National Transportation Safety Board

Marine Accident Brief

Allision of Bulk Carrier *Anna Smile* with Louis Dreyfus Grain Elevator

Accident no.	DCA14LM013
Vessel name	*Anna Smile*
Accident type	Allision
Location	Louis Dreyfus Grain Elevator dock, Woodhouse Terminal, Houston, Texas 29˚43.16′ N, 95˚14.22′ W
Date, time	July 14, 2014 0504 central daylight time (coordinated universal time – 5 hours)
Injuries	None
Damage	Grain elevator: approx. $2.5 million *Anna Smile*: estimate not provided
Environmental damage	None
Weather	Light winds 4 knots, visibility 10 miles, air temperature 79°F
Waterway information	Houston Ship Channel

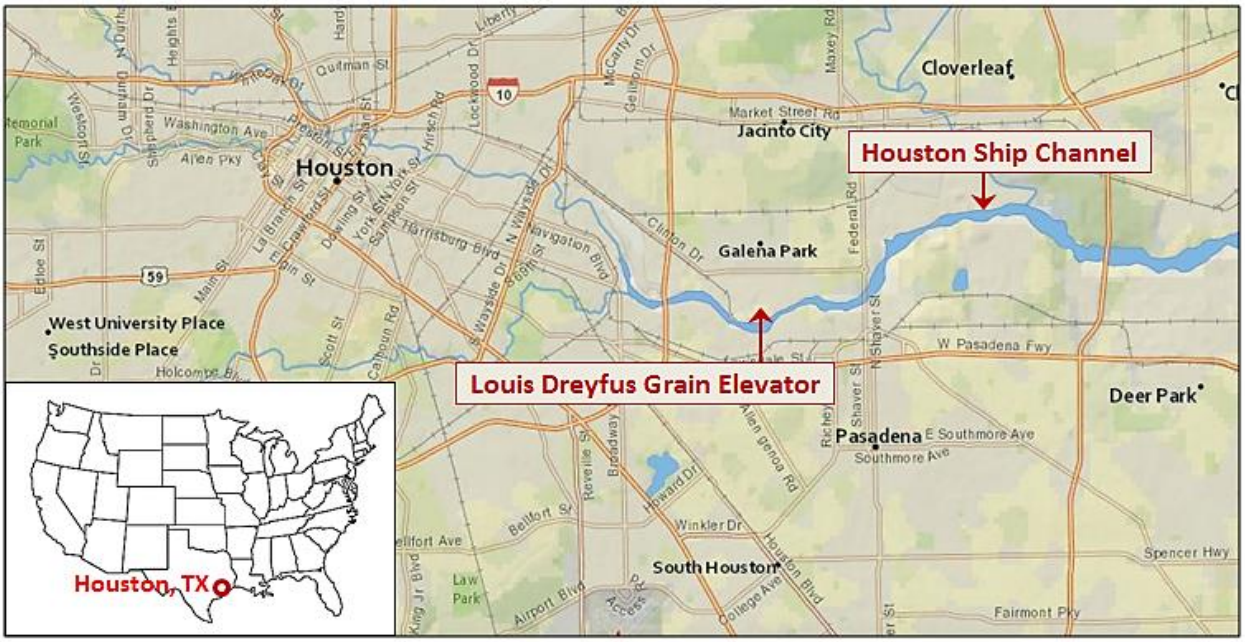
The 738-foot-long bulk carrier *Anna Smile* allided with the Louis Dreyfus Grain Elevator in Houston, Texas, at 0504 local time on July 14, 2014, while maneuvering during docking operations. Damage to the grain elevator and its foundation was estimated at $2.5 million. The *Anna Smile* suffered minor insets on the hull plating on its starboard quarter for a length of about 30 feet. No injuries or pollution were reported.

After the accident, the bulk carrier *Anna Smile* was berthed in the Houston Ship Channel upriver from the site of the allision.

