Bundesstelle für Seeunfalluntersuchung
Federal Bureau of Maritime Casualty Investigation
Federal Higher Authority subordinated to the Ministry of Transport
and Digital Infrastructure

Summary
Investigation Report 06/14

Serious Marine Casualty

Grounding of the MV MERITA in the port of Rostock on 9 January 2014

9 January 2015

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The investigation was conducted in conformity with the Law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law – SUG) of 16 June 2002, amended most recently by Article 16(22) of 19 October 2013, BGBl. (Federal Law Gazette) I p. 3836.

According to said Law, the sole objective of this investigation is to prevent future accidents and malfunctions. This investigation does not serve to ascertain fault, liability or claims (Article 9(2) SUG).

This report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to Article 34(4) SUG.

The German text shall prevail in the interpretation of this report.

Issued by:
Bundesstelle für Seeunfalluntersuchung – BSU
(Federal Bureau of Maritime Casualty Investigation)
Bernhard-Nocht-Str. 78
20359 Hamburg
Germany

Director: Volker Schellhammer
Phone: +49 40 31908300 Fax: +49 40 31908340
posteingang-bsu@bsh.de www.bsu-bund.de

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1 Summary

The Cyprus-flagged Motor Vessel (MV) MERITA was sailing from Skulte in Latvia to Rostock in Germany laden with wood.
At 2050[1] on 9 January 2014, the pilot boarded to advise the ship's command as she proceeded through the sea canal to her berth in the port of Rostock. At about 2120, as the MERITA was passing the passenger pier, the ship's command lost control of the controllable pitch propeller system (CPP system). The ship started to turn to starboard and it was not possible to stop her. Moreover, the starboard anchor, which had been let go in the meantime, had no substantial effect. At 2124, the MV MERITA's stern grounded on the eastern bank of the sea canal. Two tugs were needed to free the ship and tow her to the next berth. Considerable material damage was caused to the MERITA's propeller and rudder. Further harm to people or the environment did not occur.

[1] Unless stated otherwise, all times shown in this report are local = UTC +1.

2 FACTUAL INFORMATION

2.1 Photo

© Hasenpusch Production

Figure 1: Photo of ship

2.2 Ship particulars

Name of ship:	MERITA
Type of ship:	Cargo ship
Nationality/Flag:	Cyprus
Port of registry:	Limassol
IMO number:	8422034
Call sign:	P3XA9
Owner:	AMISCO AS Tallin
Year built:	1985
Shipyard/Yard number:	J.J. Sietas, Hamburg/916
Classification society:	DNV GL
Length overall:	98.70 m
Breadth overall:	15.45 m
Gross tonnage:	3,329
Deadweight:	4,765 t
Draught (max.):	6.13 m
Engine rating:	1,070 kW
Main engine:	WÄTSILA VASA 6R32
(Service) Speed:	14.0 kts
Hull material:	Steel
Hull design:	Double bottom

2.3 Voyage particulars

Port of departure:	Skulte, Latvia
Port of call:	Rostock, Germany
Type of voyage:	Merchant shipping, international
Cargo information:	4,123 cbm of pinewood
Draught at time of accident:	F: 6.05 m – A: 6.10 m
Manning:	11
Pilot on board:	Yes
Canal helmsman:	No
Number of passengers:	0

2.4 Marine casualty information

Type of marine casualty:	Serious marine casualty – grounding
Date, time:	09/01/2014, 2125
Location:	Port of Rostock
Latitude/Longitude:	φ 54°10.3'N λ 012°06.0'E
Ship operation and voyage segment:	Harbour mode Arrival
Place on board:	Sternpost
Consequences (for people, ship, cargo, environment, other):	Rudder and propeller damaged; voyage could not be continued; call at shipyard necessary; no personal injuries or harm to the environment

