



Bundesstelle für Seeunfalluntersuchung
Federal Bureau of Maritime Casualty Investigation
Federal Higher Authority subordinated to the Ministry of Transport,
Building and Urban Development

Summary Investigation Report 51/09

Marine casualty

Collision between the fishing vessel GITTE and the Ferry SKANIA on 17 February 2009 13 nautical miles east of Rügen

1 April 2010

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.

According to this the sole objective of the investigation is to prevent future accidents and malfunctions. The investigation does not serve to ascertain fault, liability or claims.

The present report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to art. 19 para. 4 SUG.

The German text shall prevail in the interpretation of the Investigation Report.

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1 Summary of the marine casualty

At about 0141 on 17 February 2009¹, the Ro/Ro ferry² SKANIA, sailing under the flag of the Bahamas, collided with the fishing vessel GITTE, registered in the Federal Republic of Germany, while en route from Świnoujście, Poland, to Ystad, Sweden. At the time, the fishing vessel anchored approx. 13 nm east of Rügen because of engine failure. For unknown reasons, the watchkeepers on the bridge of the ferry failed to notice the fishing vessel, which anchored on the ferry's course line, collided with the starboard forecastle and then dragged the fishing vessel with her anchor line until it broke shortly afterwards. The GITTE was damaged above the waterline; however, she remained buoyant and sailed to the port of Sassnitz under her own steam after the engine was repaired. The ferry also continued her voyage after communicating briefly with the Master of the fishing vessel. There were neither injuries nor environmental pollution.

¹ All times shown in this report are CET = UTC + 1.

² The SKANIA is internationally recognized as a Passenger Ro/Ro Cargo Ship.

2 Scene of the accident

Type of event: Marine casualty, collision between two vessels
 Date/Time: 17 February 2009, approx. 0141 h
 Location: 13 nm east of the island of Rügen
 Latitude/Longitude: ϕ 54°29.2'N λ 014°06.5'E