After discharging a load of coal in Gdynia, Poland, at the end of May 2014, the *Anna Smile* crossed the Atlantic Ocean with empty cargo holds and arrived in Houston on June 30. The vessel made several transits in the Houston Ship Channel in the first 2 weeks of July for cargo tank cleaning operations and inspections and then was scheduled to load 57,000 metric tons of grain on July 14 at the Louis Dreyfus Grain Elevator at Woodhouse Terminal #4, about 55 miles from the sea buoy outside Galveston Bay.

Accident Events

On the evening before the accident, the crew successfully completed the vessel's pre-departure checklist, including testing the steering system, navigation equipment, and the ahead/astern functions of the main engine. Two Houston pilots boarded the *Anna Smile* via pilot boat outside the anchorage at 2335. One was a senior branch pilot with 21 years of experience who was supervising the training of a junior pilot, who had about 2 years of experience. The master/pilot exchange, a meeting between the ship's captain and the pilots to share relevant voyage information, took place in the wheelhouse after the pilots arrived on board.



Location of accident at Louis Dreyfus Grain Elevator on the Houston Ship Channel near Galena Park, Texas. (Background by National Geographic MapMaker Interactive)

The *Anna Smile* was propelled by a slow speed diesel engine directly coupled to a fixed pitch propeller. During normal operations, the engine could be remotely controlled from two locations—the bridge or the engine control room (ECR). In the event of a failure of the remote systems, the engine could be controlled manually at the emergency local control station beside the engine in the machinery space.

Typically, the engine on board the *Anna Smile* was remotely operated from the bridge, but on the day of the accident, it was being controlled from the manned ECR. Before arriving in Houston, the captain received an e-mail from the local agent, which he interpreted as a directive to maneuver the ship with the ECR in control while transiting the Houston Ship Channel. The e-mail stated:

> According to pilots, vessels equipped with computerized engines, or operating on economical speed, will be required to operate the engines manually with personnel on watch prepared to answer engine maneuvering commands immediately. The engine room watch must have the ability to provide maximum power ahead or astern when so instructed in order to take recommended action in case of emergencies.

Most of the transit through the Houston Ship Channel was uneventful, with no engine problems reported by the ship's crew or pilots. The captain, second mate, and a helmsman were on the bridge with the two pilots, and the ECR was manned by the chief, second, and third engineers and the electrician. Throughout the transit, the pilot's orders for engine commands were issued verbally to the second mate on the bridge, who would repeat the order and then transmit it to the ECR using the engine order telegraph. Once the command was received in the ECR, the engine speed and/or direction was adjusted by the chief engineer using the engine control lever at the ECR console.

About half a mile from the grain elevator dock, two tugboats arrived to assist the vessel to its berth. The *Hayden II* was secured with two lines to the *Anna Smile*'s port bow in the area of cargo hold #1, and the *Captain W.D. Hayden* was secured with two lines at the stern on the port side just forward of the superstructure.

Site of the Louis Dreyfus Grain Elevator, circled in red. Vessel pictured is not the *Anna Smile*. (Background by Google Earth)

As the ship approached the pier, the pilot ordered the engine to stop, and this command was properly executed from the ECR control station, reducing the propeller rpm to zero. The

next order was dead slow astern, but when the chief engineer moved the engine control lever, the engine failed to remotely start as expected. Two more astern commands were given from the bridge—slow astern and half-astern—both with no response from the engine, despite the chief engineer's command inputs to the engine control system. The chief engineer did not advise the captain that he was having difficulty starting the engine.

Anna Smile ECR engine order telegraph and main engine control lever.

About a minute and a half after the dead slow astern command was given, the bridge team noticed the lack of engine response on the rpm indicator, and the captain called the chief engineer in the ECR to ask what was wrong with the engine. The chief engineer told the captain that the engine would not start and he was planning to switch the engine to the emergency local control station to operate the engine manually. This would require the chief engineer to leave the ECR and go two decks below into the machinery space to switch the control mode of the engine from remote to local. The pilot asked the captain about the status of the engine, but the captain did not respond.

Before leaving the ECR to change control stations, however, the chief engineer tried once again to start the engine at the console, and this time it started properly in the astern direction about 3 minutes after the first astern command was received. He remained in the ECR, and with the starting system apparently functioning again, did not switch the engine control to local as discussed with the captain. He did not call the bridge to advise the captain that he was staying in the ECR, but remained at this control location responding to several astern commands. Once the vessel's speed was reduced, the pilot ordered the engine to stop, which the chief engineer properly executed from the ECR.

