October 30, 2026 MIR-26-35

Contact of Roll-on/Roll-off Vehicle Carrier *Morning Menad* with Dundalk Marine Terminal Dock

On December 5, 2024, about 0945 local time, the roll-on/roll-off vehicle carrier *Morning Menad* was maneuvering to its berth at the Dundalk Marine Terminal on the Patapsco River in Baltimore, Maryland, when the vessel contacted the terminal dock and then grounded (see figure 1 and figure 2).[1] There were no injuries, and no pollution was reported. Damage to the vessel and facility was estimated at $1.4 million.



Figure 1. *Morning Menad* underway on November 6, 2025. (Source: Owen Foley, shipspotting.com)

[1] (a) In this report, all times are eastern standard time, and all miles are nautical miles (1.15 statute miles). (b) Visit ntsb.gov to find additional information in the public docket for this NTSB investigation (case no. DCA25FM009). Use the CAROL Query to search investigations.

Casualty Summary

NTSB casualty category	Contact
Location	Dundalk Marine Terminal, Patapsco River, Baltimore, Maryland 39°14.28′ N, 076°31.93′ W
Date	December 5, 2024
Time	0945 eastern standard time (coordinated universal time −5 hrs)
Persons on board	28 (25 crewmembers and 3 pilots)
Injuries	None
Property damage	$200,000 est. (*Morning Menad*), $1.2 million est. (facility)
Environmental damage	None
Weather	Visibility 10 mi, scattered clouds, gale conditions with gusts up to 50 kts, seas 2 ft, air temperature 38°F, water temperature 49°F, sunrise 0711, high tide 0852 (0.65 ft), low tide 1445 (0.10 ft)
Waterway information	Channel; width 400 ft, depth 42 ft

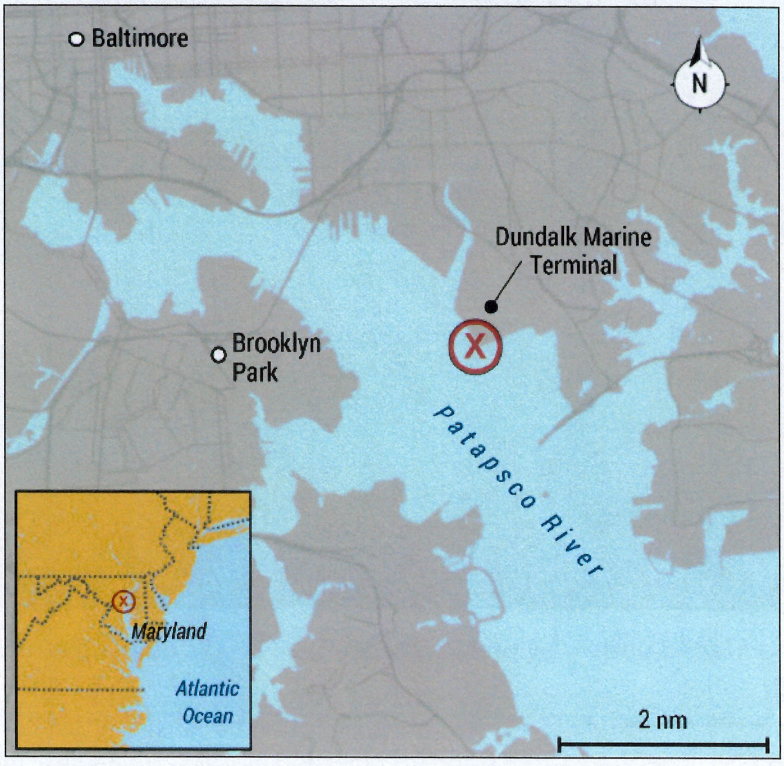


Figure 2. Area where the *Morning Menad* contacted the Dundalk Marine Terminal dock, as indicated by a circled X. (Background source: Google Maps)

1 Factual Information

1.1 Background

The 577-foot-long, South Korean-flagged roll-on/roll-off vehicle carrier *Morning Menad* was constructed of steel and built in 2007. The *Morning Menad* was a specialized type of roll-on/roll-off vehicle carrier called a pure car and truck carrier (PCTC); it was designed to transport cars, trucks, and other wheeled vehicles. The vessel was owned by Eukor Car Carriers and operated by Wilhelmsen Ship Management (Korea). The *Morning Menad* had a single rudder, a single right-hand-turning propeller directly driven by a slow-speed diesel engine rated at 16,950 hp, and a 1,360-hp bow thruster.