Excerpt from nautical chart 2921, BSH³

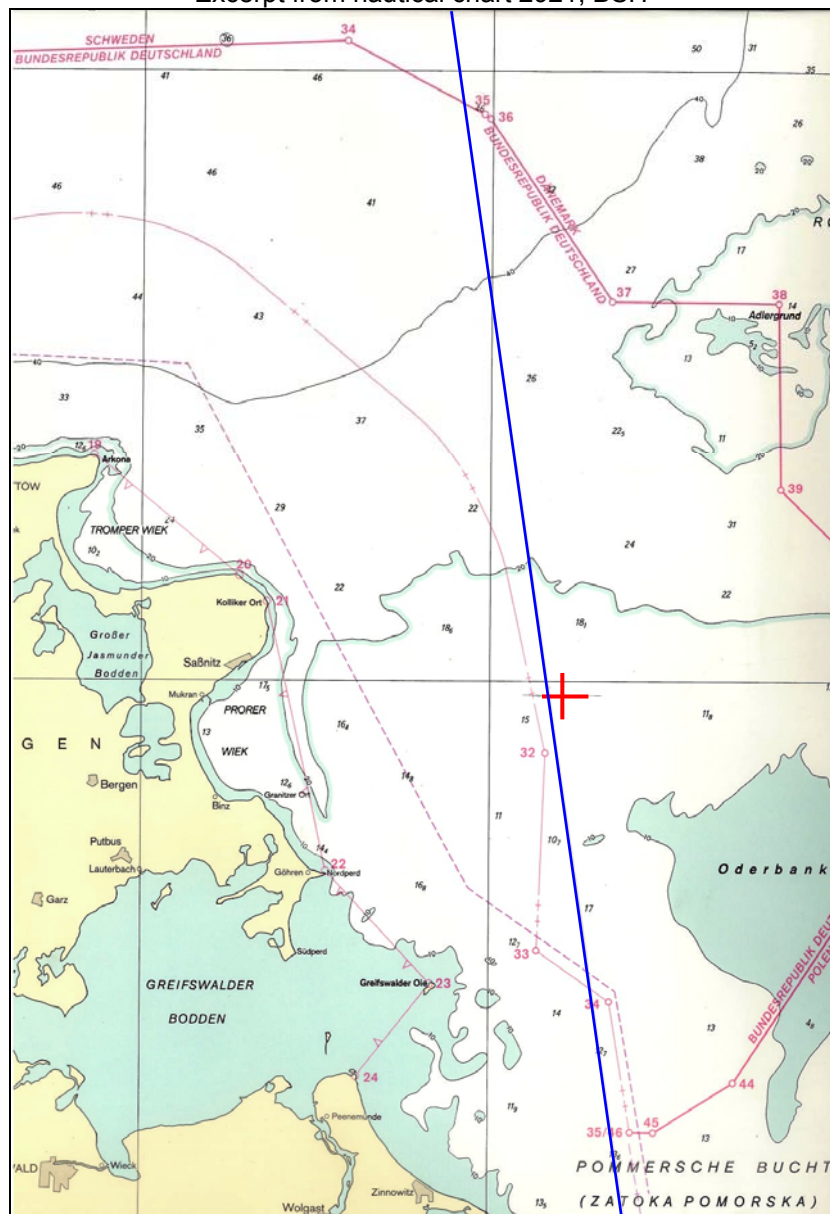


Figure 1: Scene of the accident⁴

³ BSH = Federal Maritime and Hydrographic Agency.

⁴ The blue line on the chart (drawn by the author of the report) displays the direct route between the ferry ports of Świnoujście and Ystad.

3 Ship particulars

3.1 Photo MF SKANIA



Figure 2: Photo MF SKANIA⁵

3.2 Particulars MF SKANIA

Name of the vessel:	SKANIA
Type of vessel:	Passenger Ro/Ro Cargo Ship (car ferry)
Nationality/flag:	The Bahamas
Port of registry:	Nassau
IMO number:	9086588
Call sign:	C6XF4
Owner:	Unity Line Co. Ltd, Szczecin
Year built (keel laying/completion):	1994/1995
Shipyard/yard number:	SSW Bremerhaven/1087
Classification society:	DNV
Length overall:	173.70 m
Breadth overall:	24.00 m
Gross tonnage:	23,933
Deadweight:	5,717 tdw
Draught (max.):	6.42 m
Engine rating:	8,029 kW
Main engine (type/manufacturer):	Diesel 12ZAV40S Sulzer Zaklady Urzadzen Technicznych Zgoda
(Service) speed (max.):	25.5 kts
Hull material:	Steel
Number of crew:	80 (including catering personnel)
Number of passengers (max.):	1,300

⁵ Source: Owner of the ship.

3.3 Photo FV GITTE



Figure 3: Photo FV GITTE

3.4 Particulars FV GITTE

Name of the vessel:	GITTE
Type of vessel:	Coastal vessel
Nationality/flag:	Germany
Port of registry:	Heiligenhafen
IMO number:	None
Call sign:	DKOC
Fisheries code:	SH 007
Owner:	TL Fischerei GmbH, Heiligenhafen
Year built:	1995
Shipyard:	Johs. Kristensen A/S Hvide Sande, Denmark
Classification society:	None
Length overall:	16.70 m
Breadth overall:	5.40 m
Draught:	2.60 m
Gross tonnage:	48
Engine rating:	218 kW
Main engine (type/manufacturer):	n/a
Hull material:	Steel
Number of crew:	4