***Anna Smile* bridge engine control.**

At this time, the *Anna Smile* was parallel to the pier, about 30 feet away, and moving very slowly at about 0.1 knots astern. Both tugboats were set up perpendicular to the *Anna Smile* on the ship's port side. Two mooring lines were lowered from the starboard side of the *Anna Smile*; two line-handling boats retrieved these lines, transferred the ends to the pier, and secured the lines to bollards.

To bring the ship's astern movement to a stop, the pilot ordered dead slow ahead, and once again the engine failed to start remotely from the ECR console. The chief engineer tried three times to start the engine without success. The pilot ordered more ahead commands, each with no response. Without calling the bridge, the chief engineer, third engineer, and electrician left the ECR, went into the machinery space, and began switching the engine to local control. The second engineer remained in the ECR.

During this time, the engine crew did not advise the bridge team, nor were the pilots made aware about the engine status or control location. After noticing that the engine was not responding to their commands, the pilots ordered the engine to stop. They decided that the tugboats and mooring lines would be able to bring the ship alongside since the vessel was nearly stopped. The pilots began directing the tugboats via radio to push the ship alongside the pier.

It took the chief engineer about 4 minutes to change the main engine to local control. During this time, the second mate noticed that the engine was not responding to the commands and advised the captain. The mate called the ECR to check the status of the engine. The bridge team was unaware that the chief engineer had left the ECR and that the engine was no longer being controlled from this location. The bridge team was not advised to call the phone at the local engine control to reach the chief engineer directly.

The lack of communication between the engine room and bridge crew led to a period of confusion on the bridge. The captain began speaking in his native Greek language, and the Filipino second mate and helmsman spoke to each other in their native language. The captain began repeatedly shouting "Stop the engine!" into the phone, and the engine order telegraph rang

unanswered for 47 seconds. The pilot told the tugboat captains via VHF radio that the ship was experiencing engine problems.

After completing the steps to engage the local control station, the chief engineer started the engine at the dead slow ahead speed of 40 rpm despite the current stop command. Dead slow ahead was the last command that he was aware of before leaving the ECR, but the command had changed from ahead to stop while he was changing the engine control mode. The engine continued to run in the ahead direction for about 1 minute until the chief engineer was told to stop the engine by the second engineer who ran down from the ECR and relayed the stop command he had received from the bridge via the ECR phone. When the chief engineer was asked why he did not use the local phone located directly behind him, he stated that the bridge called the ECR and it was too loud in the machinery space to hear the local phone behind the emergency control station.

Local control station at the side of the main engine.

When the *Anna Smile* unexpectedly began moving forward, the pilots immediately ordered the two tugboats to change their heading from athwartships to "looking aft" and push full ahead with right rudders in an attempt to stop the forward movement of the *Anna Smile*. The pilots' main concern was preventing a collision with a barge moored ahead of the *Anna Smile*. The pilots decided not to drop the anchor to avoid hitting line boats that may have been under the bow.

The combination of the vessel's unintended forward motion and the tugboats' thrust predominantly in the aft direction caused the starboard quarter of the *Anna Smile* to make contact with the pier, compressing a rubber bumper and striking a concrete pedestal as well as the steel frame of the grain elevator. The vessel's forward motion was arrested by the pilot's use of the

tugboats pushing aft. The main engine was eventually stopped by the engineers at the local control until the ship was secured to the pier. No pollution or breech of the hull was reported.

Personnel

At the time of the accident, the *Anna Smile* was staffed with a multinational crew comprised of Greek, Filipino, and Sri Lankan personnel. The captain had sailed in this capacity for 35 years and had worked on board the *Anna Smile* for three trips. The chief engineer had sailed on his license for 5 years, and this was his first trip on the *Anna Smile;* he joined the ship about 4 months before the accident. After the accident, the watchstanders on board the *Anna Smile* and both pilots were tested for drugs and alcohol; all results were negative. The crewmembers' work/rest/sleep histories for the previous 96 hours indicated they were adequately rested at the time of the accident.