Excerpt from Nautical Chart INT 1355, BSH

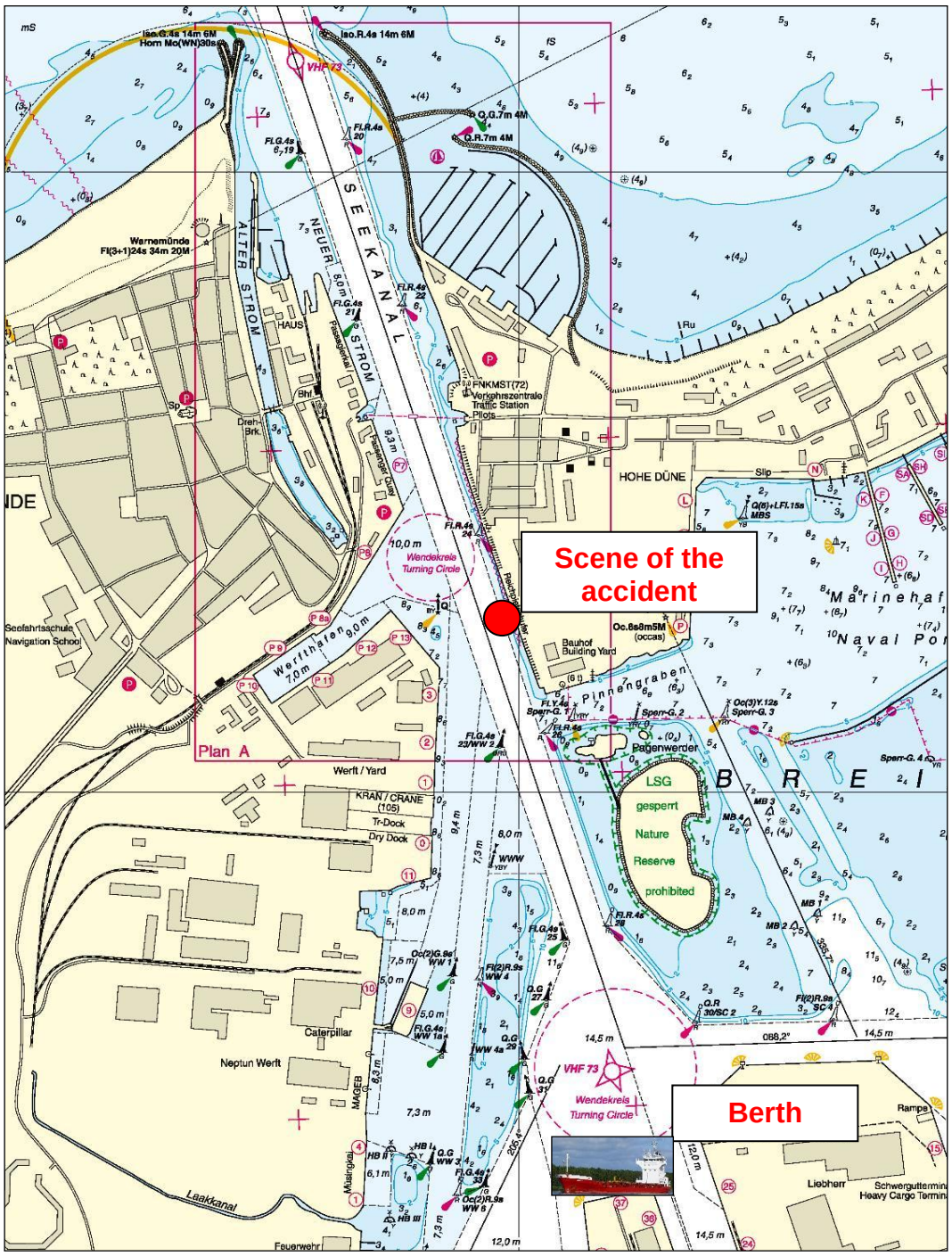


Figure 2: Nautical chart showing the scene of the accident and subsequent berth

2.5 Shore authority involvement and emergency response

Agencies involved:	Ship Safety Division (BG Verkehr), DNV GL, waterway police (WSP), Waterways and Shipping Authority (WSA) Stralsund (Vessel Traffic Service (VTS) Warnemünde)
Resources used:	Two tugs
Actions taken:	MV MERITA towed to pier
Results achieved:	No personal injuries or harm to the environment

3 COURSE OF THE ACCIDENT AND INVESTIGATION

3.1 Course of the accident

The MV MERITA, sailing from Skulte in Latvia to Rostock in Germany, was fully laden with wood. She reached the sea canal to the port of Rostock on the evening of 9 January 2014. At 2050, the pilot boarded and took charge of advising the ship's command. When the passenger pier was passed at 2120, the ship began to turn slowly to starboard. Following that, the pilot recommended that the speed be increased slightly to improve the manoeuvrability of the ship. The chief mate executed this on the engine telegraph. After a few seconds passed by without any response, the pilot said that the bow thruster should be operated hard to port. The MV MERITA's speed stood at about 6.5 kts and she continued to turn to starboard. To prevent a collision with the pier there, the pilot ordered full astern. At the same time, he informed VTS Warnemünde about the incident on VHF. Several seconds later, the bow thruster was set to hard to starboard. The speed ahead dropped continuously but the rate of turn to starboard increased. When the bow was at an angle of roughly 90° to the actual heading line, the pitch was set to zero. There was still no response from the engine, however. The starboard anchor was then dropped and the emergency stop switch pressed (see Fig. 3).
The anchor did not grip, resulting in the stern grounding on the eastern bank of the sea canal at 2124. Two tugs had to be ordered, which then pulled the ship free and towed her to the next berth.