The vessel operated on a liner route between the port of Altamira, Mexico, and US east coast ports. When in Baltimore, Maryland, the vessel normally docked at berth 11 or 13 at the Dundalk Marine Terminal to conduct cargo operations.

1.2 Event Sequence

On December 4, 2024, at 2354, the *Morning Menad* arrived at the Cape Henry pilot station at the entrance to the Chesapeake Bay and took on a pilot and a pilot in training from the Association of Maryland Pilots.[2] The vessel had a cargo of 4,212 vehicles on board, 617 of which were intended for discharge at Baltimore's Dundalk Marine Terminal, berth 13. Winds were 38 knots from the west-southwest and became stronger during the vessel's passage north through the Chesapeake Bay.[3] The master stated he had expected the winds to be lighter when the vessel arrived in the sheltered Patapsco River (Baltimore Harbor), compared to the Chesapeake Bay.

The ship reached the Fort McHenry Channel, the entrance channel to Baltimore, by 0920 the following morning. Winds were 35 knots and had shifted, now coming from the west. The ship's crew steered about 7° off the channel base course

[2] A *pilot* is retained by the ship to provide local knowledge of the waterway, familiarity with tides and currents in the area, understanding of local procedures, and a thorough knowledge of the topography of the waterway. Pilots usually operate by issuing maneuvering instructions (such as heading, rudder angle, and speed orders) to the crew under the supervision of the master or the officer in charge of the navigation watch, or both.

[3] All winds as measured by the vessel's own anemometer and reported are true wind as shown on the vessel's radar display.

to maintain the vessel's position in the channel. The pilot remarked, "We're just crabbin' along here."[4]

At 0924, when the *Morning Menad* was near the location of the former Francis Scott Key Bridge, about 1.3 miles from the terminal, two additional pilots from the Association of Maryland Pilots (pilot 1 and pilot 2) boarded the vessel while the previous pilot prepared to disembark the vessel. Pilot 1 was a senior pilot completing a final harbor familiarization trip to fully qualify as a docking pilot. Pilot 2 was also a senior pilot; he was a qualified docking pilot overseeing pilot 1's harbor familiarization trip. The off-going pilot discussed the vessel's course, speed, channel position, and equipment status with pilot 1, then turned over the conn to pilot 1. Pilot 1 conned the vessel for the remainder of the inbound passage. The off-going pilot then disembarked onto the pilot boat, while the pilot-in-training remained on board.

Pilot 1 discussed the maneuvering and docking plan with the master. About 0931, the master asked the pilots if the vessel could be docked at berth 10 instead of berth 13 due to the high-wind conditions, now averaging 37 knots with gusts to 47knots (see figure 3). Pilot 1 responded, "Can't make that determination" and stated that the master should call the ship's agent with that request.[5] The master tried twice, but he was unable to reach the ship's agent by telephone, and the pilots continued with the original plan to dock at berth 13.

[4] *Crabbing* describes a vessel's movement through the water when the course over ground is several degrees different from its heading, meaning the vessel is moving in a direction off its centerline axis, like how a crab walks on sand. Crabbing is common when steering a vessel to compensate for environmental/external effects such as wind and/or current by manipulating the vessel's heading to achieve the desired course over ground.

[5] The Maryland Port Administration told investigators that, "there is no written policy addressing an emergency need to change a vessel berthing assignment; if the pilot and/or master deem it necessary to protect life and property they will berth and provide MPA notification as soon as possible."

