National Transportation Safety Board

Office of Marine Safety

Washington, D.C. 20594

Group Chairman's Factual Report

Nautical Operations Group

Höegh Xiamen

DCA20FM020

September 16, 2021

1. Accident Information

Vessel:	*Höegh Xiamen*
Accident Number:	DCA20FM020
Date:	June 4, 2020
Time:	1530 eastern daylight time (coordinated universal time – 4)
Location:	Pier 20, Blount Island, Jacksonville, Florida
Accident type:	Fire/Explosion
Fatalities:	0
Injuries:	Municipal firefighters - 5 serious, 4 minor

2. Nautical Operations Group

Chairman: Marcel L. Muise, Nautical Operations Group Chairman
Office of Marine Safety
National Transportation Safety Board

Member: Lieutenant [redacted]
Investigating Officer
U.S. Coast Guard Sector Jacksonville

3. Summary

About 1530 local time on June 4, 2020, the Norwegian-flagged roll-on/roll-off (Ro/Ro) *Höegh Xiamen* caught fire while moored at the Blount Island Terminal in Jacksonville, Florida.[1] The crew evacuated to the pier however the fire consumed the five highest cargo decks and the accommodations. No injuries were reported to the crew though nine municipal firefighters were injured. The vessel was declared a constructive total loss. Damages to the ship and cargo were estimated at $40 million.

[1] A roll-on/roll-off (Ro/Ro) cargo ship is designed to carry wheeled cargo such as cars, trucks, and semi-trailer trucks, which are driven onto and off of the ship. Ro/Ro vessels have either a built-in or shore-based ramp that allows cargo to be efficiently rolled on and off the vessel while in port.

Figure 1. *Höegh Xiamen* underway before the accident (Source: Höegh)

4. Details of the Investigation

4.1. Injuries[2]

Table 1. Injuries

Type of injury	Minor	Serious	Fatal	None	Total
Crew	0	0	0	21	21
Passengers	0	0	0	0	0
Others	4	5	0	0	N/A
Total	4	5	0	0	21

4.2. Investigation

The Coast Guard notified the National Transportation Safety Board (NTSB) of the accident on the afternoon of June 4. Due to COVID-19 travel restrictions, NTSB investigators were unable to initially respond to the site. NTSB investigators remotely joined Coast Guard-led

[2] The NTSB uses the ICAO injury criteria in all of its accident reports, regardless of transportation mode. A serious injury is a non-fatal injury that requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; results in a fracture of any bone; causes severe hemorrhages, nerve, muscle, or tendon damage; involves any internal organ; or involves second- or third-degree burns, or any burn affecting more than 5 percent of the body surface.

interviews of the crew, Coast Guard staff, a Classification Society auditor, terminal staff, stevedores, and the charterer's representative. Investigators also reviewed terminal video, the ship's voyage data recorder (VDR), first responder statements, and drone video.

An NTSB investigator was later able to board the vessel on July 24, 2020, to capture additional photographic evidence. Afterwards, all vehicles were removed from the vessel, and the *Höegh Xiamen* was towed to Turkey for recycling. The Coast Guard inspected a sample of the vehicles for fire and dangerous goods hazards.

4.3. Background

The *Höegh Xiamen* was a 600-foot long, 4,900-unit pure car and truck carrier (PCTC), built at Xiamen Shipbuilding Industry Co. Ltd, Xiamen, Fujian, in 2010. The vessel was operated by Höegh Technical Management Inc. (Höegh) and chartered to Grimaldi Deep Sea S.p.A (Grimaldi) at the time of the accident. *Höegh Xiamen* was manned by 21 Chinese officers and crew.

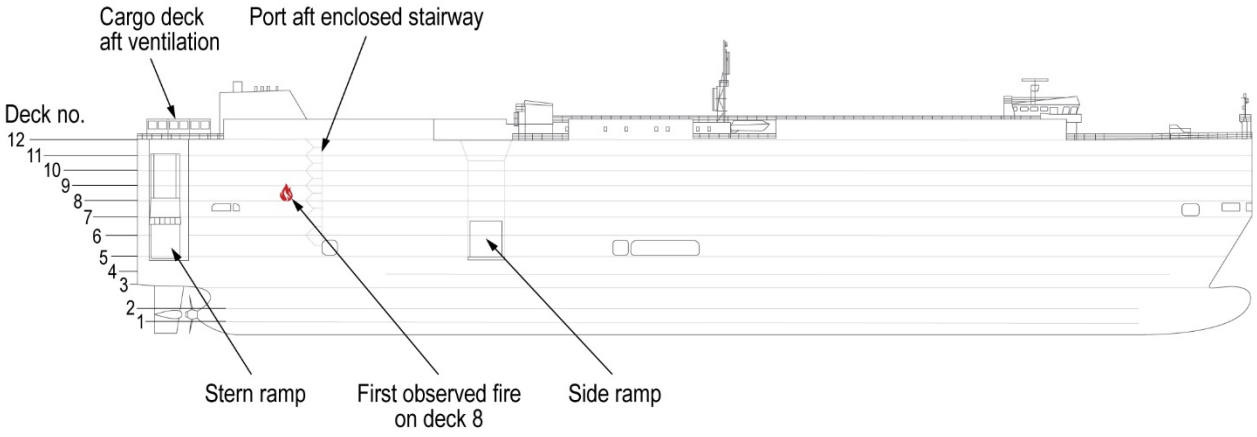

Figure 2. *Höegh Xiamen* inboard profile (Source: Höegh)