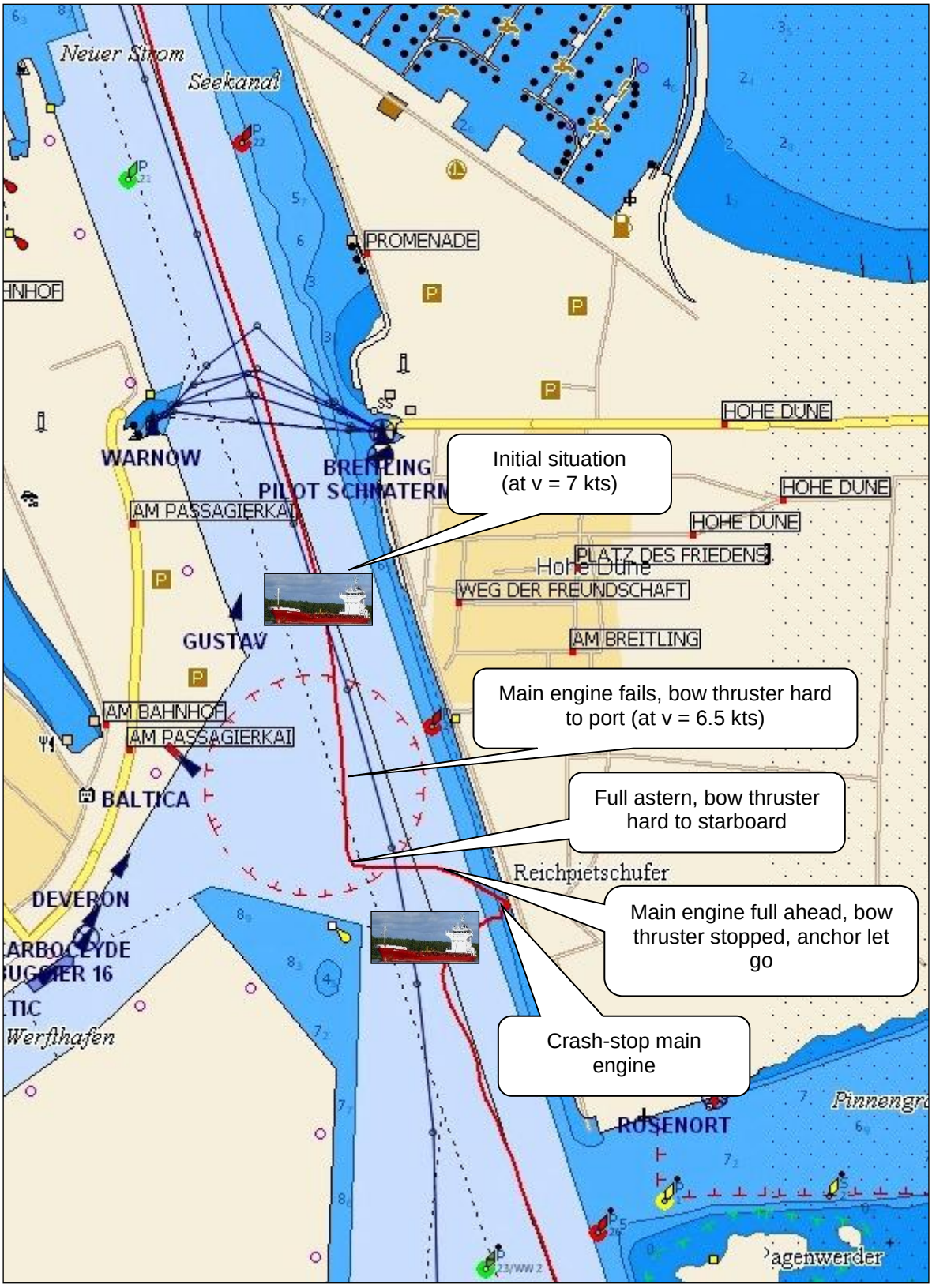


Figure 3: Course of the accident on the S-VDR

3.2 Investigation

3.2.1 Damage

Nobody was injured and there was no harm to the environment. The MV MERITA's rudder and propeller were so heavily damaged that it was necessary to call at a shipyard for one week.

