



STATE COMMISSION ON MARITIME ACCIDENT INVESTIGATION

FINAL REPORT 29/13

Serious marine casualty

M/T HORIZON APHRODITE

Bumping against a concrete cap of the head and damaging the fender frame
of the eastern breakwater at the exit from the port of Gdańsk on 22 September 2013

May 2014

The examination of the Horizon Aphrodite accident was conducted under the State Commission on Maritime Accident Investigation Act of 31 August 2012 (The Journal of Law item 1068) as well as norms, standards and recommended procedures agreed within the International Maritime Organisation (IMO) and binding the Republic of Poland.

The objective of the investigation of a marine accident or incident under the above-mentioned Act is to ascertain its causes and circumstances to prevent future accidents and incidents and improve the state of marine safety.

The State Commission on Maritime Accident Investigation does not determine liability nor apportion blame to persons involved in the marine accident or incident.

This report shall be inadmissible in any judicial or other proceedings whose purpose is to attribute blame or liability for the accident referred to in the report (Art. 40.2 of the State Commission on Maritime Accident Investigation Act).

State Commission on Maritime Accident Investigation
Chałubińskiego 4/6
00-928 Warsaw
Tel. +48 22 630 19 05, mobile +48 664 987 987
E-mail: pkbwm@mir.gov.pl
www.mir.gov.pl/pkbwm

Table of contents

1. Facts	4
2. General information	4
2.1.Ship particulars.....	4
2.2.Voyage particulars	5
2.3.Accident Information	6
2.4.Shore Services and Rescue Action Information.....	8
3. Circumstances of the Accident.....	8
4. The Analysis and Comments about Factors Causing the Accident with regard to Examination Results and Expert Opinions	13
4.1.Human Factors	13
4.2.Organizational Factors	18
4.3.Influence of External Factors on the Occurrence of the Accident	18
5. Description of Examination Findings Including the Identification of Safety Issues and Conclusions	18
6. Safety Recommendations.....	20
6.1.Pilot Station in Gdańsk.....	21
6.2.Maritime Administration.....	21
7. List of Photographs	21
8. List of Figures	22
9. Glossary and Abbreviations	22
10. Information Sources	22
11. Composition of the Accident Investigative Team.....	23

1. Facts

On 22 September 2013, the routine repair of the product carrier Horizon Aphrodite was completed in the “Remontowa” Ship Repair Yard in Gdańsk (GSR). In the afternoon, the vessel with a pilot on the bridge and the assistance of three tugboats (towlines on bow and stern and the assisting tugboat) unberthed from the Ostrowica I quay and was heading to the exit from the port.

Before reaching the western breakwater, the tugboat, which assisted the vessel on the port side, was released first and then the tugboat on the bow. While passing the western breakwater the vessel started to drift towards the eastern breakwater. The captain and the pilot were trying to avoid the contact of the hull with the fender frame securing the breakwater by manoeuvring with the engine and the rudder. However, the ship fell on the starboard: first with the stern causing damage to three dolphins, and then with the side moving forward and rubbing against spans of the guard frame. Finally, the vessel hooked on to the concrete cap of the breakwater head. The vessel stopped, and then began to move backwards and away from the guard frame. The engine working backwards, the tugboat pulling the stern away to the centre of the channel and western wind caused that the bow of the vessel again started to approach the frame and leaned against it causing damage to another four dolphins. After re-attaching the tugboat to the bow, the vessel was pulled away from the guard frame of the breakwater and it was led at the roadstead, where she let go anchor.

Because of the contact of the vessel with the cap of the eastern breakwater head, the outer shell was damaged on the starboard side in the bow section of the vessel. After a short stop at anchor, Horizon Aphrodite was led back into the Ship Repair Yard to be repaired.

2. General information

2.1. Ship particulars

Vessel's name:	Horizon Aphrodite
Flag:	Liberian
Shipowner:	Mondor Marine Inc. Trust Company Marshall Islands
Ship's operator:	Horizon Tankers Ltd S.A. Greece
Classification society:	ABS
Vessel's type:	product carrier
Call signal:	A8QT3

IMO number:	9407366
Gross tonnage (GT):	29 828
Year of build:	2008
Power:	10,965 KM (MAN B&W)
Width:	32.20 m
Length overall:	183.09 m
Hull material:	steel
Minimum crew:	14 men
Type of the VDR recorder:	Consilium Navigation AB-VDR M4



Photograph 1. Horizon Aphrodite

2.2. Voyage particulars

Ports en route:	Gdańsk – Ship Repair Yard
Port of destination:	Paldiski, Estonia
Type of navigation:	unlimited
Cargo information (quantity and type):	no cargo
Manning:	2 Georgians, 7 Russians, 11 Filipinos, 1 Pole
Passenger Information:	no passengers

2.3. Accident Information

Kind of accident:	serious maritime casualty
-------------------	---------------------------

Date and time of event: 22/09/2013 at 16:00 LT (15:00 UTC)
Geographical area of the accident: the Gdańsk Bay - the mouth of the Martwa Wisła (“Dead Vistula” river)
Nature of the water region: internal waters
Weather during the accident: Wind W5°B, sea state 3, good visibility, water temp. 12°C, air temp. 15°C
The operational status of the vessel during the event: partially ballasted
The effects of the accident to the vessel: Damage to the starboard plating at the level of alternating draught line in the bow part