The ship's cargo holds were arranged on 11 decks with the stern and side ramps located on the main deck, Deck 5. The cargo decks above were open from stem to stern but divided into horizontal fire zones by retractable ramps between decks. Decks 4, 6, and 11 were movable to allow taller vehicles to be stowed on the deck immediately below them. Together, decks 1 through 4, 5 and 6, 7 and 8, and 10 and 11 made up gastight fire zones with shared ventilation and shared carbon dioxide (CO_2) protection. Deck 9 was a single deck fire zone.

Table 2. Vessel Particulars

Vessel name	***Höegh Xiamen***
Owner	OCY Xiamen Limited
Operator	Höegh Technical Management Inc.
Port of Registry	Oslo, Norway
Flag	Norway
Classification Society	DNV GL
IMO number	9431848
Call sign	LAJM7
Build year	2010
Depth	42 feet (12.8 m)
Draft	26 feet (8.0 m)
Length overall	600 feet (182.8 m)
Length between perpendiculars	558 feet (170.2 m)
Beam	103 feet (31.5 m)
Tonnage	47,232 GT ITC
Deadweight tonnage	12,250
Service speed	20 knots

Höegh operated Ro/Ro vessels in worldwide operations, including *Höegh Xiamen*'s three sister ships: *Höegh Beijing*, *Höegh Singapore*, and *Höegh Maputo*. Grimaldi chartered the *Höegh Xiamen* to transport used vehicles in the West Africa trade. As charterers of the vessel, Grimaldi was responsible for organizing and arranging the cargo to be carried on board. On the accident voyage, *Höegh Xiamen* was scheduled to carry used vehicles from three ports in the United States—Freeport, Jacksonville, and Baltimore—to West African ports of discharge.[3] Cargo loaded in Jacksonville was specifically bound for Cotonou, Benin, and Lagos, Nigeria.

[3] Grimaldi Lines also operated its own Ro/Ro ships.

Horizon Terminal Services, a subsidiary of Höegh, operated a Ro/Ro facility on Blount Island within the Port of Jacksonville. The terminal's Pier 20 is on the west side of the island, on the Saint John River, 11 miles inland from the Atlantic Ocean.[4] Horizon also provided services at the time of the accident for Höegh Autoliners, Grimaldi, Sallaum, Glovis, and NYK, each with its own receiving guidelines. On this occasion, Horizon was working on behalf of the charterer, Grimaldi.