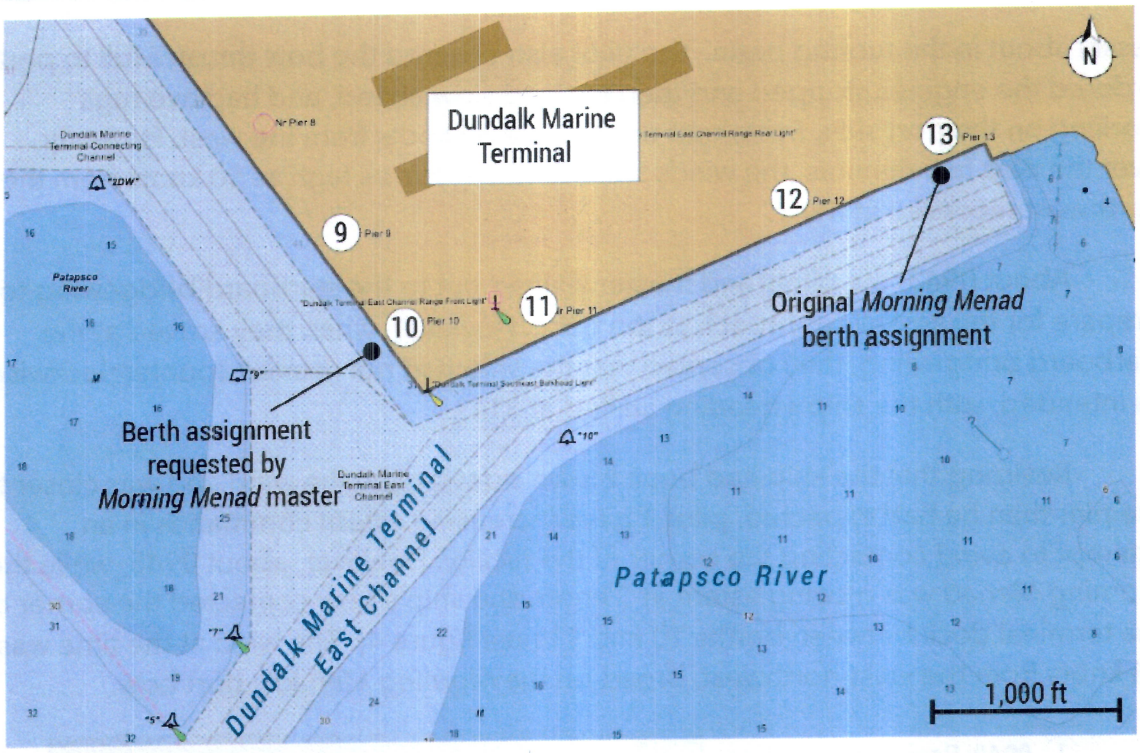


Figure 3. Overhead view of the Dundalk Marine Terminal approach and piers. (Background source: National Oceanic and Atmospheric Administration Electronic Navigational Chart US5BALCB)

At 0935, pilot 1 started the turn to starboard into the Dundalk Marine Terminal East Channel. The channel heading was 048°. The tug *Paul T. Moran* was made fast on the port shoulder. With the wind on the *Morning Menad*'s port side, the tug *Mark Moran* stood by on the starboard quarter to assist in pushing the stern into the wind. The master expressed concern about the wind again. About 0936, pilot 1 stated, "Fortunately with the direction of this wind … captain … as soon as we start … in a minute the wind is actually going to be helping us … and then it will be hurting us again … a little bit …but not so bad … here is the worst part."

At 0938, after turning into the Dundalk Marine Terminal East Channel, pilot 1 ordered the *Mark Moran* to reposition to the *Morning Menad*'s port quarter and put up a line to the *Morning Menad* machinery deck. As the ship continued to transit, pilot 1 favored the left side of the channel due to the wind on the vessel's port side.