Photograph 2. Damaged hull at the level of alternating draught line



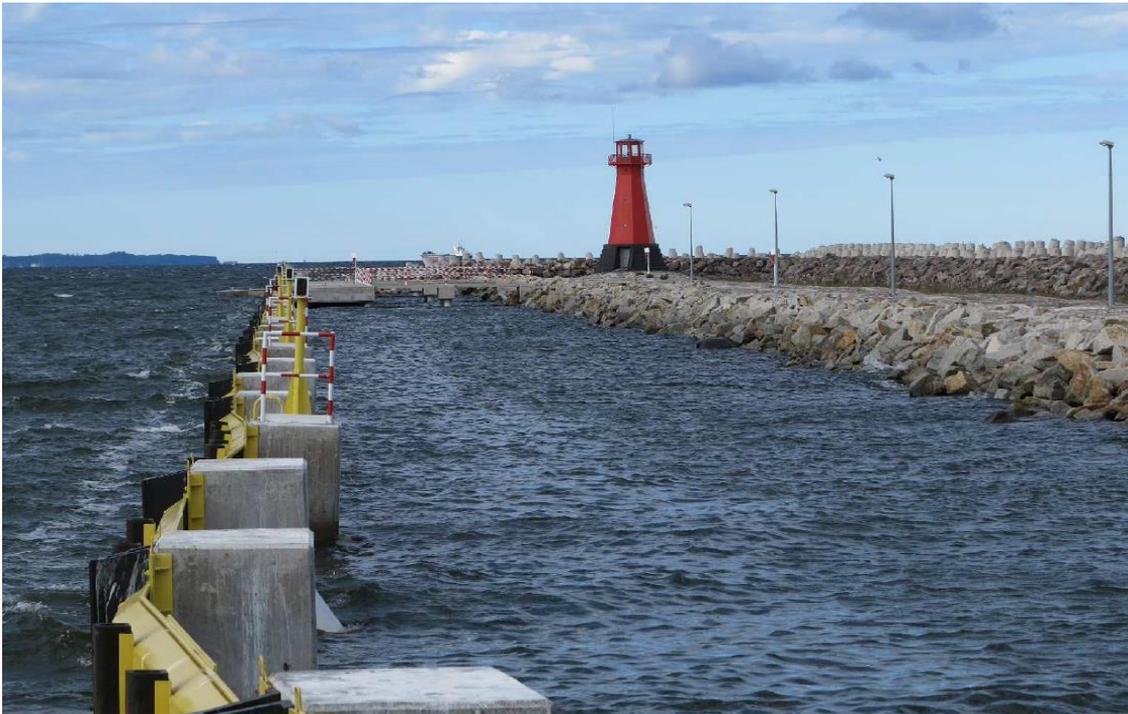
Photograph 3. Torn hull plating - view from the inside of the vessel

Consequences of the accident to the cargo: the vessel did not carry cargo

Consequences of the accident to the people: no one was harmed

Consequences of an accident to the port infrastructure:

damage to the fender frame construction of the eastern breakwater: above water - damage to more than a dozen steel bays (slides) between dolphins at a distance of ca. 100 m; under water - deviation of 7 dolphins from the vertical position.



Photograph 4. Damaged bays and supports (dolphins) of the fender frame of the breakwater



Photograph 5. Fender on a dolphin with traces of red paint stripped off the vessel's hull

2.4. Shore Services and Rescue Action Information

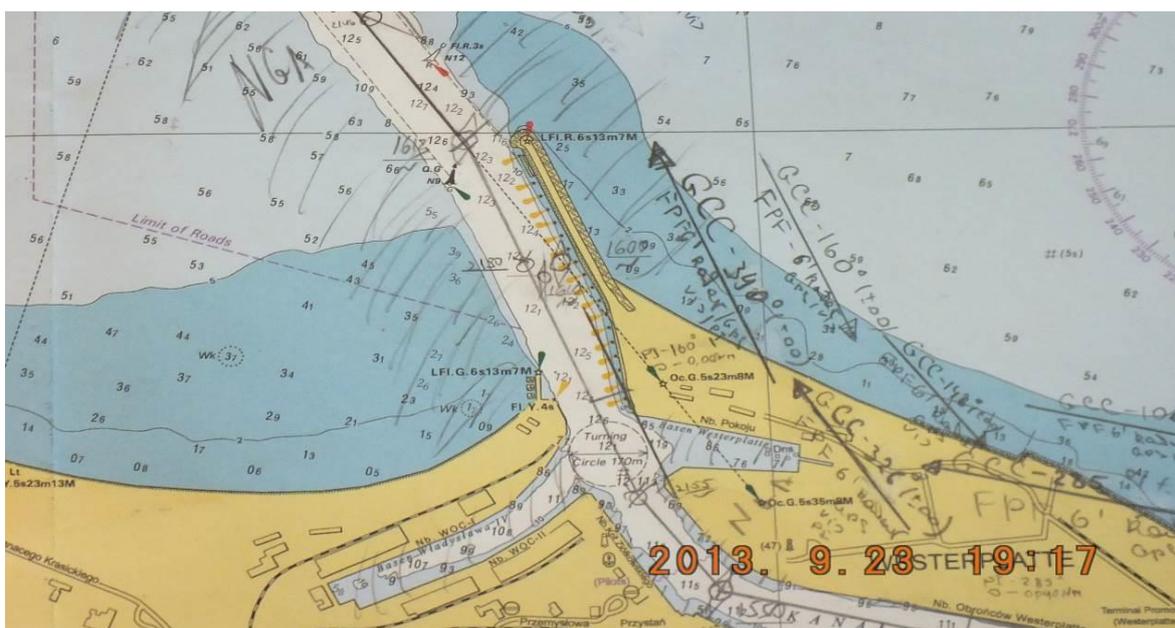
The accident resulted in the need to involve the shipyard repair crew to repair damaged hull. It did not require conducting rescue operations.

3. Circumstances of the Accident

On 22 September 2013 at ca. 14:00 the vessel Horizon Aphrodite standing in the Ship Repair Yard GSR started preparations for departure from the yard to the roadstead of the port of Gdańsk. At 14:30 the main rudder was tested. At 14:40 the pilot boarded the vessel. At ca. 14:55 the main engine was blown through and prepared for work.

The draught of the vessel was 3.00 m at the bow and 5.2 m at the stern and corresponded to the state of ballasting required when docking the vessel. The propeller and the rudder blade were submerged in about 80-85%.