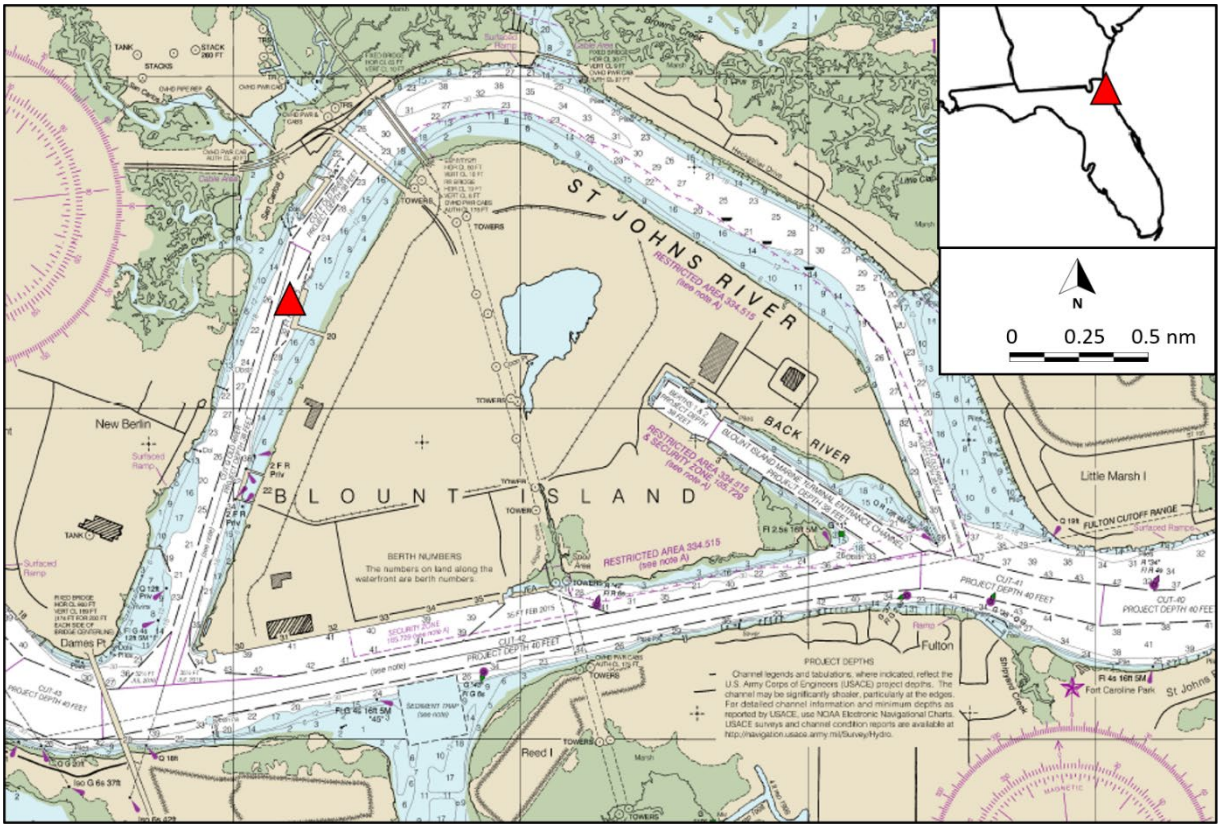

Figure 3. Area of accident where the *Höegh Xiamen* fire occurred, as indicated by the red triangle. (Background source: National Oceanic and Atmospheric Administration)

It was raining at the time of the accident with a southeast 9-knot breeze, gusting to 14 knots. The recorded air temperature was 77°F.

4.4. Accident Narrative

Höegh Xiamen arrived at Jacksonville, Florida, on the evening of June 2, having already loaded 845 vehicles in Freeport, Texas. The ship was scheduled to load an additional 1,629

[4] All miles in this report are nautical miles (1.15 statute miles).

vehicles in Jacksonville before proceeding to Baltimore, Maryland, to load the last of the trans-Atlantic cargo. Cargo had been received and staged at the Horizon Terminal prior to the ship's arrival.

Grimaldi contracted with SSA Atlantic to provide stevedores and load the cargo aboard the ship. In turn, SSA contracted with the International Longshoreman's Association (ILA) to provide longshoremen to load and secure the vehicles. The loading was supervised by SSA stevedores, the ship's crew, and a Grimaldi port captain.

According to the Grimaldi port captain, cargo loading went "smooth." On June 4, the second day of loading and the day of the fire, loading commenced at 0800 with crews working on multiple decks. Forklifted cargo was loaded onto Decks 3 and 5. Non-running units, or "tows" were loaded on Deck 7 and forward on Deck 8. Runners, or operable vehicles, were loaded on Decks 7 and 10. Cargo loading was completed at 1500, and the ship was scheduled to sail at 1700.

The crew prepared the ship for sea, and all SSA, Horizon, ILA, and Grimaldi personnel left the ship. The port captain inspected the decks before leaving, including Deck 8 about 1448. The second mate was the last crewmember to inspect Decks 5 through 11 and found everything in good order. According to the crew, Deck 8 was nearly full, and all watertight doors and internal ramps were secured. The crew raised and secured the side ramp to the pier and attempted to raise the stern ramp, but the rigging jammed, a common problem according to the chief mate, so they set it back down on the pier.

About 1530, the chief mate was waiting for heavy rain to subside before lubricating the stern ramp rigging when he noticed smoke coming from the Deck 7 and 8 ventilation exhaust housing, the second housing from aft located on the starboard aft corner of the top deck. He notified the master and sent an ordinary seaman (OS) and an able seafarer (AB) to investigate, sent the electrician to close remotely controlled dampers, and secured the cargo deck fans. The mate told investigators that closing the dampers slowed but did not stop the smoke. The chief

mate also deisolated the fire detection system from the cargo control room, which immediately alarmed.[5]

Investigators reviewed the event data and bridge audio from the VDR. The first fire alarm was heard at 1544:18. The ship's general alarm sounded at 1546:19. Table 2 contains the radio conversation between the ship and other stations.

Table 3. Select *Höegh Xiamen* audio captured by VDR

Time (GMT)	Sensor	Message	Notes
1934:29	Audio		Audio starts
1944:03	Audio		Chatter and quick steps on stairs
1946:19	Audio		General Alarm first sounds
1946:45	Audio		Announcement on board
1949:10	VHF	"Jacksonville Port Control, Jacksonville Port Control, *Höegh Xiamen.*"	Unknown channel, no reply
1949:22	VHF	"Jacksonville Pilot, Jacksonville Pilot, *Höegh Xiamen*."	Unknown channel, no reply
1951:01	VHF	"Jacksonville Port Control, *Höegh Xiamen*."	Unknown channel, no reply
1953:53	VHF	"Hello all stations. Hello all stations, this is *Höegh Xiamen*. *Höegh Xiamen Höegh Xiamen* have fire in the cargo hold if anybody can do me a favor to call for [indiscernible]."	Unknown channel, no reply
1954:15	VHF	"Jacksonville Pilot, Jacksonville Pilot, *Höegh Xiamen*."	Unknown channel
1954:28	VHF	"One-four for Pilots, one-four."	Unknown station
1954:34	VHF	"Jacksonville Pilots, *Höegh Xiamen*."	Ch. 14
1954:38	VHF	"Jacksonville Pilots back, go ahead Captain."	Ch. 14
1954:41	VHF	"Yes sir, and I try to call fire station but can't because… for your information I have a fire	Ch. 14

[5] Shipboard fire and gas detection systems may have a feature to inhibit specific sensors or a group of them. Inhibiting sensors facilitates maintenance or operations that would otherwise initiate a general alarm, ventilation fans shutdowns, close fire and dampers, output to the VDR, and/or turn on fire pumps, among other effects.