4 Course of the accident

4.1 Events from the perspective of the fishing vessel

On 16 February 2009, the GITTE was fishing in the sea area between the islands of Bornholm and Rügen. That evening, there had reportedly been problems on the main engine with a leaking injection nozzle. Therefore, at about 2200, the vessel reportedly anchored at the subsequent position of the accident in order for repairs to be carried out on the engine. Anchor watch on the bridge was reportedly kept by the Master. Since the engineer reportedly briefly required assistance with the repair, the Master reportedly went to the engine room. Prior to that, he reportedly obtained an overview of the traffic situation by glancing at his radar equipment and identified an object at a distance of 3 nm with a CPA⁶ of 0.5 nm. Following that, he reportedly switched on his NUC⁷ lights (= 2 red rotating lights, one above the other, on the signal mast above the wheelhouse). The vessel's other navigation lights reportedly consisted of:

- Anchor light and halogen spotlights on the mast on the forecastle
- 4 halogen lights on the wheelhouse
- 6 deck lights

When the Master reportedly left the engine room, he reportedly identified the SKANIA on his starboard side at a distance of 0.1 nm and recognised the imminent risk of a collision. He reportedly emitted a sound signal and unsuccessfully called the ferry on channel 16. Shortly afterwards, the ferry reportedly hit the fishing vessel on her starboard side and 'caught' the anchor line with the stem. The GITTE was reportedly dragged about 0.75 nm before the anchor line broke.

4.2 Events from the perspective of the ferry

At about 2300 on 16 February 2009, the SKANIA cast off from ferry terminal No. 3 at Świnoujście in accordance with her schedule and headed for Ystad. At about 2345, the Second Nautical Watch Officer (NWO) reportedly took over the watch from the Third NWO. In addition to the NWO, the bridge was reportedly manned by a seaman on watch and a trainee.

At about 0140, the Master was in his quarters when he reportedly noticed a thud on the hull. He then reportedly immediately called the bridge and asked the Second NWO for an explanation. The Officer on Watch reportedly told him that the cause of the thud must reportedly have been a wave. About one minute later, the officer reportedly called and informed him that the cause of the thud was reportedly likely to have been a collision with a small unlit floating object. Following that, the Master reportedly went to the bridge. He reportedly met the Chief Engineer on his way there and ordered him to initiate the emergency plan. On the bridge, the Master reportedly immediately stopped the ferry and established contact with the other vessel via VHF. When he arrived on the bridge, he was reportedly initially unable to establish visual contact with the vessel. This was reportedly only possible after the vessel's navigation lights and deck lighting had reportedly been switched on. After being asked, the ship's command of the fishing vessel reportedly assured him that the vessel had reportedly not suffered severe damage and was reportedly able to

⁶ CPA = closest point of approach.

⁷ NUC = not under command.

continue her voyage without assistance. The Master of the fishing vessel reportedly accepted responsibility for the accident repeatedly and declined any assistance from the SKANIA during the radio contact.

At about 0210, the Master of the ferry was reportedly informed by his engineers that their vessel was reportedly undamaged. After being reassured by the fishing vessel that she was reportedly not in danger and obtaining the consent of MRCC⁸ Bremen, the SKANIA reportedly continued her voyage towards Ystad at 0235.

4.3 Consequences of the accident

4.3.1 Personal injuries

The accident did not lead to any personal injuries.

4.3.2 Damage to the vessels

4.3.2.1 Damage to the FV GITTE

Due to the collision with the ferry, the damage above the fishing vessel's waterline was not insignificant; however, she remained seaworthy. A dent ran along the starboard side of the bulwark on the forecastle for a length of approx. 3 metres. Approx. 5 metres of handrail was destroyed in this area (see **Fig. 4**). Furthermore, inter alia the anchor windlass was damaged and the anchor equipment lost. There was other 'bodywork damage' in the area of the wheelhouse. The signal mast on the forecastle broke off.