At 14:55 a towline from the tugboat Taurus was attached at the bow and the one from the tugboat Virtus at the stern. When throwing the mooring lines, the tugboat Ajaks was pushing the vessel to the quay and then stayed around the bow as assistance. At 15:05, Horizon Aphrodite threw the last line and unberthed from the quay of the GSR in the Ostrowica I Basin. During manoeuvres the bridge was occupied by the captain, chief officer and AB, at the bow there were a boatswain and two OSs, at the stern - second mate and two ABs, in the engine room there were chief engineer, I engineer and II engineer and electrician. After the departure from the berth, the pilot directed the ship to the port exit.



Photograph 6. Navigation Chart BA 2680. Exit lane from the port of Gdańsk

While passing through the Zakręt 5 Gwizdków (the Turn of Five Whistles) the tugboat Ajaks was assisting the vessel at the starboard and at the turn of the ferry base, it changed position to the port side of the vessel. At the level of Władysława IV Basin, the tugboat Ajaks was released. At that time the vessel was moving at the speed of ca. 3.5 knots with the corresponding engine setting at *Dead Slow Ahead*.

At ca. 15:52 after the release of the tugboat Ajaks, before reaching the western breakwater, the pilot informed the captain that he would throw the towline at the bow and ordered the tugboat Taurus to loosen the towline in order to let it go. He passed similar command to the tugboat at the stern (Virtus). Because of the captain's intervention, who suggested to release the tugboats only after passing the red head (of the eastern breakwater), the pilot canceled the command for tugboats. At ca. 15:54, when the bow passed the green head (of the western breakwater), the vessel began drifting towards the eastern breakwater. The pilot ordered the tugboat at the stern to hold the stern towards the green head. After a while, he gave a similar command to the tugboat at the bow. Because at that time the towline at the bow had already been thrown, the pilot decided to accelerate. At ca. 15:55 the speed of the vessel was increased up to *Slow Ahead*. The pilot ordered the tugboat at the bow to move to starboard. Since the vessel did not stop drifting towards the eastern breakwater, when the stern passed the green head, the pilot repeated the request to the skipper of the stern tugboat to hold the stern of the vessel "windward" (to pull to the west). The manoeuvres with the main rudder: *Port 20, Hard a Port, Midships, Port 20, Hard a Port* did not improve the situation. The vessel continued drifting and the bow began to approach the breakwater more rapidly. The pilot ordered the stern tugboat to stop pulling the stern away and tried to use the bow tugboat to push the bow from starboard to port, but the tug skipper decided not to enter the tugboat between the breakwater and the vessel.

At ca. 15:57 the vessel increased engine speed to *Half Ahead*. The manoeuvres with the main rudder: *Hard a Port, Midships, Starboard 10, Midships* did not prevent further drifting of the vessel to the eastern breakwater and the vessel fell starboard onto the fender frame protecting the breakwater.

At ca. 15:58 moving at the speed of 3.7 knots the vessel first rubbed with the stern against steel bays between main dolphins no. 7 and 8 (equipped with warning lights and ladders), damaging three dolphins, and then began to move forward along the fender frame of the breakwater rubbing its steel bays. Subsequent manoeuvres with the rudder: *Left 10, Hard a Port, Midships*, did not push the vessel away from the fender frame.



Photograph 7. The vessel leaning starboard side against the fender frame protecting the breakwater

At ca. 15:59 the pilot stopped the engine, called the tugboat Taurus and ordered to give tow-line at the bow. Then he commanded *Slow Astern*. At ca. 16:00 the vessel got caught at the bow part of the starboard side in the concrete cap of the eastern breakwater head and stopped.



Photograph 8. The cap of the breakwater head with a visible point of contact with the vessel's hull

The engine working astern and the tugboat at the stern pulling the vessel away in the south-westerly direction to the center of the fairway caused that the vessel started to move backwards. The pilot stopped the engine and first ordered *Very Slow Ahead* and then *Slow Ahead* and *Half Ahead*. Before the towline was attached at the bow, the bow of the vessel drifted for a second time to the fender frame of the eastern breakwater and at ca. 16:05 at the speed of 1.5 knots (backwards) the vessel leaned against it damaging four more dolphins between main dolphins no. 5 and 6.

After fixing the towline at the bow, the tugboats Taurus and Virtus pulled the vessel off the breakwater. At ca. 16:20 after moving by 3-4 cable-lengths to the North-West of the red head of the eastern breakwater two tugboats were released.

After half an hour the vessel arrived to the anchorage No. 3 at the roadstead and at 16:50 dropped anchor at position $\varphi = 54^\circ 27,67'N$, $\lambda = 018^\circ 42,46'E$. The pilot and the captain of the vessel took the pilot boat and made visual inspection of the hull from the outside. There were noticed abrasions on the starboard almost along the entire length of the vessel and two dents in the bow section near the bulbous bow.



Photograph 9. Abrasions of the hull on the starboard side



Photograph 10. Dents on the hull on the starboard side

After inspecting the tanks at the bow, the crew stated that the plating of the hull in one of the dents had been punctured, and one of the longitudinal frames deformed.



Photograph 11. The deformed longitudinal frame in the ballast tank

Later, the same day after leaving the anchorage the vessel returned to the Gdańsk Ship Repair Yard to have the plating repaired.



Photograph 12. The cut out part of the hull's metal plating in the place of tear



Photograph 13. Inserted new metal plate in the plating of the hull

4. The Analysis and Comments about Factors Causing the Accident with regard to Examination Results and Expert Opinions

Because of the accident both, the hull of the vessel Horizon Aphrodite and the port infrastructure - the fender frame of the eastern breakwater of the port of Gdańsk – were damaged. Too dynamic contact of the hull with the fender frame caused the damage by the vessel of dolphins of the fender of the eastern breakwater and bays between the dolphins. The contact was caused by wind drift and ineffective manoeuvres conducted by the captain and the pilot of the vessel. Improper manoeuvres with the engine after the vessel had contacted the fender frame caused the damage to the vessel itself.

4.1. Human Factors

In the opinion of the Commission, the pilot leading the vessel out of the Port of Gdańsk made a mistake by dropping the tugboat at the bow too early.