Time (GMT)	Sensor	Message	Notes
		in the cargo hold and the vessel still… is the Berth number [indiscernible], Blount Island Terminal. Can you, can the fire station come to us as soon as possible? Thank you. It's an emergency. Thank you."	
1955:03	VHF	"Captain, stand by this channel, stand by one-four. I'm calling now. Stand by."	Ch. 14
1955:07	VHF	"Ok stand by this channel *Höegh Xiamen* [indiscernible] is at Blount Island Terminal Berth Number 20. We have a fire in the cargo hold. Have a big fire in the cargo hold. Thank you."	Ch. 14
1955:20	VHF	"Stand by, Captain. Stand by."	Ch. 14
1955:49	VHF	"Vessel *Höegh Xiamen*, Vessel *Höegh Xiamen*, come back on one-six. This is the Coast Guard."	Ch. 16
1955:59	VHF	"*Höegh Xiamen*, *Höegh Xiamen*. Jacksonville pilots."	Ch. 14
1956:07	VHF	"*Höegh Xiamen*, *Höegh Xiamen*. Jacksonville pilots."	Ch. 14
1956:10	VHF	"Vessel *Höegh Xiamen, Höegh Xiamen* this is Coast Guard Sector Jacksonville on one six, over."	Ch. 16
1958:13	VHF	"Vessel *Höegh Xiamen*, *Höegh Xiamen*, Coast Guard Sector Jacksonville on one six."	Ch. 16
1958:20	VHF	"This is *Höegh Xiamen*, this is *Höegh Xiamen*, Madam we have a fire in the cargo hold we have a fire in the cargo hold, deck number 8. Would you please call fire to please come to us. Right now. Thank you."	Ch. 16
1959:05	VHF	"Vessel *Höegh Xiamen*, what is your position?"	Ch. 16
1959:39	VHF	"Vessel *Höegh Xiamen, Höegh Xiamen*, what is your position?"	Ch. 16

Time (GMT)	Sensor	Message	Notes
1959:46	VHF	"Yes sir, this *Höegh Xiamen.* Madam, would you please [indiscernible] to call, please. We have a fire in the cargo hold. We have a fire in the cargo hold, Deck number 8."	Ch. 16
2000:00	VHF	"To verify, you have a fire in the cargo hole [sic]? Is that what you said?"	Ch. 16
2000:05	VHF	"Yes, Deck number 8, Deck number 8, Deck number 8."	Ch. 16
2000:24	VHF	"*Höegh Xiamen*, do you have a position available. We need to know a position."	Ch. 16
2000:36	VHF	"Vessel *Höegh Xiamen* Come back on one-six"	Ch. 16
2000:56	VHF	"Coast Guard, Coast Guard this is *Norwegian Pearl*."	Ch. 16
2001:03	VHF	"Coast Guard, US Coast Guard this is *Norwegian Pearl*. We can see from Berth 31, the ship *Höegh Xiamen*. It's on Berth 20 on Blount Island, they got on fire."	Ch. 16
2001:24	VHF	"*Norwegian Pearl.* You said they're on fire near Blount Island? Is that correct?"[6]	Ch. 16
2001:29	VHF	"Yes, Blount Island, Berth number 20. Name of the vessel *Höegh Xiamen*."	Ch. 16
2001:43	VHF	"*Höegh Xiamen*, is that what you said?"	Ch. 16
2002:40	VHF	"Pan Pan, Pan Pan, Pan Pan. All stations, All stations, All stations. This is United States Coast Guard Sector Jacksonville Florida, United States Coast Guard Sector Jacksonville Florida, United States Coast Guard Sector Jacksonville Florida. Break. 1958 Coordinated Universal Time, 358 local time The Coast Guard received a report of a vessel on fire near Blount Island, position is 30-24.355N 081-32.77W. All vessels are	Conversation with *Norwegian Pearl* continues after the Sector cannot raise *Höegh Xiamen. Norwegian Pearl* confirms *Höegh Xiamen* is a car carrier, that first responders are on scene, and that they can reach the vessel from shore.

[6] *Norwegian Pearl* was a 964-foot-long cruise ship moored at Berth 31 on the southwest tip of Blount Island.

Time (GMT)	Sensor	Message	Notes
		requested to keep a sharp lookout, assist if possible and report all sightings to the Coast Guard. Signed Commander, United States Coast Guard Sector Jacksonville Florida. Break. This is United States Coast Guard Sector Jacksonville Florida. Out. "	

Aboard the vehicle carrier, the OS reported back to the mate that there was fire on Decks 7 and 8 and that there was no lighting on Deck 8. The chief engineer also reported heavy smoke and no lighting on Deck 8, but also checked Deck 7 where he could see a small fire on Deck 8 above with flaming fuel dripping to Deck 7, starboard side aft. The mate then ordered the fire team, once mustered by the general alarm, to investigate. They, too, were forced to retreat due to heavy smoke under pressure on Deck 8.

