

Sinking of US Cargo Vessel SS *El Faro*

Near Acklins and Crooked Island
Bahamas
October 1, 2015

This two-dimensional animation reconstructs the sequence of events leading to the sinking of the US-flagged cargo vessel SS *El Faro* in the Atlantic Ocean near Acklins and Crooked Island, Bahamas, which occurred on the morning of October 1, 2015.

The animation displays the position of *El Faro* as a yellow circle, and a solid white line indicates the track path of the vessel. During the animation, the planned course and proposed course changes for *El Faro* are shown as dotted white lines.

The Voyage Data Recorder (VDR) was recovered on August 8, 2016. The VDR retained the last 26 hours of conversation on the bridge and vessel operating data. Data from the VDR were used to determine the position and heading of the accident vessel. The bridge audio from the VDR was also used in reconstructing the sequence of events in the accident. The animation does not depict visibility conditions at the time of the accident. The animation includes audio narration, and the script of the narration is appended to this description/disclaimer.

The animation begins with an overall map of the area between Jacksonville, Florida and San Juan, Puerto Rico. An inset photograph of the fully loaded *El Faro* is shown in the upper right side of the screen, and the typical course from Jacksonville to San Juan traveling to the east of the Bahama Islands is depicted. An inset photograph shows the VDR in its position on *El Faro* before the voyage; the inset transitions to a photograph of the VDR in its location on the bottom of the ocean before it was recovered. An arrow indicating north, and a scale are shown in the lower left side of the screen.

The departure of the *El Faro* on September 29, 2015 at 9:48 pm Eastern Daylight Time (EDT) is indicated, along with the position and development of Hurricane Joaquin from a tropical depression through a tropical storm to a hurricane. A series of predicted storm tracks are animated, indicating that the storm was consistently predicted to move

southwest, then turn north. The National Hurricane Center's Best Track (the actual track calculated after the accident) is also shown.

The date and time in EDT of selected events are displayed on the lower left side of the screen, as they are depicted or when mentioned in the narration. The sequence of events starts at 5:36 am EDT on September 30 with the earliest information available from the VDR. The position of *El Faro* is shown along with the predicted storm tracks from Bon Voyage System (BVS) and from the National Hurricane Center Sat-C, plus the National Hurricane Center Best Track. The hurricane position is interpolated on the BVS or Sat-C tracks to indicate where the hurricane would have been expected to be at any time. The BVS information is shown in blue, the Sat-C information is shown in red and the National Hurricane Center Best Track is shown in black. Beginning at 2:30 pm EDT on September 30, the animation changes to a closer view including the islands in the Bahamas, with the islands of San Salvador, Rum Cay and Samana Cay identified with text labels. The Old Bahama Channel north of Cuba is also labeled with text.

Beginning at 12:00 am EDT on October 1, the animation changes to a closer view centered on San Salvador, Rum Cay and Samana Cay, which are identified with text labels. The Old Bahama Channel north of Cuba is again labeled with text. An inset photograph looking at the aft and starboard side of *El Faro* is shown, superimposed with twelve white ovals to indicate the openings in the hull that would have allowed water to enter the second deck of the vessel.

Beginning at 5:43 am EDT on October 1, the animation changes to closer view showing the position, heading and track path of *El Faro*, along with Samana Cay identified with a text label. The vessel is shown 30 times actual size. Selected summarized or paraphrased comments from the bridge audio from the VDR are displayed as text along with the time in EDT at the time they occurred. The center of the hurricane along the National Hurricane Center Best Track is shown, along with the wind circulation directions. An inset photograph illustrates a scuttle from *El Faro*. An inset graphic indicates the listing of the ship to starboard or to port, as reported in the narration.

The animation is followed by an underwater photo of the stern of *El Faro* resting on the seafloor.