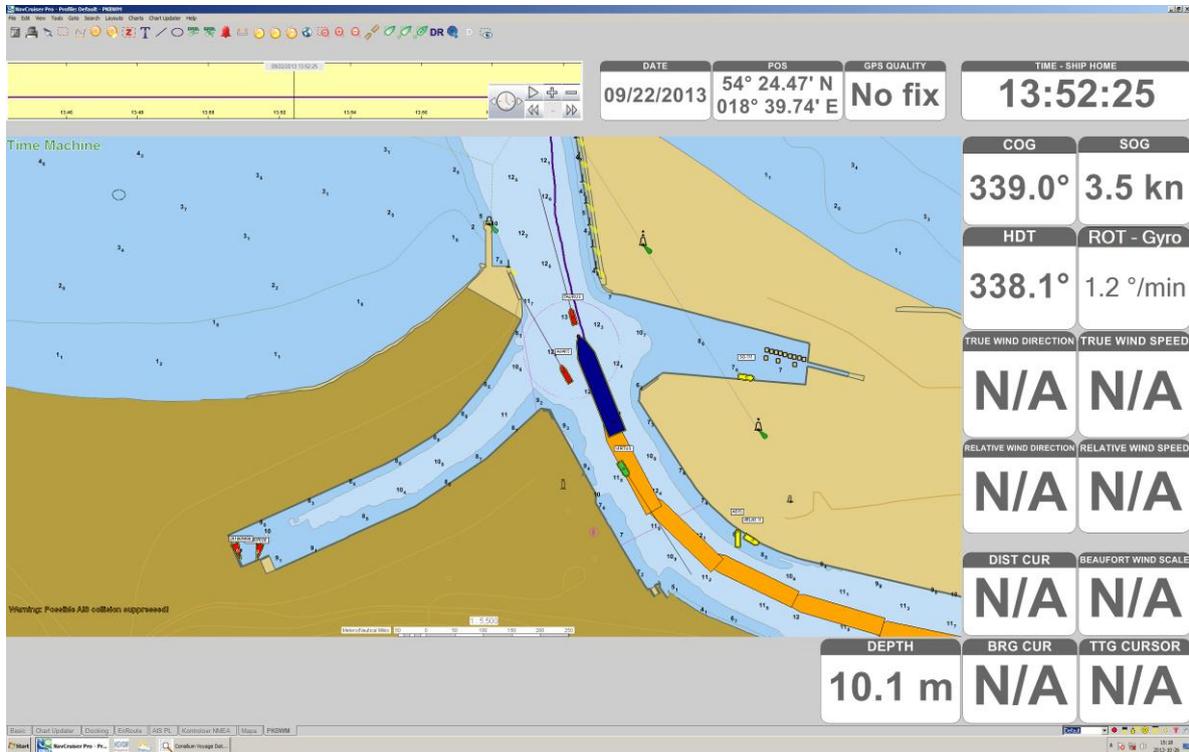


Figure 1. Location of the vessel at the time the command was given to drop the towline at the bow (13:52:25 LT)

The pilot should have foreseen that at such a large windage area of an empty and not fully ballasted vessel, and with a strong wind blowing almost perpendicularly to the ship's side, the vessel would be exposed to its effect, especially after passing the quays and port buildings, which accounted for some protection from the wind. Using a tugboat at the bow after the vessel had passed the western breakwater, holding the vessel on the towline from the port or pushing the bow from the starboard, would prevent drifting and causing damages.

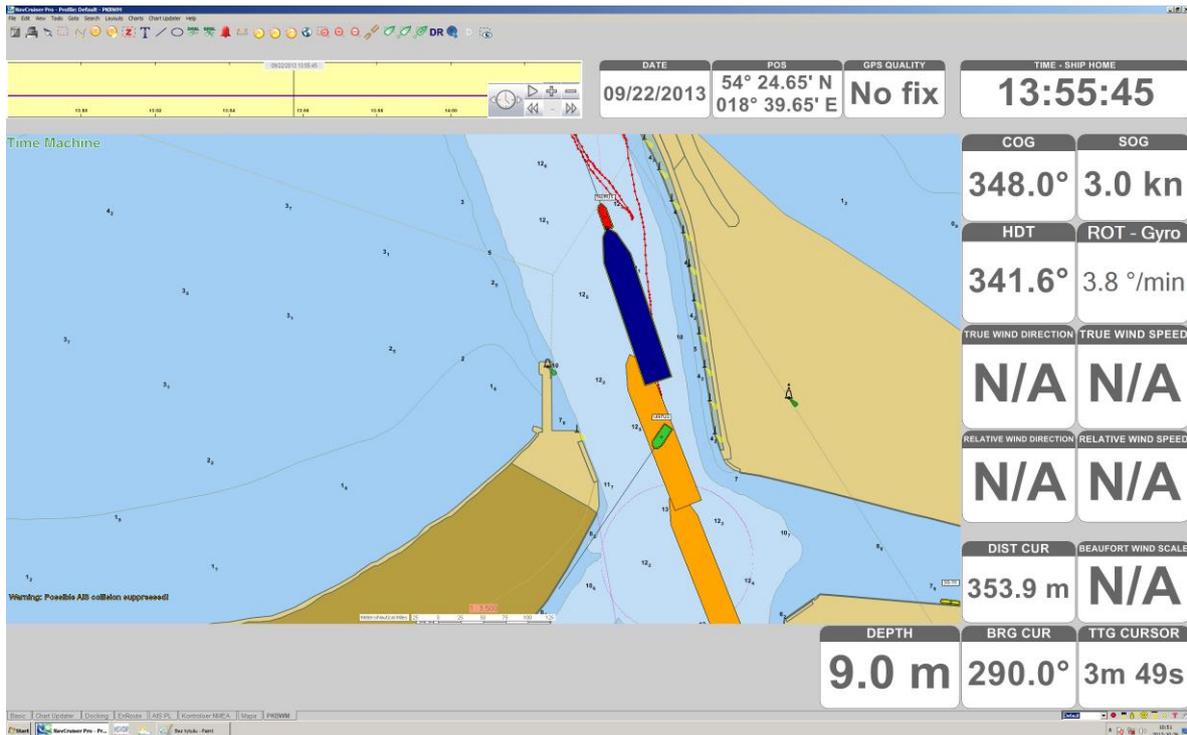


Figure 2. Position of the vessel at the time of passing the head of the western breakwater (15:55:45 LT)