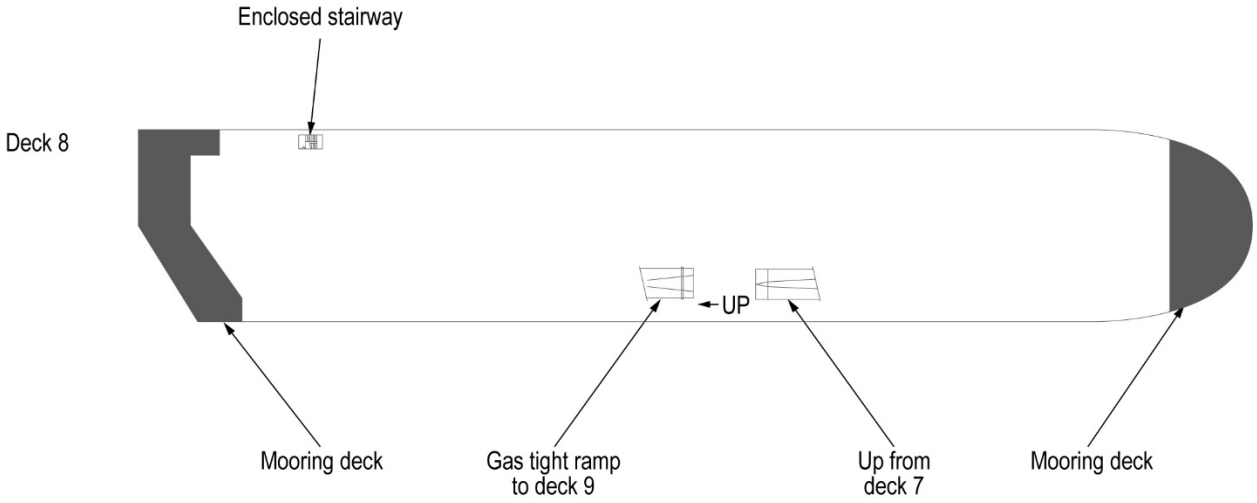

Figure 4. Höegh Xiamen arrangement of Deck 8 (Source: Höegh)

About this time, the mate saw smoke from additional ventilation trunks. He recommended to the master using the fixed CO_2 system and mustered the whole crew. The captain also had the mate close all the manual dampers on the top deck, in addition to the remotely controlled ones.

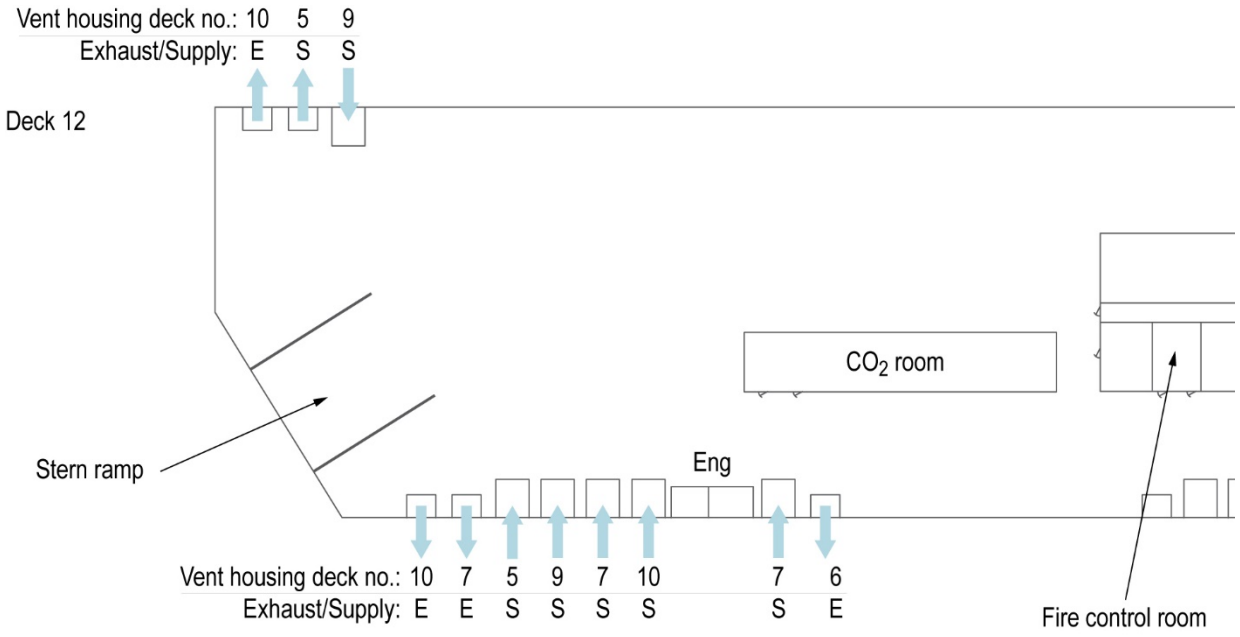

Figure 5. Arrangement of ventilation trunks on Deck 12, starboard aft.