Animation Narration

1. The 40-year old, US-flagged, steam-powered cargo ship *El Faro* was owned by TOTE Maritime Puerto Rico and operated by Tote Services Incorporated.
2. The vessel was engaged in weekly service between Jacksonville, Florida and San Juan, Puerto Rico, and typically followed a course travelling to the east of the Bahama Islands.
3. The vessel sank on October 1st, 2015 in Hurricane Joaquin, a Category 3 hurricane.
4. At 9:48 Eastern Daylight Time, on the evening of September 29th, *El Faro* departed Jacksonville loaded with containers and vehicles. The ship was bound for San Juan, with a crew of 33.
5. Two days before *El Faro* left on the accident voyage, the storm that became Hurricane Joaquin was a tropical depression about 360 nautical miles northeast of San Salvador Island, Bahamas.
6. The system was upgraded to Tropical Storm Joaquin at 10:36 the evening of September 28th.
7. Hurricane Joaquin was consistently predicted to move southwest, then turn north. But the storm continued to move in a more southerly direction. Its intensity grew to a higher level, and faster than predicted.
8. On August 8, 2016, about 10 months after the vessel sank, *El Faro's* voyage data recorder (or VDR) was recovered. It lay under more than 15,000 feet of water.
9. The VDR recorded the last 26 hours of conversation on the bridge as well as vessel operating data.
10. The VDR recording began at 5:36 the morning of September 30th. The vessel was traveling at about 20 knots.
11. Just after 6 AM on September 30th, a Bon Voyage System (or BVS) weather package was downloaded on a computer in the captain's office. The BVS weather package had been sent about one hour earlier.
12. BVS is a desktop application provided by a private company, Applied Weather Technology. The BVS package showed the predicted storm track, weather, and sea state information in graphic form.
13. BVS tropical cyclone position and intensity information sent to *El Faro* during the accident voyage was typically 6 hours behind the current National Hurricane Center information.
14. According to the BVS package sent at 5 AM, storm winds were 55 knots sustained.

15. Aboard *El Faro*, BVS weather packages were sent only to the captain's email address, but he could forward them to a computer on the bridge where the information would have been available to other crew members.
16. After reviewing the 5 AM BVS weather information with the chief mate, the captain ordered a course change of 10 degrees to the south to put distance between the ship and the approaching storm.
17. About 15 minutes later, *El Faro* received a National Hurricane Center storm advisory on the Sat-C printer on the bridge. This unscheduled advisory contained a minor correction to the normally scheduled advisory that had been sent about 2 hours before.
18. Sat-C is an automated satellite system that transmits weather advisories to vessels of all types. Sat-C data is only provided in a text format. This report indicated similar intensities to the 5 AM BVS package. Sustained winds were 60 knots, gusting to 75 knots.
19. Throughout this presentation, the position of the storm will be interpolated along each predicted BVS or Sat-C track in order to show where the storm would have been expected to be at any specific time.
20. The position of the storm along the National Hurricane Center's Best Track, or "actual track" will be shown in black. This storm track was calculated after the accident.
21. The National Hurricane Center identified the storm as a hurricane at 7:39 AM on September 30th. It was then centered about 135 nautical miles east-northeast of San Salvador Island.
22. During the noon-to-four watch on September 30th, the VDR recorded Coast Guard aircraft broadcasting two warnings to mariners about the hurricane.
23. Later that afternoon, after hearing several discussions about the weather, the helmsman asked the captain if he was going to turn around. The captain said no.
24. Just before 5 PM, the ship received a Sat-C weather report that sustained winds had increased to 75 knots, gusting to 90 knots.
25. The BVS weather package sent to the captain's email address at 5 pm, and downloaded about an hour later showed slightly less intense conditions.
26. About 7 PM, the captain ordered a course change of 10 degrees farther to the south to put more distance between the ship and the storm. The vessel's track would shift to pass between San Salvador Island and Rum Key, and then turn to pass to the north of Samana Key.
27. After 7:57 PM on September 30, the captain left the bridge and was not heard again on the VDR recording until 4:09 the next morning.