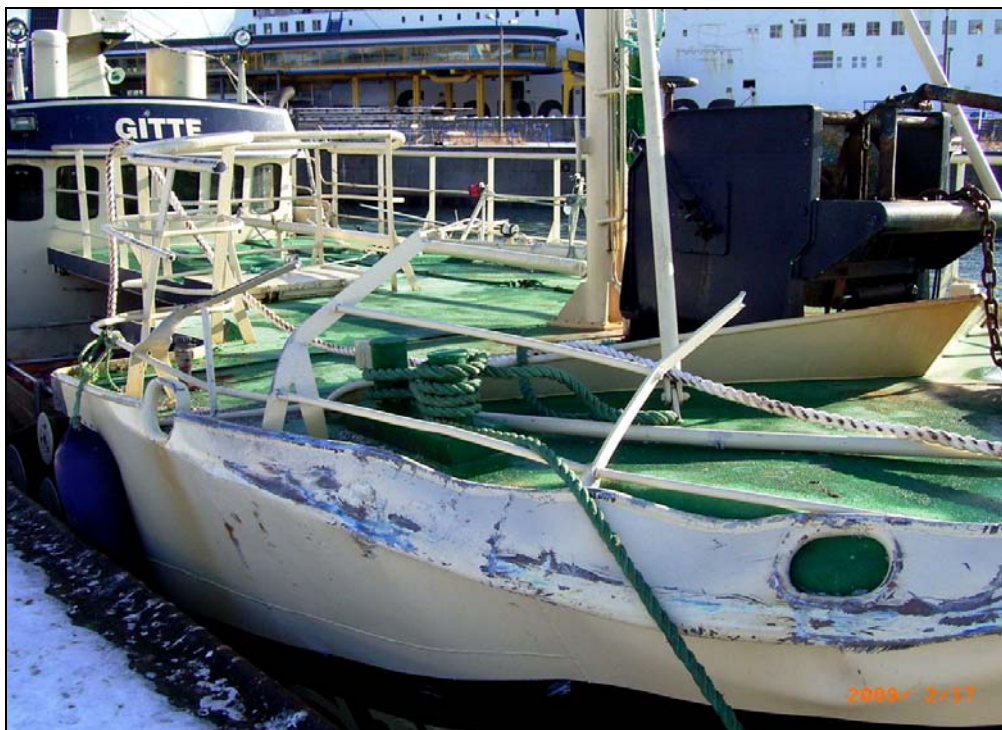


Figure 4: Damage to the forecastle of the FV GITTE

⁸ MRCC = Maritime Rescue Coordination Centre.

4.3.2.2 Damage to the MF SKANIA

Apart from some paint abrasions and scratches on the port side of the stem, the ferry remained undamaged (see Fig. 5).



Figure 5: Paint abrasions on the stem of the MF SKANIA⁹

4.3.3 Environmental pollution

The environment was not affected by the collision between the two vessels. No pollutants escaped.

⁹ Source: Owner of the ship.

5 Investigation

5.1 Course, substantive particulars, sources

The Federal Bureau of Maritime Casualty Investigation (BSU) was informed about the collision by the federal police and the waterway police shortly after it occurred.

At the request of the BSU, both the operator of the fishing vessel and the ferry's shipping company subsequently sent information about their vessels and accident reports, which in each case reflected the accident subjectively.

Moreover, the BSU was able to avail itself of the technical records of Vessel Traffic Service (VTS) Warnemünde. Since the scene of the accident was located in the outer sector of the reception area of the VTS, there were no radar records and the VHF recordings were unusable. However, the VTS recorded the SKANIA's AIS¹⁰ signal very well; therefore, the course of her voyage was easy to trace. The GITTE was not equipped with an AIS. It was possible to roughly verify her position before the accident by means of the satellite positioning system of the State Fisheries Inspectorate.¹¹

The ferry's Voyage Data Recorder (VDR)¹² could have been an important source for the investigation of the accident, especially as regards verifying the communication on the bridge of the SKANIA before and after the accident and in terms of the visibility of the fishing boat on the radar. However, since the SKANIA was neither headed for a German port nor flew the German flag, the BSU was prevented from reading off the VDR data on board or requiring the vessel's shipping company to surrender the data for legal reasons. The shipping company's essential response to a corresponding request was that submission of the recordings to the BSU was prevented by other pending investigations.

