the "*Cubanos*," to inform the OSC that the pilot boat was too large to pick up passengers from the small boat. The pilot boat would have to pick up passengers from the cutter directly. The *Caribbean Fantasy* master then requested the *Joseph Tezanos*'s help in contacting a police boat nearby to pull a raft to the platform, to which the *Joseph Tezanos* replied that they had "no comms with the police boat."

The *Caribbean Fantasy* had seven dogs on board. The dogs had been kept in kennels in an air-conditioned room in between the ship's stacks on deck 7 aft. However, in preparation for the intended arrival in port, two of the dogs in small kennels were moved down to deck 3 (garage B). When interviewed, the ships hotel director told investigators the dogs were moved there upon request of the owners. When the evacuation order was given, the two dogs, still locked in their kennels, were left behind as passengers and crew went to their emergency stations. These dogs died from apparent smoke inhalation and were recovered on board by firefighters on August 20.

The remaining dogs were moved by crew members and brought to deck seven forward to a safe area that was clear of smoke. Following the recovery of the passengers, the five dogs were rescued by the Coast Guard and FURA helicopters and were later reunited with their owners.

The fire continued to burn on the *Caribbean Fantasy* throughout the evacuation of the ship. The intense heat generated by the fire caused paint on both sides of the ship to blister and eventually burn off. On the starboard side of the ship, above the waterline and forward of the MES, large pieces of paint burned and fell from the ship and into the water. The engine casings extending from the engine room to the stacks were also subject to this intense heat from the fire and paint began to burn, blister and fall away. Although close to the MES, none of the pieces of paint that fell came into contact with the slide, platform, or any of the liferafts.

**Figure 17. On the left, at 0853, paint is starting to blister at the water line. On the right, at 1049, large pieces of paint are missing from the ships side extending to the stack and at the water line just forward of the MES slide and platform. (Photos by Coast Guard)**

About 1030, the master informed the *Joseph Tezanos* that the last of the passengers had been evacuated from the ship. He then coordinated with the safety officer and staff captain to release the crew from their stations. This included the crewmembers manning the starboard side MES. Video from the cutter showed the last person coming down the slide at 1104. The remaining persons arriving at the MES platform were recovered directly by Coast Guard, CBP, and good Samaritan vessels and brought to pier 6. Removal of persons from lifeboat no. 3 continued, and, at 1119, the master informed the *Joseph Tezanos* that there were 6 persons remaining on board. All persons from lifeboat no. 3 were transferred to the ATON boat by about 1130.

The master released the cadet from the bridge once he was sure that there were no passengers remaining on board. Although there was no full accounting of passengers and crew, the master stated that he was confident that there was no one remaining on board since the crew had conducted several sweeps of the ship and evacuation control leaders confirmed there was no one remaining. He told investigators that, at the time of the accident, most of the passengers were up and getting ready to debark the vessel. Thus, many of the passengers had their personal belongings with them as they waited in public spaces ready to debark the ship.

Once the starboard MES was no longer manned, the platform and slide drifted away from the ship, which allowed a tugboat and firefighting vessel to spray the ship's side to cool the burning areas.

With all passengers, crew, and surviving dogs evacuated, five crewmembers remained on board the *Caribbean Fantasy*: the master, the staff captain, the safety officer, the chief engineer, and the chief electrician. The *Joseph Tezanos* requested that all remaining persons leave the ship, but the master responded that the shore-based firefighters were still on board and they had requested that the chief engineer and chief electrician remain behind to help with firefighting efforts. He stated it was his wish to remain on board with the shore-based firefighters and his crew accompanying them. He was told by the *Joseph Tezanos* that everybody needed to be off the ship and the cutter did not have any means to get in contact with the shore-based firefighters. At 1150, the master replied that he would try to reach the firefighters, but they were down in the engine room.

The master was able to contact the chief engineer and firefighters, and he ordered them to the helicopter deck. The master also proceeded to the helicopter deck. Once there, he reported to the *Joseph Tezanos* that he had all remaining crew and that they were ready for evacuation. At about 1224, a FURA helicopter landed on deck and picked up the remaining five crew, leaving the shore-based firefighters behind. The master stated that he did not want to leave the ship considering there were about 10 firefighters still on board, but said that he understood from the cutter that he had to disembark. Recorded radio communications between the *Joseph Tezanos* and the master captured the master requesting clarification of whether he had to leave the ship, considering that fire teams were still on board and the possibility of removing the ship from its grounded position by tugboats. Upon hearing the dialogue between the master and the *Joseph Tezanos*, Sector San Juan informed the cutter, via their secure Coast Guard frequency, that they could not order the master to abandon the vessel. They could only recommend that he do so. This information, however, was not communicated back to the master.

After transporting the crew to the airport, the FURA helicopter returned to the *Caribbean Fantasy* to pick up the shore-based firefighters, making two separate trips. All persons were off the ship just before 1300.

# 8 Weather

The accident occurred during daylight hours in good visibility. At 0730, about the time the fire broke out in the engine room, a weather buoy located about 1.7 miles east of the San Juan harbor entrance recorded the winds from 083 degrees true at 13 knots, with gusts to 17 knots, and an air temperature of 83.7 degrees F.[30] At 0800, the wave height was recorded at 4 feet with a period of 6.1 seconds and a mean wave direction from 054 degrees true. Conditions as recorded at the buoy remained consistent throughout the duration of the evacuation.

At 1300, the *Joseph Tezanos* weather log reported winds from 073 degrees true at 17 knots, a water temperature of 85 degrees F, an air temperature of 87 degrees F, waves from 070 degrees true at 2 feet and a sea swell from 050 degrees at 2 feet. There was a note in the weather log that no weather observations were taken from 0900 to 1200 due to the *Caribbean Fantasy* response and that the 1300 weather was consistent with the previous four hours of weather.

[30] Ocean weather data buoy number 41053, owned and maintained by Caribbean Integrated Coastal Observing System (CarlCOOS).