Damage

Damage to the grain elevator's east tower was estimated at $2.5 million. Horizontal and vertical steel structural supports on the grain elevator's structure were damaged, concrete pads were cracked, and a rubber fender was bent from the impact. To repair the elevator tower, contractors were required to remove and replace the entire upper section of the tower from the base, including the conveyor and carousel; fabricate four new legs of the lower structure; repair the bent fender and bent steel in the upper section; and replace the damaged concrete pedestals and dock area.

Louis Dreyfus Grain Elevator east tower, which was damaged in the allision.

Close-up of a damaged concrete pedestal (left) at the Louis Dreyfus Grain Elevator and a cracked weld and bent I-beam on a vertical support (right). (Left photo by Coast Guard)

The *Anna Smile* sustained minor scraping and a 2-inch inset of the hull plating for about 11 frames (30 feet) as the ship moved forward while in contact with the grain elevator. The damage estimate for the ship has yet to be determined, but the classification society recommended that the insets be repaired by June 2017, which is the next regularly scheduled dry-dock period.

Damaged area of *Anna Smile* hull (top) and close-up of vessel frames 41–52.

Vessel Propulsion and Engineering Analysis

The vessel's 11,670 horsepower, slow-speed, five-cylinder engine is directly connected to a fixed-pitch propeller. The slow rotational speed of the engine does not require a reduction gear between the engine and propeller.

To change the vessel's direction, the engine must be brought to a stop to secure the propeller rotation and then restarted either ahead or astern using high pressure compressed air. Commands from the two remote control locations—the bridge and ECR—are transmitted to the engine via pneumatic/electric control signals.

The emergency maneuvering mode is engaged by unlocking a blocking lever, freeing a regulating hand wheel, adjusting an impact hand wheel to disconnect the governor and connect the regulating wheel to the fuel pumps, and then switching a control valve lever to the emergency operation position. Controlling the engine in this mode bypasses the pneumatic and fuel regulating control systems that are used to remotely operate the engine from the bridge or ECR. Phones and an engine order telegraph repeater located directly behind the local control station provide communication with the bridge.

Following the accident, the engineering staff found excessive moisture in the control air system, which prevented the pneumatic changeover valves from functioning properly. After removing the moisture in the control air system, the engine was successfully tested in the presence of a regulatory surveyor and US Coast Guard personnel, and the vessel was cleared to sail.

The audible and visual indicators of the engine order telegraphs and phones in the ECR, on the bridge, and at the local control station were tested after the accident and found to be working properly.

Interviews with the crew indicated that communication between the bridge team and the engine crew broke down when the engine failed to start as expected and the engineers took control of the engine locally. The crew had no established procedures or training to effectively deal with such an emergency. The managing company for the *Anna Smile* had a safety management system in place for the vessel, but no specific guidance dealt with a failure of the main engine control system from the ECR, nor did it require training for emergency engine operations of this nature.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the allision of the bulk carrier *Anna Smile* with the Louis Dreyfus Grain Elevator while docking was a lack of communication from the engineering staff to the vessel's bridge team and pilots while the vessel was experiencing problems with the starting system of the main engine as well as the absence of specific procedures and training for emergency engine operations.

Vessel Particulars

Vessel	*Anna Smile*
Owner/operator	Prosperity Bay Shipping Company
Port of registry	Majuro, Marshall Islands
Flag	Marshall Islands
Type	Bulk carrier
Year built	2004
Official number (US)	2838
IMO number	9280770
Construction	Steel, strengthened for heavy cargoes
Length	738.2 ft (225.0 m)
Draft	64.3 ft (19.6 m)
Beam/width	106.0 ft (32.3 m)
Tonnage	40,524 gross tons
Engine power, manufacturer	11,670 hp (8,550 kW) MAN B&W 5S60MC MK6
Persons on board	22 (20 crewmembers and 2 Houston pilots)

For more details about this accident, visit http://www.ntsb.gov and search for NTSB accident ID DCA14LM013.

Adopted: April 30, 2015