3.2.2 Weather report

The BSU requested from Germany's National Meteorological Service (DWD) a detailed weather report describing the conditions in the Baltic Sea, the port of Rostock, in particular. This report was subsequently considered in the assessment and is reproduced in an editorially revised form below.

1. Underlying data

*Germany's National Meteorological Service has hourly measurements and observations from the surrounding stations (Kirchdorf/Poel, Boltenhagen, Pelzerhaken, Marienleuchte, and Fehmarn/Weste) at its disposal for the Rostock-Warnemünde area. Some of these stations are not manned permanently. Ship reports from the sea area concerned were also taken into account. Analyses of the DWD in Offenbach and the American GFS (**G**lobal **F**orecast **S**ystem) model were used to map the weather conditions. Forecasts of the ECMWF (**E**uropean **C**entre for **M**edium Range **W**eather **F**orecast based in Reading, England) global weather forecast model, the DWD's GME global weather forecast model, as well as the COSMO-EU and COSMO-DE regional weather forecast models, also from the DWD, were considered. Satellite images and rawinsondes were also analysed. The BSH (Federal Maritime and Hydrographic Agency) current model was also included.*

2. Weather conditions at 2124 CET (2024 UTC) on 9 January 2014

*The 'DAGMAR' low pressure system with core pressure of 1,000 hPa was located over the Irish Sea. It dropped rapidly to 985 hPa up until the evening of 9 January 2014 and was then already situated over Jutland. The closeness of the isobars was indicative of quite strong winds. The associated cloud structure of the 'DAGMAR' low pressure system is evident in the attached infrared satellite image (**Figure 4**). At the same time, showers and isolated thunderstorms moved across the region in the unstable air mass at the back of the oscillating cold front.*

3. Weather and sea state in the area of Rostock-Warnemünde at 2124 CET (2024 UTC) on 9 January 2014

Wind:

A west-south-west wind prevailed in the area of Rostock Warnemünde at the time of the accident. The average measurement was 23 knots (6 Bft) with as much as 35 knots (8 Bft) measured in places on the open water.

Due to the unstable air mass with showers and thunderstorms, there were widespread gusts of 41 to roughly 47 knots (9 Bft) in the coastal area. As much as 10 Bft was registered in places on the open water in a northerly direction.

Weather and visibility:
Cloud cover was variable at the time of the accident. Precipitation was dying down somewhat. However, a narrow band with rain showers was already over the middle of Schleswig-Holstein, which slowly moved to the south-east. A weak thunderstorm passed across at 1800 UTC.

Temperature:
Air temperature stood at 8 degrees. Moreover, water temperatures of 6 degrees were measured.

Current:
The mean current velocity in the area of the accident was initially 0.1 knots in the layer between 0 and 5 m and increased to 0.3 knots from the west to south-west (Figure 5) at the time of the accident.

Wind and waves:
Predicted wind speeds were very consistent with the winds actually measured.
Here, wave heights of 1.5 to 2 m with south-westerly mean winds of 6 Bft were predicted for the time of the accident. According to the enclosed forecast, the wind was predicted to turn westward with wave heights amounting to 2.5 m (Figure 6) as early as 2100 UTC.