To moor at berth 13, the *Morning Menad* next needed to stop, rotate about 150° counterclockwise in the turning basin next to the terminal, and back about five ship lengths into the slip, mooring starboard side to the pier (the vessel's cargo ramps were on the starboard side). The ship's heading when moored at the pier would be 247°. At 0940, the pilot gave a hard port rudder command to turn the

vessel about in the turning basin. The pilot also ordered the bow thruster full to port, ordered the engines stopped and then to dead slow ahead, and had two tugs working on the port side. Sustained winds were 39 knots from the west. However, over the next few minutes, the winds shifted, with gusts as high as 50 knots from the northwest recorded at 0942.

About 0943, the pilots and master walked out to the starboard bridgewing to prepare for the vessel's approach to the dock. However, when they arrived at the starboard bridgewing, they observed that the ship had not rotated counterclockwise as intended, with the ship's heading stalled at 311°.

Realizing that the ship had been blown sideways by the wind and was closer to the pier than he had expected, pilot 1 gave increasing astern commands in an attempt to avoid contacting the corner of the facility. However, about 0945, while the *Morning Menad* was moving astern at 3 knots, the ship's bow contacted the corner of the terminal dock between berths 10 and 11 (see figure 4). The wind at the time was 44 knots from the west-northwest, broad on the *Morning Menad*'s port bow.

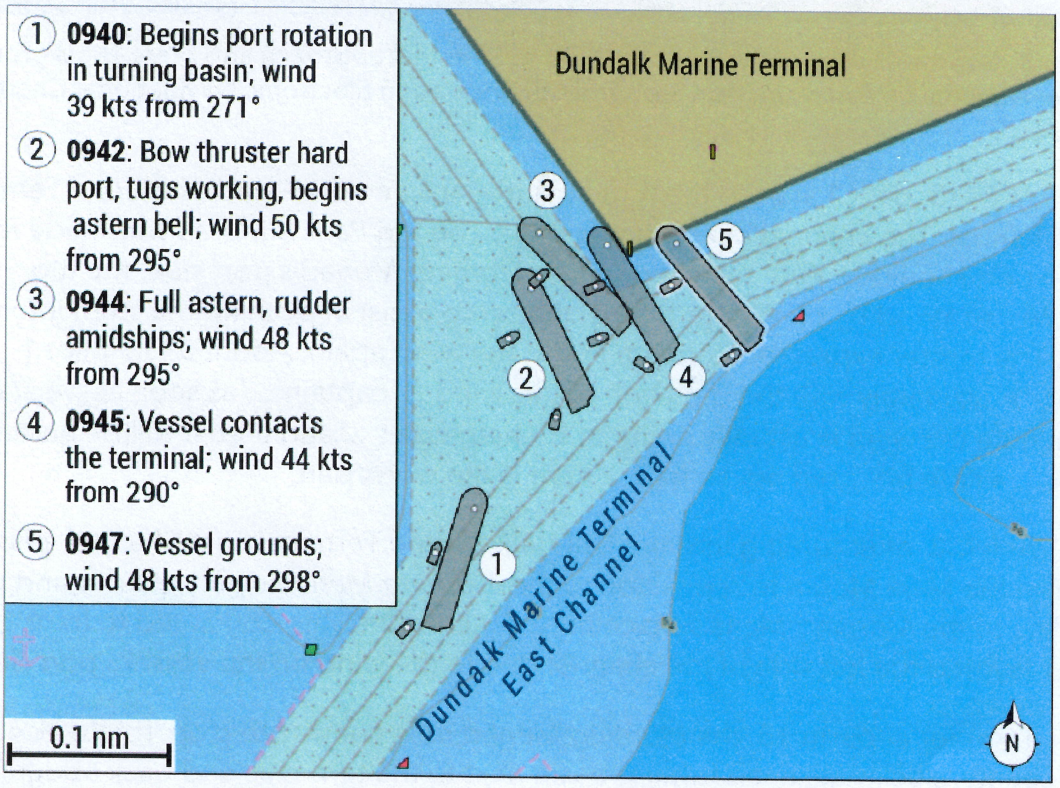


Figure 4. Locations and positions of the *Morning Menad* and two harbor assist tugs as the ship attempted a rotation to port in the turning basin and was pushed by the wind into the Dundalk Marine Terminal. (Background source: National Oceanic and Atmospheric Administration Electronic Navigational Chart US5BALCB as viewed on Made Smart)

The crew let go the port anchor and two shots of chain in an attempt to arrest the vessel's movement. However, at 0947, the ship grounded, opposite of berth 11. The wind at that time was 48 knots, still coming from the west-northwest.