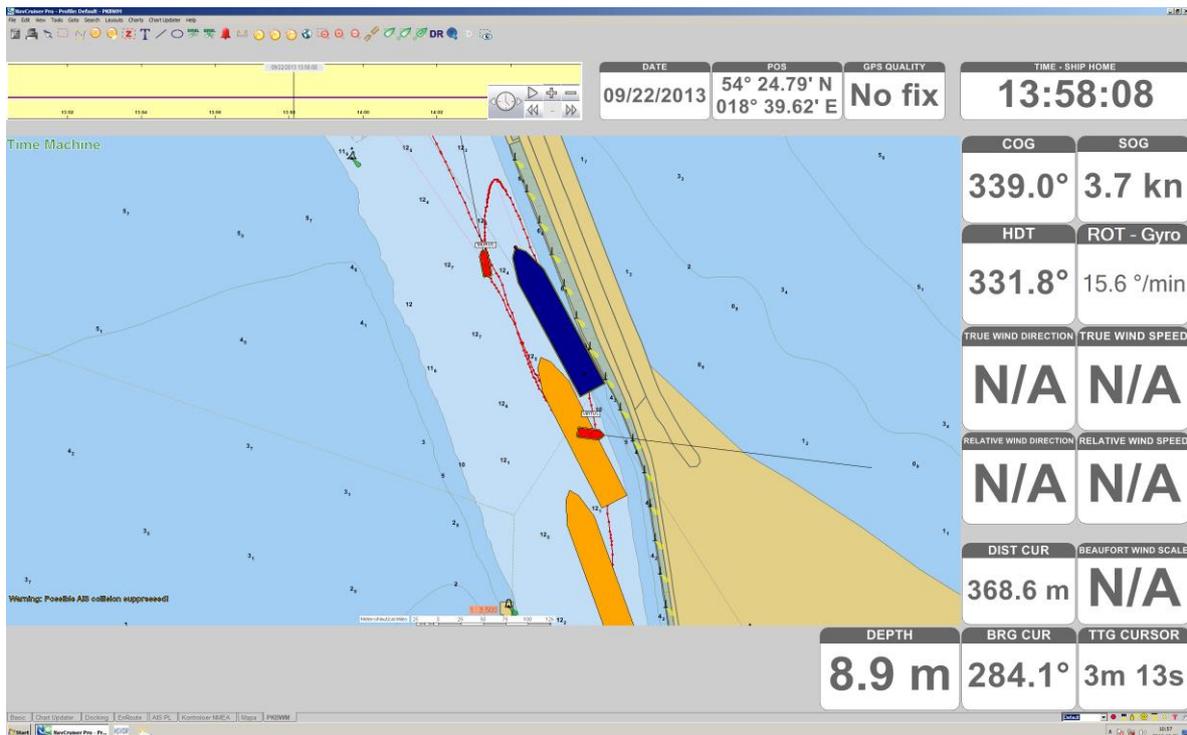


Figure 3. Position of the vessel at the time of bumping with the stern into the fender frame (15:58:08 LT)

Drift of the vessel had started before it reached the western breakwater and continued - despite the use of a tugboat at the stern - until the vessel rested on the fender frame.

Hitting on the concrete cap of the breakwater head, which caused damage to the vessel in her bow part, could have been prevented if the captain or the pilot used full power of the main engine (the vessel was capable of almost 11 thousand HP). The applied manoeuvre *Slow Astern* proved to be ineffective and the vessel stopped just after hitting the cap of the head.

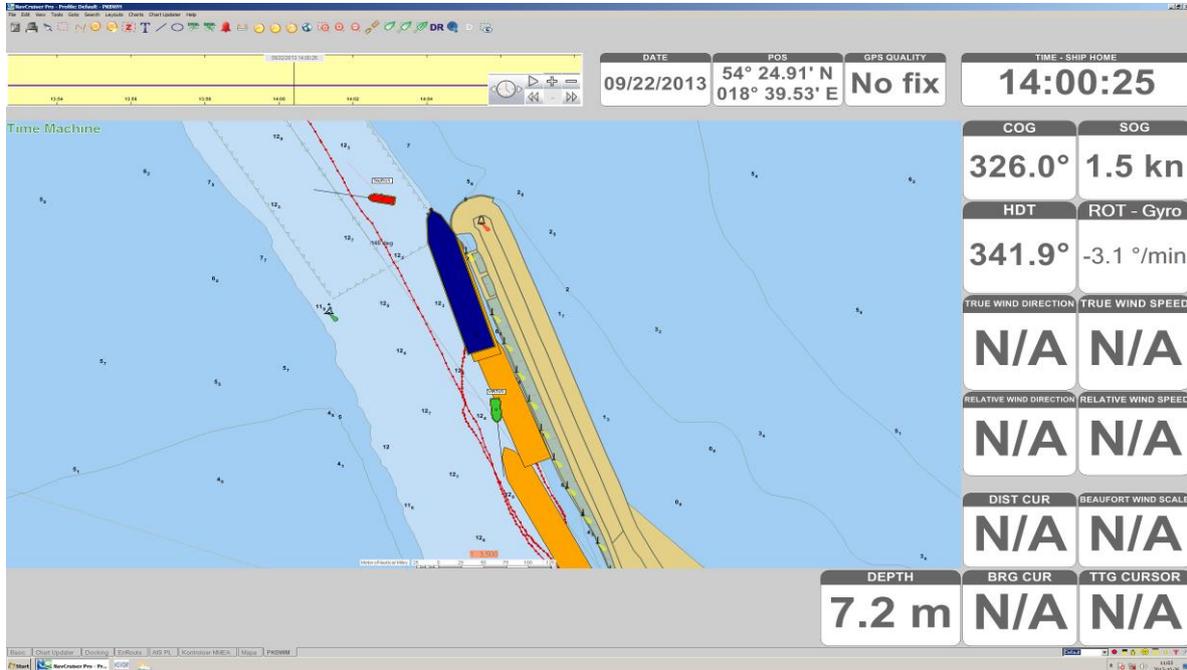


Figure 4. Position of the vessel at the time of hitting on the cap of the breakwater head (16:00:25 LT)