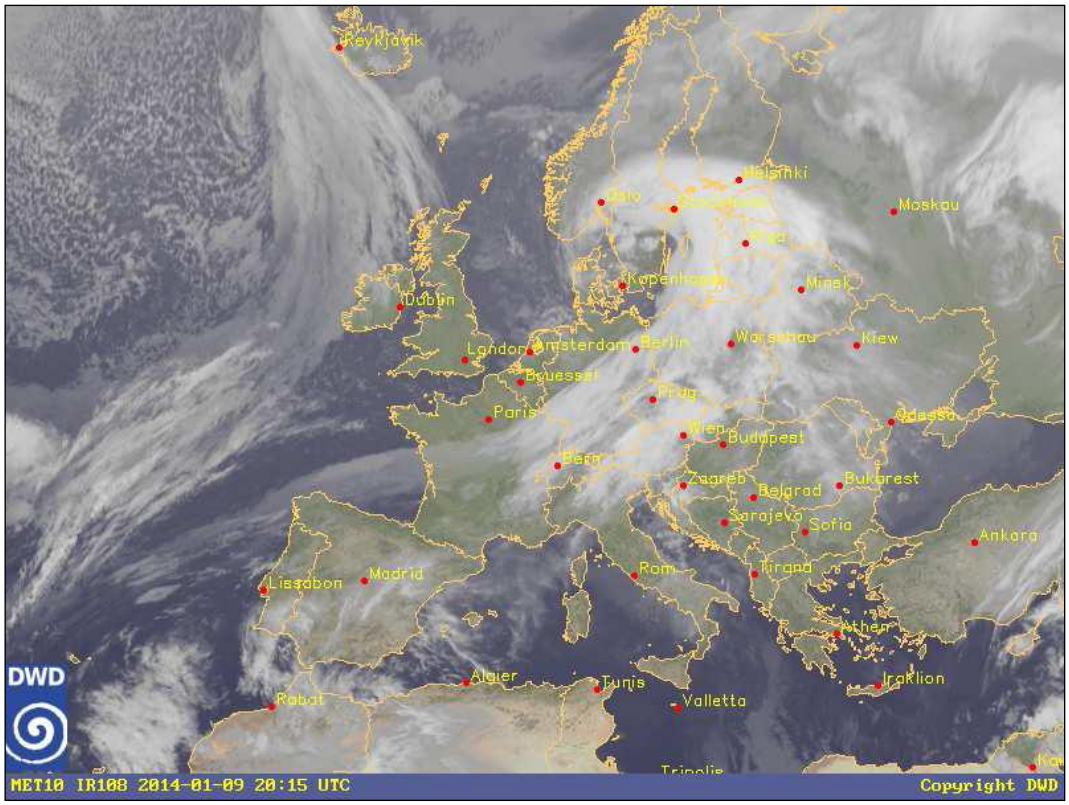


Figure 4: Infrared satellite image

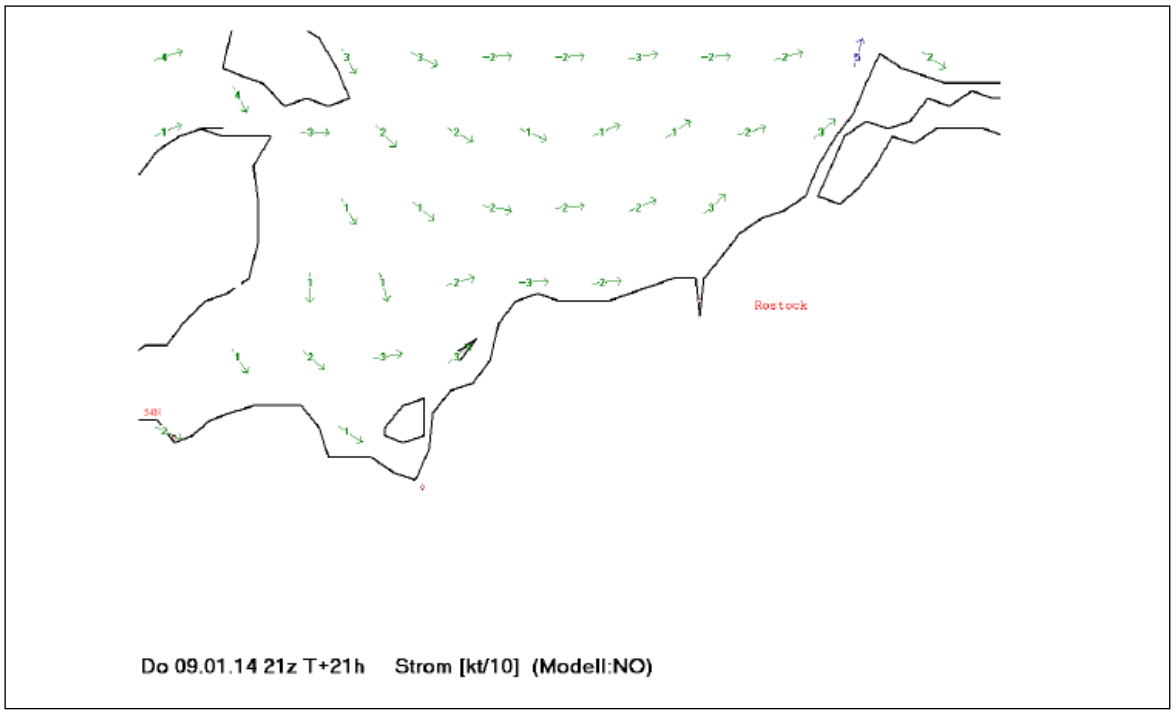


Figure 5: State of the current at the time of the accident

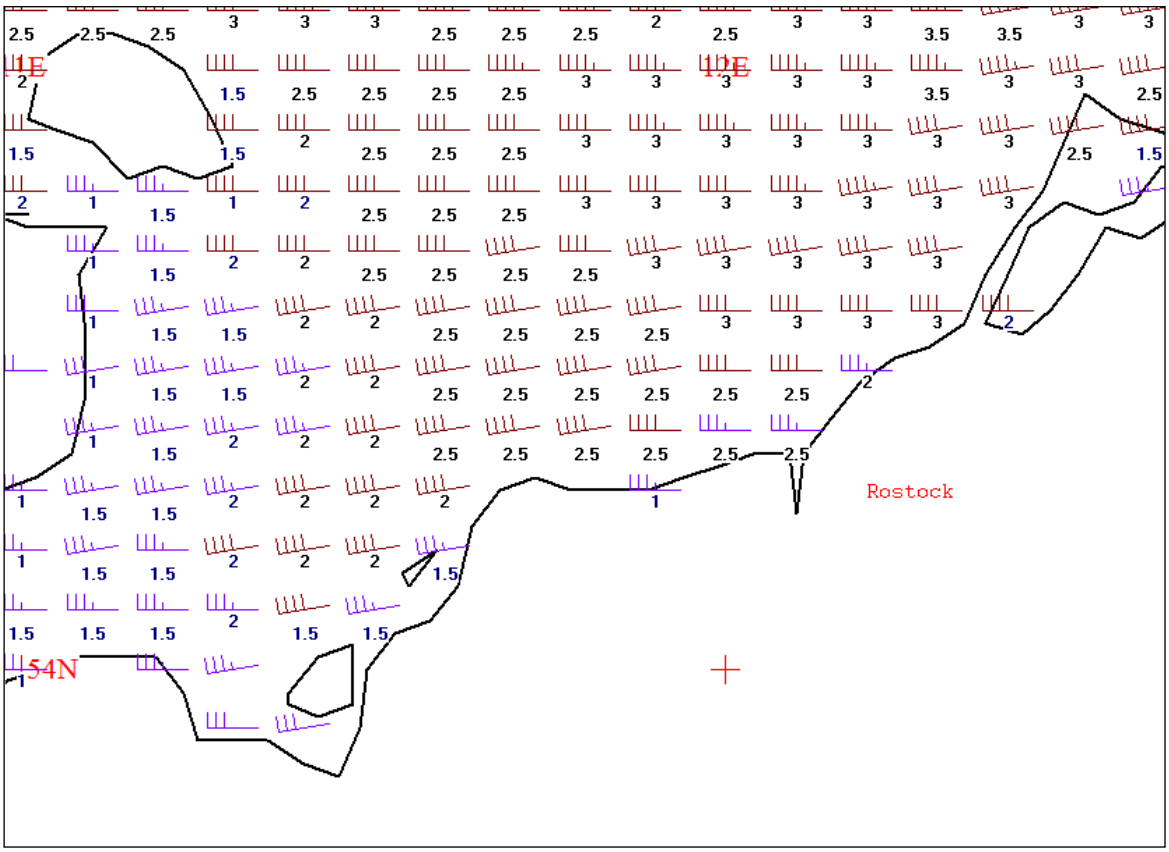


Figure 6: State of the wind at the time of the accident

3.2.3 Data from the voyage data recorder (VDR)

The MERITA is equipped with a Voyage Master II S-VDR made by Sperry Marine. The BSU secured the VDR data on board on 14 January 2014. Unfortunately, only the following data are available: audio recordings of the bridge microphones and VHF traffic, AIS data relating to the position, course and speed of the ship. Engine control data were not recorded.

3.2.4 Data from the VTS

VTS Warnemünde provided VHF and radar recordings. Several screenshots of the course of the accident are shown here for illustration.

Figure 7: Radar image at 211946

Figure 7 shows the point at which the ship started to turn to starboard. Figures 8 and 9 show the course of the voyage when the ship did not respond to the engine commands. MV MERITA finally grounded on the eastern bank at 2124, as shown in Figure 10.

The recordings of the VHF calls underpin previous findings vis-à-vis the course of the accident.