Two additional tugs later arrived, and the four tugs freed the ship at 1117. The *Morning Menad* anchored in safe water at 1154 and eventually moored at another berth at the terminal at 1730.

After the casualty, pilot 2 told investigators that the bollard pull of two tugs in combination with the ship's functional bow thruster was adequate to dock the ship based on wind predictions for the day of the casualty. Pilot 1 told investigators, "With the tugboat power that we had on that size ship, the bow, even in 20, 25, even 30 knots of wind, we should have been able to pick that bow up."

Pilot 2 told investigators that the National Oceanic and Atmospheric Administration Physical Oceanographic Real-Time System website he consulted predicted sustained gusts of 28 or 29 knots, and the real-time sensor at the former Francis Scott Key Bridge location was consistent with those forecasted winds. He stated that the actual winds were "way higher than that," and explained that typically the winds in Baltimore Harbor are less than those in the Chesapeake Bay. He further stated, "So I had assumed that this was going to be the case on the 5th, and indeed it was not. We had every bit, maybe stronger, inside the harbor than there was out on the bay. So it got us in trouble, in a nutshell."

Pilot 2 also told investigators that an alternate plan for the *Morning Menad,* if the wind was too high to safely moor the vessel at berth 13 after they had turned the vessel around, would have been to sail back out of the channel to an anchorage.

1.3 Additional Information

1.3.1 Damage

The *Morning Menad* suffered damage to its starboard freshwater tank and its bulbous bow. The starboard freshwater tank had a holed and fractured side shell plate, a deformed side shell plate, a deformed side shell frame, and a deformed tank top. The bulbous bow was also fractured and dented (see figure 5). Repairs were estimated at $200,000.



Figure 5. External view of damage to the *Morning Menad* near the bulbous bow.

The ship's contact with the terminal dock caused mechanical spalling damage to the concrete fascia wall, deformed bollards, a damaged navigation light, and various bent signs (see figure 6). A terminal CCTV system was also damaged. Damages to the facility totaled about $1.2 million.



Figure 6. *Left to right*: Damage at the corner of berths 10 and 11; dock damage on berth 11. (Source: Moffat & Nichol)

1.3.2 Forecasted Weather

A cold front marks the leading edge of a cold, dry air mass. Cold fronts routinely form every few days in the winter and move westward across the continental US. They are typically associated with a surface low pressure. Cold fronts are accompanied by gusting and quickly veering winds, usually from south or southwest to northwest.

A low-pressure system first appeared on surface analysis charts 3 days before the casualty, on December 2. On December 3, at 0903, the vessel operator emailed the *Morning Menad* crew and others, warning them to prepare for heavy weather using the appropriate checklist. By the time the ship arrived at the Cape Henry pilot station on December 4, the low-pressure system was east of Lake Huron with an associated cold front stretching to Oklahoma.

The pilots obtained their weather forecast from the National Weather Service (NWS) website, while the *Morning Menad* crew had access to a commercial provider. Each NWS Weather Forecast Office issued Area Forecast Discussions (AFD), which described the short-term weather conditions within the region and contained a marine section with additional marine-related issues. The latest AFD as of the ship's arrival at the Cape Henry pilot station was issued at 2132 on December 4 and stated that a gale warning would be in effect between 0600 and 1900 on December 5. The AFD specifically warned of a "potent cold front crossing the waters on Thursday morning [December 5], all waters will see gale conditions with gusts up to around 45 knots. A few storm force gusts are possible with initial frontal passage around mid morning." The coastal weather forecast issued a few minutes later, at 2135, predicted west winds, 20 to 25 knots, with gusts to 35 knots for Baltimore Harbor.