5.2 Course of the voyage

5.2.1 Technical recordings

The analysis of the AIS recording showed that during the thirty minutes under consideration up to the time at which the collision took place and even a few minutes thereafter, the SKANIA was sailing at an almost constant speed over ground of 14.6 kts on a course over ground of approx. 345 degrees towards Ystad (see **Figs. 6 to 11**).

¹⁰ AIS = **A**utomatic **I**dentification **S**ystem; introduced to improve maritime safety. All ships equipped with this system transmit via VHF their current GPS-based data, such as position, course and speed as well as possibly other information, which can be made visible on a monitor. Moreover, an increasing number of sea markers and coastal radio stations are being equipped with AIS transmitters and/or receivers.

¹¹ The positioning system of the Fisheries Inspectorate, which is binding throughout the EU, includes all fishing vessels with a length of more than 15 metres. These fishing vessels are required to send position reports to the competent supervisory authority at regular intervals (depending on the fishing grounds at intervals of one or two hours) via satellite.

¹² VDR = **V**oyage **D**ata **R**ecorder, required system for gathering data to facilitate analysis of the causes an accident should one occur.

Ref.: 51/09

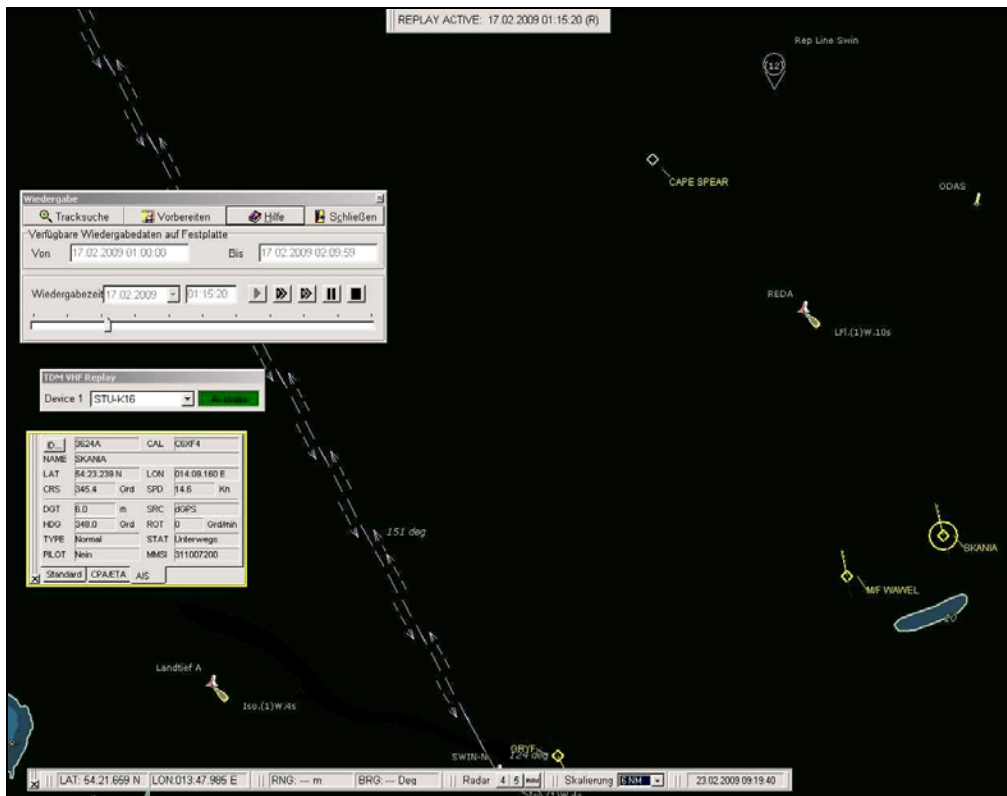


Figure 6: AIS signal of the MF SKANIA at 011520

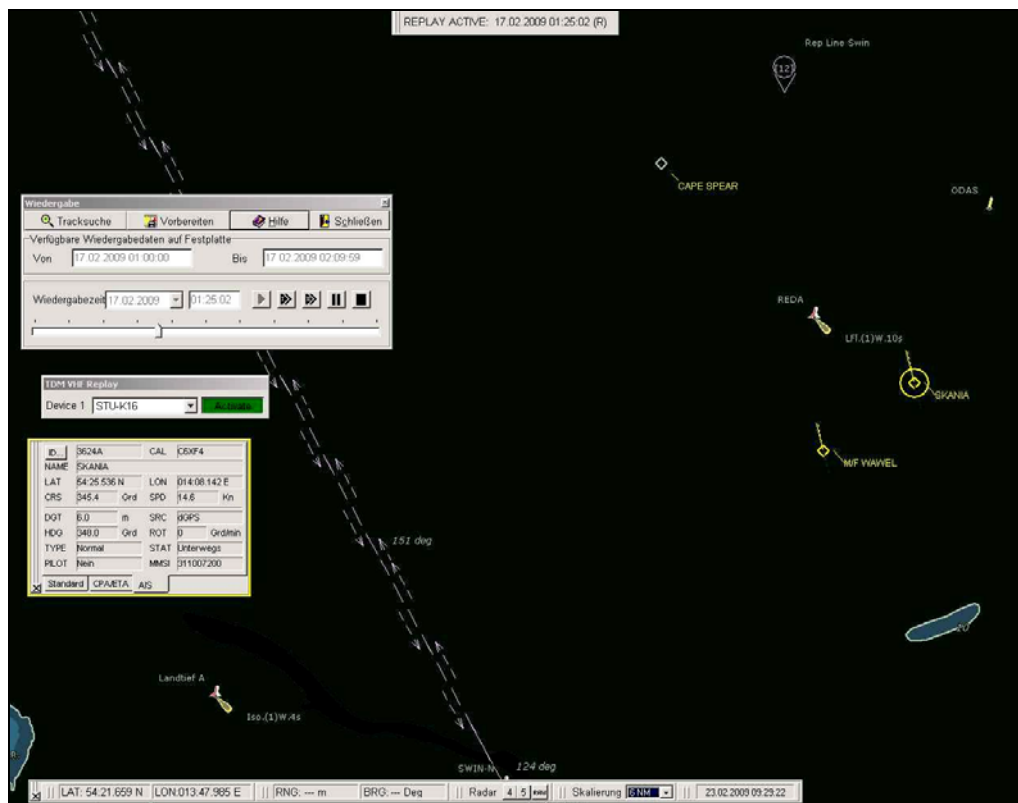


Figure 7: AIS signal of the MF SKANIA at 012502

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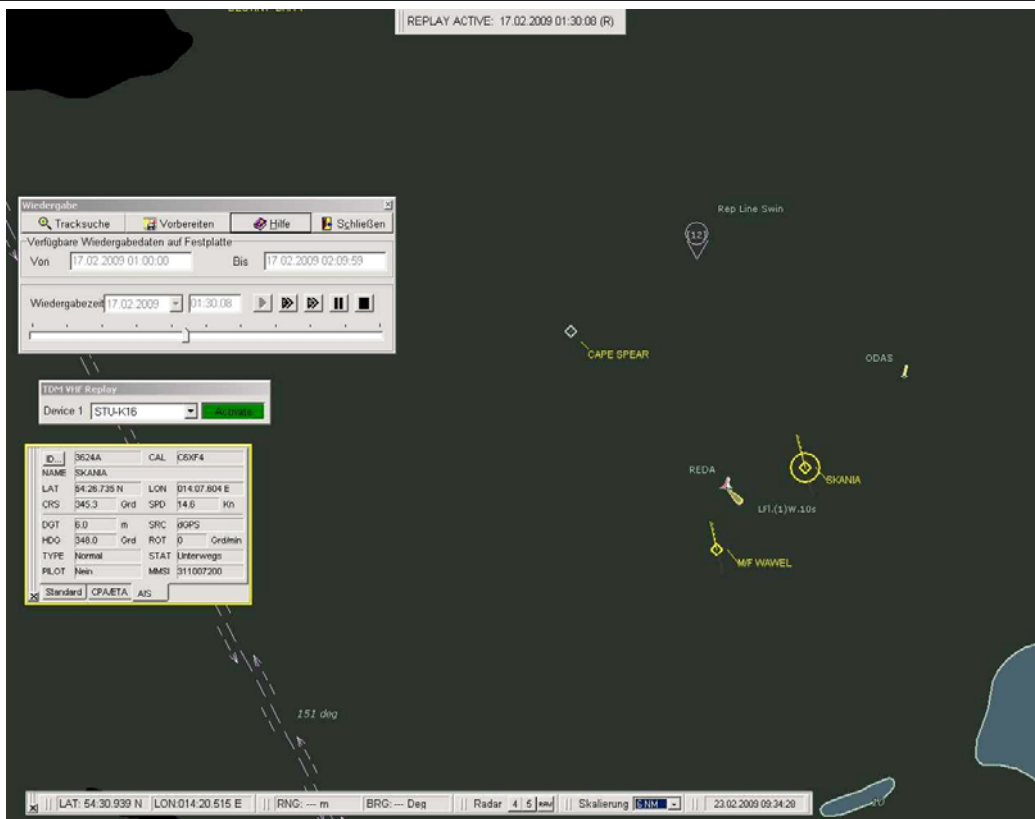