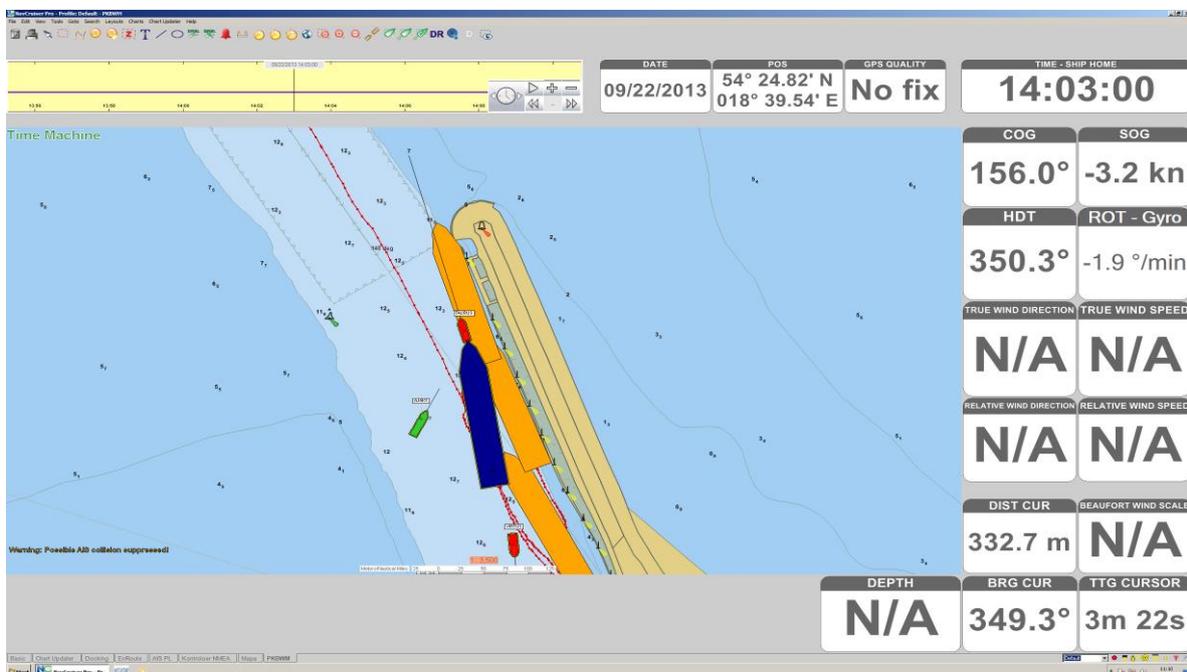


Figure 5. Position of the vessel after moving away from the fender frame (16:03:00 LT)

After the vessel moved away from the head and the fender frame of the breakwater due to a strong drift and prolonged time of giving the towline at the bow, there was another blow at the fender frame (with the bow). There passed almost 6 minutes from the time the pilot ordered to give the towline until it was fixed. The towline was fixed 10 seconds before the blow.

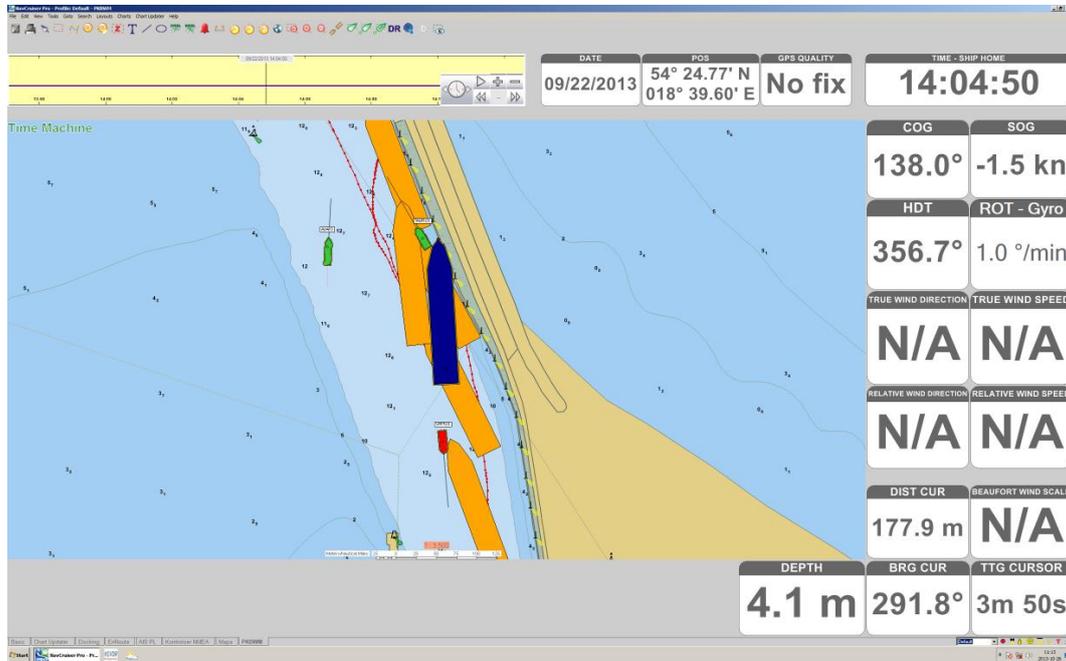


Figure 6. Position of the vessel at the time the bow leaned against the fender frame (16:04:50 LT)