The master told investigators he attempted to call for help on VHF Channel 16 without reaching anyone, then called the ship's agent by phone, also without reaching him. The VDR captured a radio call, but investigators could not determine on which channel the transmission was, and the Coast Guard received no distress call. The VDR recorded the master calling for help by VHF radio several times starting at 1549. At 1554, an unknown vessel answered his call and advised him to switch to Channel 14 to reach the pilot station, and he did so. They relayed the distress call to the Coast Guard's Jacksonville Sector Command Center, who were able to reach the ship by radio at 1558.

Jacksonville Fire and Rescue Department (JFRD) was first alerted to the fire by a passerby at their Station 48 on Blount Island. The first engine arrived on scene at 1603.[7] The chief mate and captain met the first engine company on the stern ramp and provided the ship's emergency plans. The second mate showed the firefighters the way to Deck 8 via the port aft stairs and again opened the door to find heavy smoke. According to the chief mate and second mate, the fire department then requested the crew evacuate the ship. The captain then asked the firefighters if they should release the CO_2 fire-extinguishing system to which the firefighters

[7] Jacksonville Fire and Rescue Department, Incident Report 64084-2020-06-04 for Engine 48.

concurred. The chief engineer and chief mate returned to the CO_2 room, now full of smoke, on the top deck and attempted to release the system but were unsuccessful. The captain followed them to the upper deck, Deck 12, after he lost radio contact with them. The mate proceeded to the deck office, where he was able to silence the fire alarm, while the captain and chief engineer proceeded to the fire control room, where they were able to release the CO_2 system. They then abandoned the ship.

Firefighters reported finding doors closed in the port aft stairway to each deck, except the upper deck, Deck 12. There was no pressure behind the doors when they accessed Decks 7 and 8, and they started suppression using their own hose lines and equipment. About 1846, a ladder company working on the upper deck was ordered to start opening ventilation to evacuate smoke and improve visibility on the fire decks. They reported smoke flowed freely from the starboard aft ventilation trunks after opening the housing doors. Upon opening the door to the exhaust trunk for Deck 9 though they heard a rush of air and the ventilation housing exploded, throwing debris in the air. Firefighters staged in the port aft stairway and on Deck 5 described two explosions with intense heat and a “roaring sound of rushing air”. Eight firefighters were burned, five of them seriously. Another developed heat exhaustion.Those firefighters working on Deck 7 and 8 were unharmed.

Figure 6 – Overpressurization of Deck 9 ventilation exhaust trunk (Source: WJXT)

Following the explosion, the JFRD took a defensive strategy, assisted by the Coast Guard, boundary cooling while keeping the vessel upright and afloat, until Resolve Marine personnel and equipment arrived, the commercial salvor identified in *Höegh Xiamen*'s approved non-tank vessel response plan. The fire continued to burn for eight days, destroying the interior of Decks 7 through 12, including the accommodations. The Fire and Explosions Group Chair's factual report contains additional information regarding the fire, suppression efforts, and the ship's firefighting systems.

The anchor handling tug, *Alp Striker*, towed the ship from Jacksonville on August 30 and arrived in Aliaga, Turkey on October 5 where the *Höegh Xiamen* was to be recycled.

4.5. Additional information

4.5.1 Human factors

The master had 26 years of experience in the industry, 13 of which were as captain, and had been aboard *Höegh Xiamen* for 7 months. The chief mate had 12 years of experience in the industry, 10 months as chief mate, and 8 months on board *Höegh Xiamen*.

All post-accident drug and alcohol test results for the crew were negative. Investigators reviewed the previous month's work/rest hours log, which documented only one discrepancy for the third mate during a port call the previous month. The crew carried valid national People's Republic of China and Norwegian-flag state STCW certificates of competency.

4.5.2 Cargo operations

Horizon received cargo—in this case used vehicles—from shippers via truck. Cargo was received, inspected, separated by operability, and staged for customs clearance and for loading on a particular vessel.

See the NTSB Hazardous Materials Group Factual Report for a detailed discussion of cargo, cargo handling, and procedural and regulatory safety barriers.

4.5.3 Fire and lifesaving

Per Höegh's Cargo Safety Awareness procedure, the cargo hold fire detector system was inhibited during cargo operations as exhaust from the vehicles would continuously initiate nuisance alarms. The probability of detecting a fire was provided by crew stationed on the cargo decks during cargo loading. According to the captain, *Höegh Xiamen*'s system would become active automatically, 10 hours after being isolated.

Table 5 includes fire alarms that were electronically logged by the VDR or captured by the VDR bridge microphones, in sequence as they were activated after the system was actuated.