In a 0050 update on December 5, the NWS warned of gusts "increasing to 40 kt [knots] in the late morning and early afternoon." By 0400, gale force winds had reached the southern portions of Chesapeake Bay, and an updated AFD warned of "a blustery westerly wind to overspread the waters with gusts up to 35 to 45 knots" following passage of the cold front.

This forecast remained unchanged over the next several iterations, including the 0936 forecast, the last before the casualty. A corresponding urgent Marine Weather Message was also issued to this effect, stating: "Mariners should alter plans to avoid these hazardous conditions. Remain in port, seek safe harbor, alter course, and/or secure the vessel for hazardous conditions."

As of 1000, the surface analysis chart depicted the cold front extending from New Jersey southwestward through eastern Maryland, Virginia, western North

Carolina and South Carolina, and then westward across Georgia and Alabama. According to the station models, the cold front by then was located east of the casualty site.

The closest weather station to Baltimore Harbor, which pilot 1 and pilot 2 used as a reference, was located at the site of the former Francis Scott Key Bridge. Screenshots from the National Oceanic and Atmospheric Administration website used by the pilots on the day of the contact showed predicted 20-knot winds with observed winds over 30 knots. This sensor, however, had an elevation of 15 feet, lower than the center of the sail area of the *Morning Menad*.

1.3.3 Postcasualty Actions

Following the casualty, on September 12, 2025, US Coast Guard Sector Maryland-National Capital Region published Findings of Concern 012-25, "Wind Related Decision Making: Prioritizing Safety During Vessel Maneuvers."[6] The document cited the *Morning Menad* dock contact and listed two contributing factors and five findings of concern that could mitigate the risks associated with the contributing factors, if implemented. One of the findings of concern was to establish procedures that "grant docking pilots the discretion to change berth assignments in emergent situations when deemed necessary."

[6] See https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/CG-5PC/INV/foc/USCGFOC_012-25.pdf.

2 Analysis

While under pilotage in gale-force westerly winds with two harbor assist tugs alongside, the roll-on/roll-off vehicle carrier *Morning Menad* attempted to rotate counterclockwise in the Dundalk Marine Terminal East Channel turning basin before docking. The vessel subsequently contacted the dock and grounded.

Cold fronts are not unusual in the Chesapeake Bay and Baltimore area in the wintertime. Mariners are trained to be aware of changing weather conditions due to a cold front. The front that arrived on the morning of December 5 had appeared on surface weather analysis since December 3. The *Morning Menad*'s operators warned their vessel crews of the weather forecast the same day the first analysis was issued, 2 days before the casualty. The forecast and AFD issued by the NWS the evening of December 4 warned of the front's arrival and predicted up to 40 knots of wind. The NWS subsequently issued a gale warning for waters including Baltimore Harbor starting at 0600 on December 5. Thus, the ship's crew, pilots, and facility personnel had access to information that adequately warned of the approaching dangerous weather.

PCTCs like the *Morning Menad* have tall, flat-sided superstructures that run almost the entire length of the hull and present several thousand meters of sail area (the *Morning Menad* had over 3,000 square meters [32,000 square feet] of sail area).[7] As such, these ships are sensitive to high winds. Wind will affect these ships the most when on the vessel's beam, forcing the ship sideways (swaying), heeling the ship to leeward, and/or increasing the turning moments required to turn the ship.