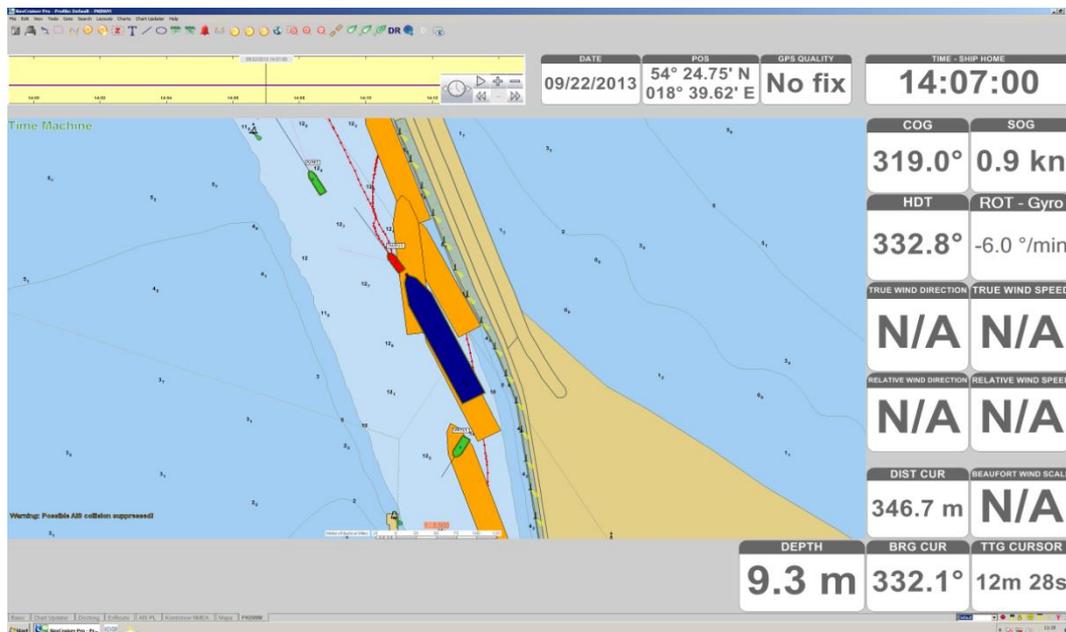


Figure 7. Position of the vessel after it was pulled away from the breakwater by tugboats (16:07:00 LT)

4.2. Organizational Factors

An organizational factor that could have had some effect on the occurrence of the accident was the lack of berth or a waiting area in the GSR yard where Horizon Aphrodite could have been ballasted to reach the draught at which the vessel would have a smaller windage area and the propeller and the rudder completely immersed in water.



Photograph 14. The chart BA 2680. Depths in the Ostrowica I Basin.

From information obtained during the investigation, it results that the ballasting of the vessel was to take place only after her departure to the roadstead of the port of Gdańsk.

4.3. Influence of External Factors on the Occurrence of the Accident

The external factor influencing the accident was western wind of 5-6^B blowing into the ship's side. The wind caused the drifting of the vessel in the direction of the eastern breakwater. Adrift, empty, and not fully ballasted vessel was not capable, without the aid of tugboats, to stay in the middle of the fairway: she leaned twice against the dolphins supporting the fender frame of the breakwater damaging them.

5. Description of Examination Findings Including the Identification of Safety Issues and Conclusions

In result of the investigation, the Commission considered that the main factor, which contributed to the accident, was the fact that the bow tugboat Taurus was released too early and the assisting tugboat Ajaks on the starboard at the bow was not used in the final phase of the manoeuvres when leaving the port channel. The pilot released the tugboats despite the prevailing adverse weather conditions. He did not take into account the current state of the half-ballasted vessel in which its side surface exposed to the wind was over 500 m² greater than in the normal state of ballasting (i.e. a state with full all ballasts, giving draught of 6.20 m at the bow and 8.20 m at the stern).

After releasing the tugboat at the bow (when the bow passed the head of the western breakwater, and the vessel began drifting in the direction of the eastern breakwater under the influence of strong wind) the pilot indeed ordered to turn the rudder *Hard a Port* – however, he did not increase the engine settings to allow for faster return of the vessel by the increased hydrodynamic force at the rudder. In addition, he ordered the stern tugboat to pull away the stern towards the green head of the western breakwater (to the left) which prevented the stern from going to the right thereby directing the bow windward to the left - to the center of the fairway.

The decision to increase the engine speed to *Half Ahead* was delayed and this manoeuvre did not prevent the vessel from drifting and leaning the stern against the fender frame of the breakwater.

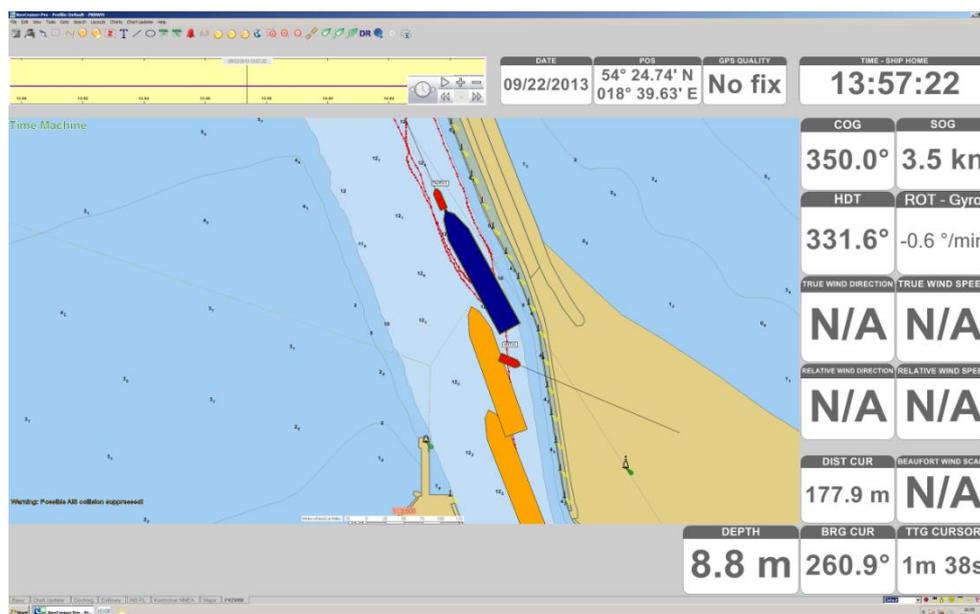


Figure 8. Position of the vessel at the time of the Half Ahead command (15:57:22 LT)

After bumping of the vessel against the fender frame, instead of stopping the vessel quickly with the *Half Astern* maneuver the pilot recommended only *Slow Astern* with the engine. It was not enough to stop the vessel quickly and it bumped against the cap of the head and tore the plating of the hull. The recommendation to work astern with the engine was given not before the lapse of a minute of the vessel's moving along the fender frame.