Table 4. *Höegh Xiamen* VDR fire alarms

Time (GMT)	Sensor	Tag	Notes
19:45:51	Alarm	System reset	
19:46:01	Alarm	Generic, Smoke/Heat Zone 006, B055	No. 9 Car Deck, Aft-Stbd, FR 35S
19:46:19	Audio		General Alarm first sounds
19:46:45	Audio		Announcement on board
19:48:48	Alarm	Generic, Smoke/Heat, Zone 007, B103	No. 8 Car Deck, Midd-Stbd, FR 77S
19:49:55	Alarm	Generic, Smoke/Heat, Zone 007, B065	No. 8 Car Deck, Midd-Port, FR 77P
19:50:18	Alarm	Generic, Smoke/Heat, Zone 007, B067	No. 8 Car Deck, Midd-Port, FR 90P
19:51:41	Alarm	Generic, Smoke/Heat, Zone 008, B168	No. 7 Car Deck, Aft-Stbd, FR 36S

Time (GMT)	Sensor	Tag	Notes
19:52:11	Alarm	Generic, Smoke/Heat, Zone 005, C097	No. 10 Car Deck, Aft-Cent, FR 5M
19:52:18	Alarm	Generic, Smoke/Heat, Zone 003, A089	Aft-Stair way, Dk-9, Aft-Port, FR 31P
19:52:38	Alarm	Generic, Smoke/Heat, Zone 006, B014	No. 9 Car Deck, Midd-Port, FR FR 77P
19:53:56	Alarm	Generic, Smoke/Heat, Zone 005, C058	No. 11 Car Deck, Aft-Stbd, FR 58S
19:54:37	Alarm	Generic, Smoke/Heat, Zone 006, B028	No. 9 Car Deck, Midd-Cent, FR 90M
19:54:38	Alarm	Generic, Smoke/Heat, Zone 005, C060	No. 10 Car Deck, Aft-Port, FR 20P
19:56:57	Alarm	Generic, Smoke/Heat, Zone 008, B126	No. 7 Car Deck, Mid-Port, FR 103P
19:56:58	Alarm	Generic, Smoke/Heat, Zone 008, B123	No. 7 Car Deck, Mid-Port, FR 129P
19:58:20	Alarm	Generic, Smoke/Heat, Zone 004, C027	No. 11 Car Deck, Midd- Cent, FR 77M
19:58:53	Alarm	Generic, Smoke/Heat, Zone 008, B169	No. 7 Car Deck, Aft-Stbd, FR 21S
20:00:44	Alarm	Generic, Smoke/Heat, Zone 004, C014	No. 11 Car Deck, Midd-Port, FR 77P
20:00:47	Alarm	Generic, Smoke/Heat, Zone 006, B026	No. 9 Car Deck, Aft-Cent, FR 64M
20:00:48	Alarm	Generic, Smoke/Heat, Zone 004, C050	No. 11 Car Deck, Midd-Stbd, FR 90S
20:00:52	Alarm	Generic, Smoke/Heat, Zone 004, C028	No. 11 car Deck, Midd-Cent, FR 90M
20:00:54	Alarm	Generic, Smoke/Heat, Zone 008, B117	No.7 Car Deck, Fore-Port, FR 192P
20:01:17	Alarm	Generic, Smoke/Heat, Zone 004, A123	Aft escape hatch deck 11, Frame 7P
20:01:18	Alarm	Generic, Smoke/Heat, Zone 006, B015	No. 9 Car Deck, Aft-Port, FR 64P
20:12:25	Alarm	Generic, Smoke/Heat, Zone 006, B019	No. 9 Car Deck, Aft-Port, FR 19P
20:12:46	Alarm	Generic, Smoke/Heat, Zone 006, B016	No. 9 Car Deck, Midd-Port, FR 51P
20:12:49	Alarm	Generic, Smoke/Heat, Zone 008, B144	No. 7 Car Deck, Midd-Cent, FR 103M
20:12:54	Alarm	Generic, Smoke/Heat, Zone 002, A075	Crew K, Room 1227
20:14:17	Alarm	Generic, Smoke/Heat, Zone 006, B010	No. 9 Car Deck, Midd-Port, FR 116P
20:14:19	Alarm	Generic, Smoke/Heat, Zone 004, C008	No. 11 Car Deck, Midd-Port, FR 103P
20:14:39	Alarm	Generic, Smoke/Heat, Zone 005, C061	No. 10 Car Deck, Aft-Port, FR 31P

Time (GMT)	Sensor	Tag	Notes
20:14:41	Alarm	Generic, Smoke/Heat, Zone 008, B159	No. 7 Car-Deck, Midd-Stbd, FR 129S
20:16:12	Alarm	Generic, Smoke/Heat, Zone 002, A082	Suez Room, Stbd, End of accommodation
20:16:14	Alarm	Generic, Smoke/Heat, Zone 008, B161	No. 7 Car-Deck, Midd-Stbd, FR 116S
20:16:20	Alarm	Generic, Smoke/Heat, Zone 016, F060	E/R Dk-3 (2nd Floor), Stbd-Aft, Deck air compressor, FR 26S
20:16:22	Alarm	Generic, Smoke/Heat, Zone 002, A077	Fire Control Room Station 1

The chief engineer had led training on the fixed CO_2 system during the last fire drill, the previous weekend. The system was operational with no maintenance issues according to the crew.

The vessel had an approved Non-Tank Vessel Response Plan, which identified Resolve Marine as its contract salvors and firefighters. Horizon Terminal, however, was not an oil transfer facility and did not have a response plan per 33 *Code of Federal Regulations* Part 154. Horizon management were unaware of any training or familiarization of the facility or vehicle carriers by the fire department.