Figure 8: AIS signal of the MF SKANIA at 013008

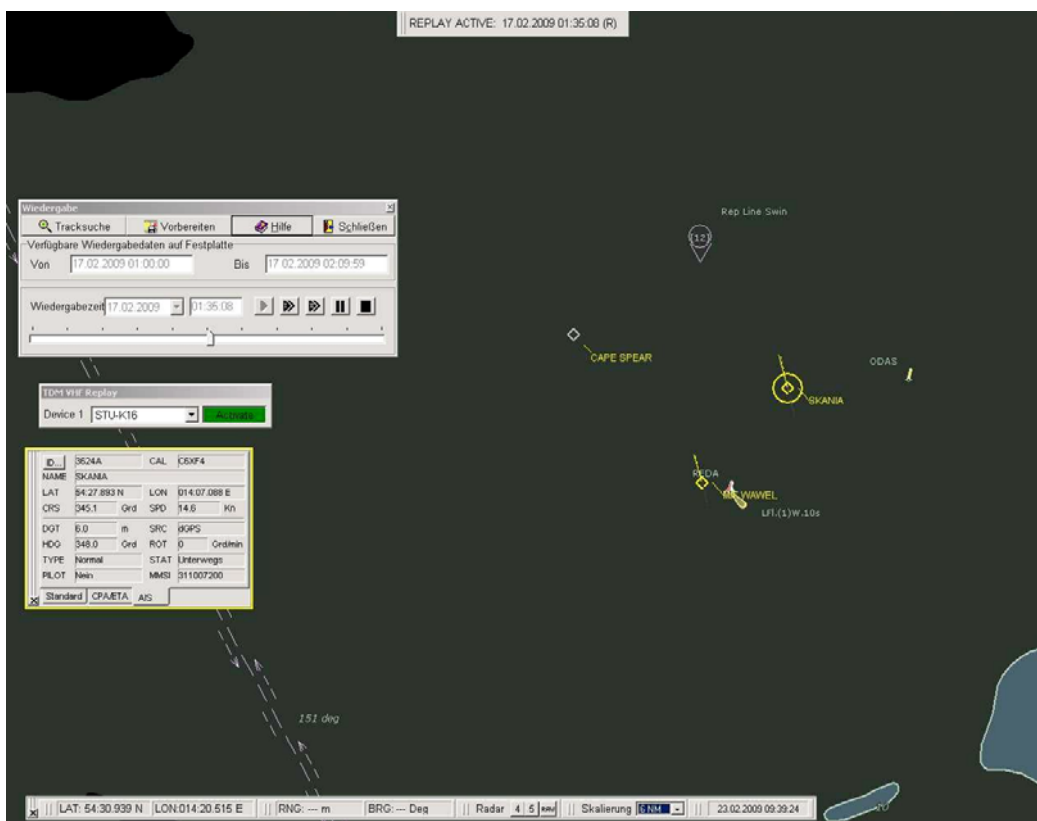


Figure 9: AIS signal of