In the last phase of emergency manoeuvres at the fender frame, when the engine was working *Dead Slow Astern* and the vessel was moving backwards at the speed of approx. 3 knots, and the tugboat at the stern was pulling the ship away into the southwesterly direction to the center of the fairway, the pilot stopped the engine, gave the command *Midships* and then *Dead Slow* followed by *Slow Ahead*. The towline at the bow had not yet been given and the tugboat could not stop the bow drifting towards the breakwater, additionally entered into rotation to the right due to the pilot's manoeuvres: *Slow Astern* and *Hard to Starboard*. The command: *Half Ahead* and turning the rudder *Hard a Port* given later did not help because the tugboat at the stern had reacted to the pilot's command to pull windward earlier than the tugboat at the bow and the vessel once again leaned the bow against the fender frame causing its damage.

The Commission has objections to the cooperation of the pilot with tugboats while manoeuvring the vessel on its way out. The pilot was not aware of the fact that the bow tugboat dropped the towline (it slackened the towline and collected it when thrown by the crew), despite the withdrawal of a command to drop the towlines due to the intervention of the ship's captain.

This meant that the pilot did not speed up right after leaving the western breakwater, because he counted on the possibility to use the tugboat at the bow and assistance in pulling the bow away to the center of the fairway (windward). Lack of coordination between the tugboats in the last phase of emergency manoeuvres - the pilot ordered both tugboats to pull windward – caused uncontrolled turn of the vessel (stern to the port, bow to the starboard) and blow of the bow against the fender frame.

6. Safety Recommendations

The State Commission on Marine Accident Investigation has considered reasonable issuing safety recommendations that form a proposal of measures, which may contribute to prevention of similar accidents in future, to the following entities.

6.1. Owner of the Horizon Aphrodite

The Commission has recommended that the shipowner, Horizon Tankers Ltd. SA Greece, should develop such procedures for preparation of the vessel to exit port that would ensure that the vessel would not be able to exit port not fully ballasted and they would allow the captain to conduct ballasting operations regardless of previously adopted operating plans and schedule of voyages.

6.2. Pilot Station in Gdańsk

The Commission has recommended that pilots should use tugboats and advise captains to use their assistance until the vessel is pulled away to the roadstead – behind the head of the eastern breakwater to the water region with safe depths (for a given draught of a vessel), taking into account weather conditions during the pilotage and manoeuvrability of a vessel.

6.3. Maritime Administration

The Commission has recommended that the Director of the Maritime Office in Gdynia should place - in the Order introducing port regulations (Part II Chapter I: Additional provisions for the port of Gdańsk) - a provision regulating the release of tugboats from assisting vessels with large windage area (including in particular not fully ballasted vessels) exiting the port channel, not before reaching the roadstead, depending on the existing weather conditions.

7. List of Photographs

Photograph 1. Horizon Aphrodite	5
Photograph 2. Damaged hull at the level of alternating draught line.....	6
Photograph 3. Torn hull plating - view from the inside of the vessel	6
Photograph 4. Damaged bays and supports (dolphins) of the fender frame of the breakwater .	7
Photograph 5. Fender on a dolphin with traces of red paint stripped off the vessel's hull.....	7
Photograph 6. Navigation Chart BA 2680. Exit lane from the port of Gdańsk	8
Photograph 7. The vessel leaning starboard side against the fender frame.....	10
Photograph 8. The cap of the breakwater head with a visible point of contact	10
Photograph 9. Abrasions of the hull on the starboard side.....	11
Photograph 10. Dents on the hull on the starboard side.....	12
Photograph 11. The deformed longitudinal frame in the ballast tank	12
Photograph 12. The cut out part of the hull’s metal plating in the place of tear	13
Photograph 13. Inserted new metal plate in the plating of the hull.....	13
Photograph 14. The chart BA 2680. Depths in the Ostrowica I Basin.....	18

8. List of Figures

Figure 1. Location of the vessel at the time the command was given to drop the towline at the bow (13:52:25 LT)	14
Figure 2. Position of the vessel at the time of passing the head of the western breakwater (15:55:45 LT)	15
Figure 3. Position of the vessel at the time of bumping with the stern into the fender frame (15:58:08 LT)	15
Figure 4. Position of the vessel at the time of hitting on the cap of the breakwater head (16:00:25 LT)	16
Figure 5. Position of the vessel after moving away from the fender frame (16:03:00 LT)	16

Figure 6. Position of the vessel at the time the bow leaned against the fender frame (16:04:50 LT)	17
Figure 7. Position of the vessel after it was pulled away from the breakwater.....	17
Figure 8. Position of the vessel at the time of the Half Ahead command (15:57:22 LT)	19

9. Glossary and Abbreviations

1. ABS - American Bureau of Shipping (American classification society)
2. B - Beaufort
3. LT - local time
4. MAN B&W - producer of ship's engines
5. UK - United Kingdom
6. UTC - universal time
7. W - westerly

10. Information Sources

Notification of the accident

Materials from hearing of witnesses

Data from the vessel's S-VDR

Expert opinion of WUPROHYD Gdynia – Stocktaking of damages and the assessment of the cost of repair of the eastern breakwater inn the Port of Gdańsk

11. Composition of the Accident Investigative Team

The team conducting the examination was composed of:

the Team Leader: Krzysztof Kuropieska – a member of the State Commission on Maritime Accident Investigation

the Team Member: Marek Szymankiewicz – a Secretary of the State Commission on Maritime Accident Investigation