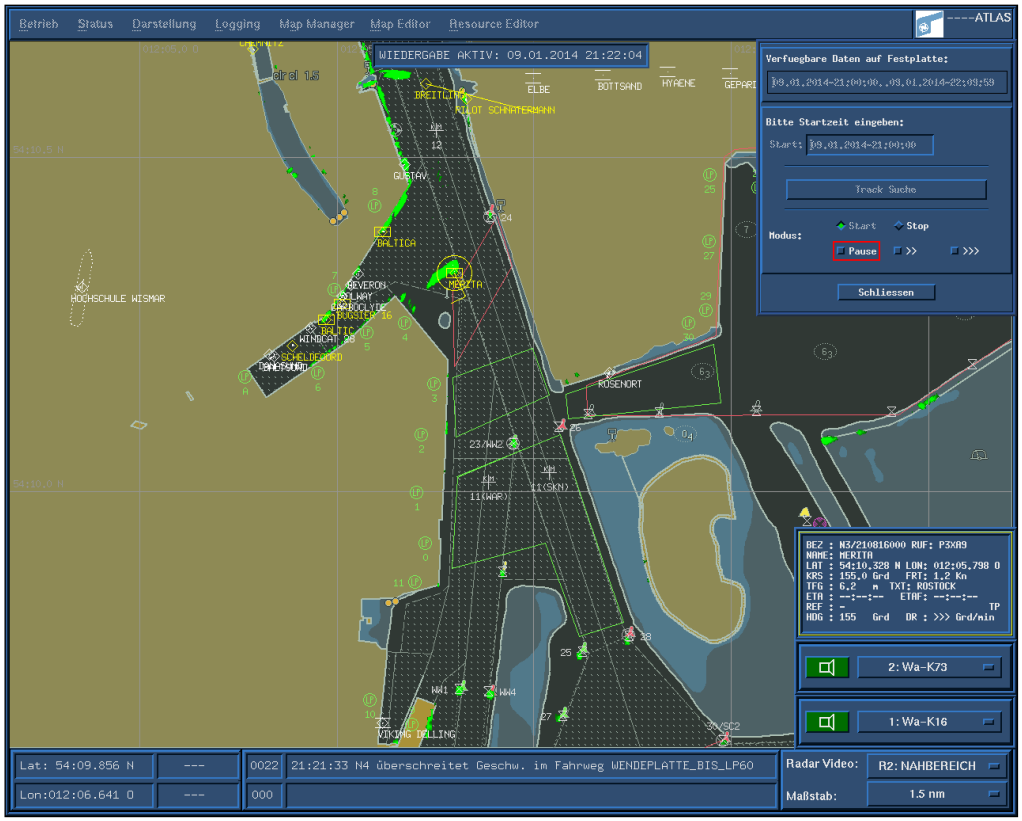


Figure 8: Radar image at 212204

Figure 9: Radar image at 212328

Figure 10: Radar image at 212546

3.2.5 On-scene investigation

Two BSU staff members carried out an inspection on board the MV MERITA on Tuesday 14 January 2014. The ship's command was co-operative and contributed important information for the investigation of the cause of the accident. It was possible to take charge of the VDR data. Numerous photos and copies of paperwork were made.

The course of the accident was reproduced in detail. In particular, it was indicated that only four minutes passed between the failure of the main engine control and the ship grounding. The master stated that he reportedly also attempted to work with the tiller[2] during the period indicated. This was supposed to override all the other control units but had no effect, either.

It was finally the chief engineer who explained the reason for this in the engine control room (ECR). Two hydraulic pumps drive the CCP system. One runs continuously and the other is on standby. Each pump has a coupling between its motor and the rotor blades. This coupling consists of a metal cap and plastic insert. The purpose of the plastic insert is to absorb vibrations until it is mechanically worn out (see Figs. 11 to 13), when it should be renewed.

[2] A tiller is a small control lever that bypasses all other input/commands from the steering control and is used to steer the rudder directly

It appears this did not happen in the case at hand. Therefore, after the plastic had worn the metal cap also wore until the connections ran smoothly over each other (see Figs. 14 and 15). Consequently, the rotor blades stopped turning and the pressure in the system dropped. The second pump was actuated automatically but this needed a few minutes until the pressure in the system was sufficiently high again.
A new coupling is shown in Figures 11 to 15, illustrating the facts.