- 28.** Just before 11 PM, the bridge received a Sat-C advisory that the storm's sustained winds were 100 knots, gusting to 120 knots. Joaquin was now a Category 3 hurricane.
- 29.** At 11:00 PM, a BVS weather package was sent to the captain's computer. It was not downloaded until 4:45 the next morning.
- 30.** After reviewing the updated Sat-C weather report at 11 PM, the third mate called the captain. He told the captain that on its current track, the vessel would meet the storm at four o'clock the next morning. The VDR only recorded audio from the bridge, and did not capture the captain's side of the conversation.
- 31.** About 10 minutes later, the third mate called the captain back and said they would be 22 miles from the center of the storm at 4 AM, and suggested altering their course to head south at 2 AM. However, this suggested course change was not implemented.
- 32.** At the midnight watch turnover, the third mate told the second mate that they were receiving different information from different weather sources.
- 33.** The second mate reviewed the weather forecast and began looking at the charts for a course to avoid the storm.
- 34.** At 1:20 AM on October 1st, after hearing a satellite radio report that the storm was strengthening, the second mate called the captain and suggested a course change at 2 AM toward Old Bahama Channel, which runs north of Cuba.
- 35.** The captain did not agree with the second mate's suggestion. The second mate said the captain's orders were to run with the original course.
- 36.** This course put them directly into the forecasted path of the hurricane.
- 37.** Throughout the second mate's midnight to four watch, the weather deteriorated rapidly. The ship began listing to starboard because of the strong winds on the port side, and the vessel was losing speed as it approached the outer bands of the storm.
- 38.** Due to the starboard list and worsening conditions, seawater entered into the partially-enclosed second deck of the cargo area through cargo loading and other openings in the hull. Toward the end of the watch, the vessel was unable to maintain its heading using the autopilot system because of the wind and the high seas.
- 39.** At 4:09 AM, the captain returned to the bridge. He and the crew talked about the weather and the loss of ship's speed.
- 40.** Despite the worsening weather, the captain said several times that they would be ahead of the storm. He thought they were on the better side of it, meaning the less-dangerous quadrant.

41. The captain was most likely relying on the BVS graphical weather package sent at 5 PM the evening before. He had not downloaded the most recent BVS package.
42. Statements on the bridge indicated that the ship was listing to the starboard side, due in part to strengthening winds on the port side.
43. About 4:40 AM, the chief engineer called the bridge and said the starboard list was affecting the oil levels in the sumps of engine room machinery.
44. At 4:45 AM, the captain downloaded the BVS weather package that had been sent about 11 o'clock the night before. By the time the captain downloaded it, the storm's position and intensity data in the BVS package were 12 hours behind the National Hurricane Center's current information.
45. About the same time, a National Hurricane Center advisory arrived on the bridge via Sat-C. The hurricane was centered about 17 nautical miles north of Samana Key. Maximum sustained winds were 105 knots, gusting to 130 knots.
46. The chief mate mentioned a list of possibly eighteen degrees while the captain discussed how oil levels in the engine room were affected by the list with the engineer who was aboard to supervise the riding gang.
47. At 5:43, the bridge received a phone call that there was water in the number three cargo hold. The crew thought the water was possibly coming from a small open hatch, called a scuttle, on the second deck.
48. A minute later, the captain said cars were loose. He was likely referring to cars in the lower level of the number three cargo hold.
49. The captain verified that bilge pumps were running to remove the water in three hold, and he directed the engineers to pump ballast water from a starboard to a port tank to correct the list.
50. The captain and chief engineer spoke on the phone about the water level rising in the cargo hold and the effects of the list.
51. After speaking to the chief engineer, the captain ordered the ship to be turned to port, to put the wind on the starboard side of the vessel to create a port list.
52. As the ship was turning to port, the chief mate reported that the hold was flooded on the starboard side.
53. Within 2 minutes, the ship's significant starboard list shifted to a significant port list.
54. After the ship was listing to the port side, the captain ordered the engineers to stop transferring ballast.

55. The chief mate accessed the scuttle, reporting that the water had been knee-deep and pouring over the scuttle, and then closed it.
56. After the turn to port, the crew on the bridge noticed that the ship was losing speed.
57. Shortly after 6 AM, *El Faro* lost propulsion and the vessel could no longer maneuver.
58. At 7:06 AM, the captain spoke with Tote's designated person to advise him of the situation. He reported that there was a considerable amount of water in three hold, they had lost propulsion due to a loss of lube oil pressure, the list was about 15 degrees and the weather was ferocious. Afterwards, the captain told the second mate to send a distress message.
59. At 7:15 AM, the chief mate reported that the chief engineer said a fire main was ruptured, likely meaning that there was a damaged seawater pipe in three hold, allowing seawater to rush into the cargo hold.
60. The chief mate reported that cars were floating in the number three cargo hold, and a bilge alarm alerted the crew that water began entering another cargo hold.
61. Although the crew had closed the scuttle and were pumping out the space, water was still entering the cargo hold faster than the bilge pumps could remove it.
62. At 7:27 AM, the captain ordered the emergency signal to be sounded over the general alarm system, and two minutes later, the captain ordered the abandon ship signal to be sounded.
63. The VDR recording ended at 7:39 AM while the captain tried to help the helmsman escape the ship's bridge.

****Please contact Record Management Division to get a copy of the animation.**