4.5.4 Crew actions

Höegh Xiamen's Emergency Plan specified that the master was "Overall in Command", the chief officer "Fire Leader in Cargo spaces/Accommodation" and chief engineer "Fire Leader in ER (engine room) spaces." Regarding the use of CO_2, the plan tasks the chief engineer with releasing CO_2 "only after verbal order from the Master." The chief officer was to report to the bridge when all crew were accounted for prior to any use of CO_2. The Emergency Plan also stated that while in port that the "Port fire brigade to be called for assistance if necessary" and that "The Fire Chief function may be taken over by the fire leader from ashore."

4.5.5 Regulatory history

DNV GL, on behalf of Norway, issued a document of compliance in 2018 regarding equipment and construction requirements for ships carrying dangerous goods per the International Convention for the Safety of Life at Sea (SOLAS) II-2/19.4.

The ship's last Coast Guard port state control exam was in August 2019, also in Jacksonville, with no deficiencies issued. There were no outstanding flag state deficiencies or International Safety Management (ISM) non-conformities and one condition of class for minor hull damage to be repaired during the next drydocking. Port state control officers confirmed that they checked cargo stowage and were aware there were fuel tank restrictions, but stated they had no way to check levels without turning the vehicles on.Given the close stowage plan, there was no way to even get in the cars.

4.5.6 Safety Management System (SMS)

Höegh's procedures referred the crew to the charterer's handling procedures for special cargo. Additionally, their "Cargo Safety Awareness" procedure required the following, among other safety barriers:

- Any spillage of oil and/ or fuel from vehicles to be cleaned immediately, if necessary cargo operations should be suspended until the area is considered safe.
- Fire Detectors in Car Decks are to be isolated during cargo operations.
- Detectors on only those decks where cargo operations are working need to be isolated.

The last annual master's review of the SMS was dated December 12, 2019. The report and the shoreside reply complement the vessel and the SMS, despite a change in management, new preventative maintenance software, and the ship moving to the US-Africa service. Throughout 2019, there were no port state control deficiencies. The last ISM annual internal audit in July 2019 documented only one minor non-conformity regarding the audit being overdue and observations regarding recordkeeping.

A DNV GL auditor attended the vessel on June 3 and 4 to conduct a scheduled external ISM audit. The ship had no prior outstanding non-conformities, and the audit found no new ones. The audit report also mentioned another port state control exam in 2020 in Benin, also with no non-conformities. The same auditor completed Maritime Labour Convention (MLC) and International Ship and Port Facility Security (ISPS) audits on the vessel. The audit report concluded, "A good safety culture appears evident onboard and crew conveyed that the company

provides good support." He stated his audit was not impeded by language barriers. He did not interview or talk to the stevedores.

The auditor told investigators that Höegh's SMS was electronic, other than hard copies of required bunkering procedures, checklists, et cetera. The ship used Star IPS for computer maintenance software, and the auditor found no overdue maintenance.

DNV witnessed a fire drill as part of the ISM audit on June 3. The drill included a galley fire scenario. The auditor told investigators that he was satisfied with the crew's teamwork, equipment, and competence, including hose handling, securing electricity and ventilation, communications, and use of personal protective equipment. The use of the CO_2 fixed fire-extinguishing system was not part of the drill.

The ship had a steering casualty before entering port on the evening June 2, when the system had momentarily not responded to a helm command. The situation was rectified by switching follow-up controllers, and the ship was allowed to proceed once verified by a Coast Guard investigator on board. The Coast Guard issued a deficiency to the ship, stating, "All the steering gear components and the rudder stock shall be of sound reliable construction. Port state control officers observed that the #1 steering gear not operating properly based from events described by crew when entering Jacksonville, FL." The DNV-GL auditor tested the steering system in every configuration and was unable to duplicate the failure mode, and the Coast Guard deficiency was cleared.

Höegh Xiamen was also listed as a site on Grimaldi's ISO 14001 Environmental Management System certificate issued by RINA.

4.5.7 Similar accidents

Coast Guard Sector Jacksonville investigated two additional Ro/Ro fires in 2020, following the *Höegh Xiamen* fire. The US-flagged *Arc Independence* experienced a cargo hold fire while under way on August 30 about 180 miles offshore of Jacksonville. The crew was alerted to the fire by the ship's detection system and was able to contain the fire to a single vehicle with fire extinguishers. The vehicle was smoking from under the hood, and the crew had to break a window to access the engine compartment.

The Norwegian-flagged *Höegh Transporter* experienced a fire while alongside Blount Island's Pier 20 on November 17, 2020. The ship was being fumigated prior to setting sail when

the crew was alerted to a fire. In this case, the cargo operations were also complete, though the detection system had been activated. The vessel was loaded with new cars.

The Coast Guard published Safety Alert 06-20, “Recognizing Fire Hazards & Proper Cargo Stowage” on November 30, following the fires. The Safety Alert called attention to the hazards of combustibles stowed in vehicles, leaks, fuel levels, and batteries.