To moor at berth 13, the *Morning Menad* had to stop, rotate about 150° in the turning basin next to the terminal, and back about five ship lengths into the slip. To rotate the vessel for the docking maneuver, Pilot 1 reduced the vessel speed and began to turn the bow to port and push the stern to starboard using the rudder, bow thruster, and tugs. On the casualty day, predicted westerly gale force winds first presented on the port quarter, but then the wind increasingly affected the ship as it rotated in the turning basin and the wind moved toward the beam. As the vessel turned to port, nearly on a northerly heading, westerly winds were acting on the port beam, resulting in the vessel's maximum sail area being subject to the wind load (force). The high winds on the port side rendered the tugs and the vessel's maneuvering capabilities insufficient, causing the vessel to move laterally to starboard, toward the pier, and eventually contact the pier. Had the ship been able to

[7] *Sail area* is the area of the above-water silhouette of a vessel and cargo, as viewed from abeam.

complete its rotation to port and reach its intended heading of 247°, the high wind would have been on the starboard bow, which presented a much smaller sail area than its beam profile, minimizing its effect on the vessel as it backed into the berth.

Proper voyage planning and bridge resource management includes assessing potential hazards and planning mitigation strategies. When the pilots and master realized that the wind in Baltimore Harbor was higher than they had expected, they could have deviated from the original plan to dock the *Morning Menad* at berth 13. Pilot 2 told investigators that there was a mitigation strategy for the high wind: Had the wind been too severe to back into the slip once the vessel was turned around, he would have sailed the ship back out to an anchorage to await favorable weather. Alternatively, they also could have moored port side to berth 13 to await better weather and turn the ship around later. (The *Morning Menad*'s cargo ramps were on the starboard side, and, therefore, it would have needed to be moored starboard side to the pier to unload cargo.)

Recognizing the developing risk due to the high winds, the *Morning Menad* master asked the pilots about docking at a different berth. In this case, mooring at berth 9 or 10 would have been a simpler option, because the face of the Dundalk Marine Terminal was to leeward (the wind would have helped push the vessel toward the pier when docking), and mooring at berth 9 or 10 would not have required the *Morning Menad* to turn to such an extent into the strong wind. However, the pilots told the master to arrange a berth change himself with his agent, even though they were just minutes from docking at the terminal. The master was unable to reach the agent, and therefore the pilots continued with the plan to dock at berth 13.

Both pilots told investigators that they thought they had the appropriate resources to successfully dock the ship given the expected weather conditions. However, when they realized that the winds were higher than they had expected them to be, the pilots did not adjust their docking plan. Despite the weather warning, the master's request to moor elsewhere, and the challenge of maneuvering a vessel with a known large sail area in significant wind, the pilots attempted to turn the ship around and moor the ship as planned. Continuation bias is an unconscious cognitive bias to continue with an original plan despite changing conditions. The pilots' continuation with the planned docking at berth 13 despite their knowledge that the wind gusts were higher than what they had been expecting was consistent with continuation bias.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the contact of the roll-on/roll-off vehicle carrier *Morning Menad* with the Dundalk Marine Terminal dock was the reluctance by the pilots to consider an alternative approach to moor the vessel when stronger wind conditions than they expected became apparent, resulting in strong beam winds acting on the vessel's large sail area, which prevented them from successfully carrying out the planned maneuver.

Vessel Particulars

Vessel	*Morning Menad*
NTSB vessel group	Cargo, General (Roll-on/roll-off vehicle carrier)
Owner/operator	Eukor Car Carriers (Commercial) / Wilhelmsen Ship Management (Commercial)
Flag	Republic of Korea
Port of registry	Jeju, Republic of Korea
Year built	2007
Official number	JJR-171074
IMO number	9318515
Classification society	Korean Register (KR)
Length (overall)	577.4 ft (176.0 m)
Breadth (max.)	105 ft (32.0 m)
Draft (casualty)	29.5 ft (9.0 m)
Tonnage	41,192 GT ITC
Engine power; manufacturer	1 x 16,950 hp (12,640 kW); MAN B&W Uljanik 8S50MC-C diesel engine

NTSB investigators worked closely with our counterparts from **Coast Guard Sector Maryland-National Capital Region** throughout this investigation.

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For more detailed background information on this report, visit the NTSB Case Analysis and Reporting Online (CAROL) website and search for NTSB accident ID DCA25FM009. Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting–

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