Figure 11: New intact coupling

Figure 12: Section of coupling with plastic buffer

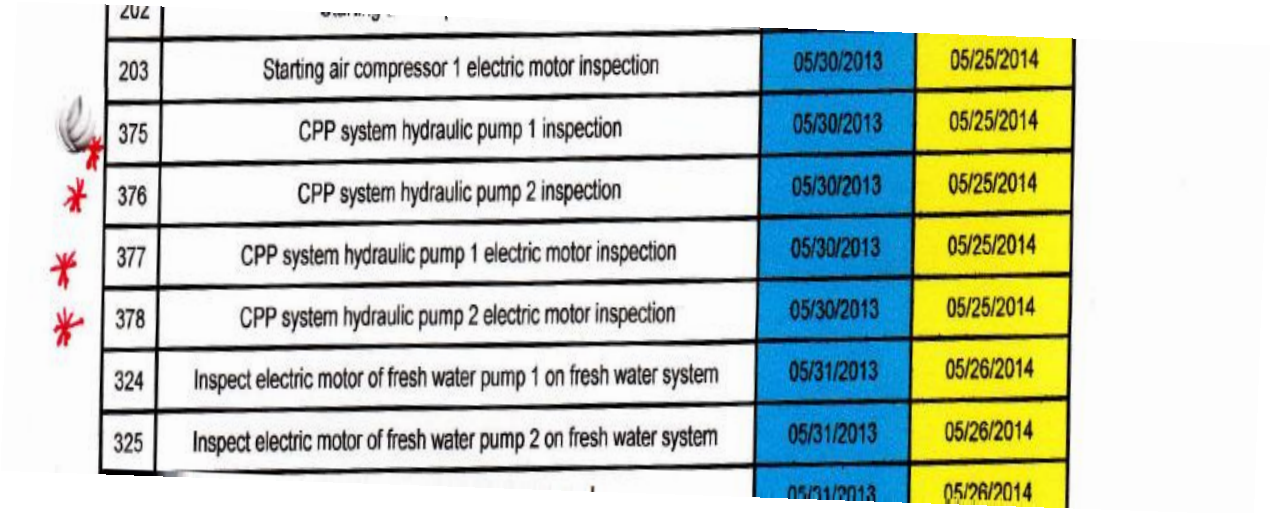
Figure 13: Section of coupling with plastic buffer removed

Figure 14: Coupling without plastic buffer

Figure 15: Coupling without metal cap

3.2.6 Maintenance intervals

Following a corresponding request, the owner provided the MV MERITA's maintenance plan (Plan Maintenance System – PMS). This indicates that the CPP system was last serviced on 30 May 2013 and the next was scheduled for 25 May 2014 (see lines 375 to 378 of Fig. 17).



203	Starting air compressor 1 electric motor inspection	05/30/2013	05/25/2014
375	CPP system hydraulic pump 1 inspection	05/30/2013	05/25/2014
376	CPP system hydraulic pump 2 inspection	05/30/2013	05/25/2014
377	CPP system hydraulic pump 1 electric motor inspection	05/30/2013	05/25/2014
378	CPP system hydraulic pump 2 electric motor inspection	05/30/2013	05/25/2014
324	Inspect electric motor of fresh water pump 1 on fresh water system	05/31/2013	05/26/2014
325	Inspect electric motor of fresh water pump 2 on fresh water system	05/31/2013	05/26/2014

Figure 16: Maintenance plan – excerpt

4 ANALYSIS

Fortunately, there were no personal injuries despite the severe material damage. Furthermore, it was possible to prevent any harm to the environment.

The review of the accident revealed no communication problems between the parties involved. Quite the opposite, the pilot and ship's command co-operated well during the period of the accident, in particular.

It was possible to determine the cause conclusively. The coupling of a hydraulic pump was worn out, thus interrupting the flow of power from the motor to the rotor of the pump. This caused the CPP system to fail and the ship's command suddenly had no influence on the speed of the ship. The MV MERITA's stern was already grounded by the time the second hydraulic pump had reached its full effect.

The environmental conditions had no significant impact on this.

According to the ship's maintenance plan, this coupling was renewed in May of the previous year and was not due for inspection for another four months. Therefore, it must be assumed that this coupling did not meet the material standards and thus wore out long before it was scheduled to.

5 SOURCES

- Enquiries by the waterway police
- Written statements
  - Ship's command
  - Owner
  - Classification society
- Witness accounts
- Nautical charts and ship particulars, BSH
- Official weather report by the DWD
- Radar recordings, ship safety services/vessel traffic services