the MF SKANIA at 013508

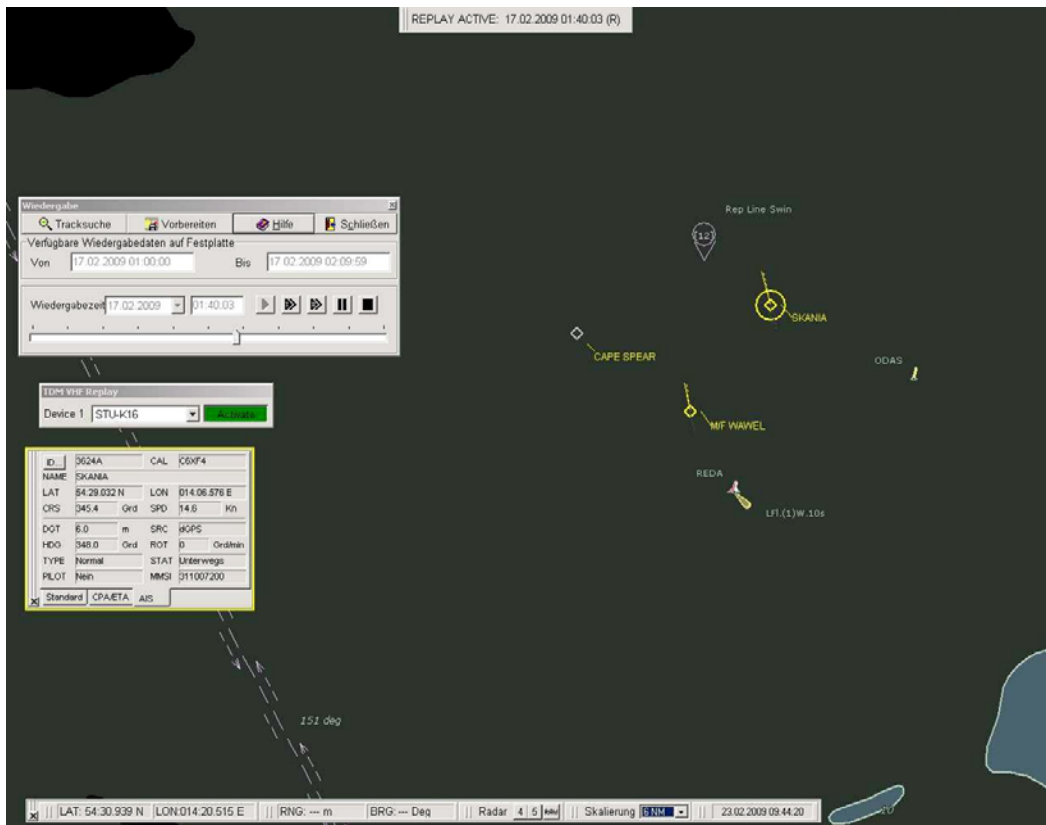


Figure 10: AIS signal of the MF SKANIA at 014003

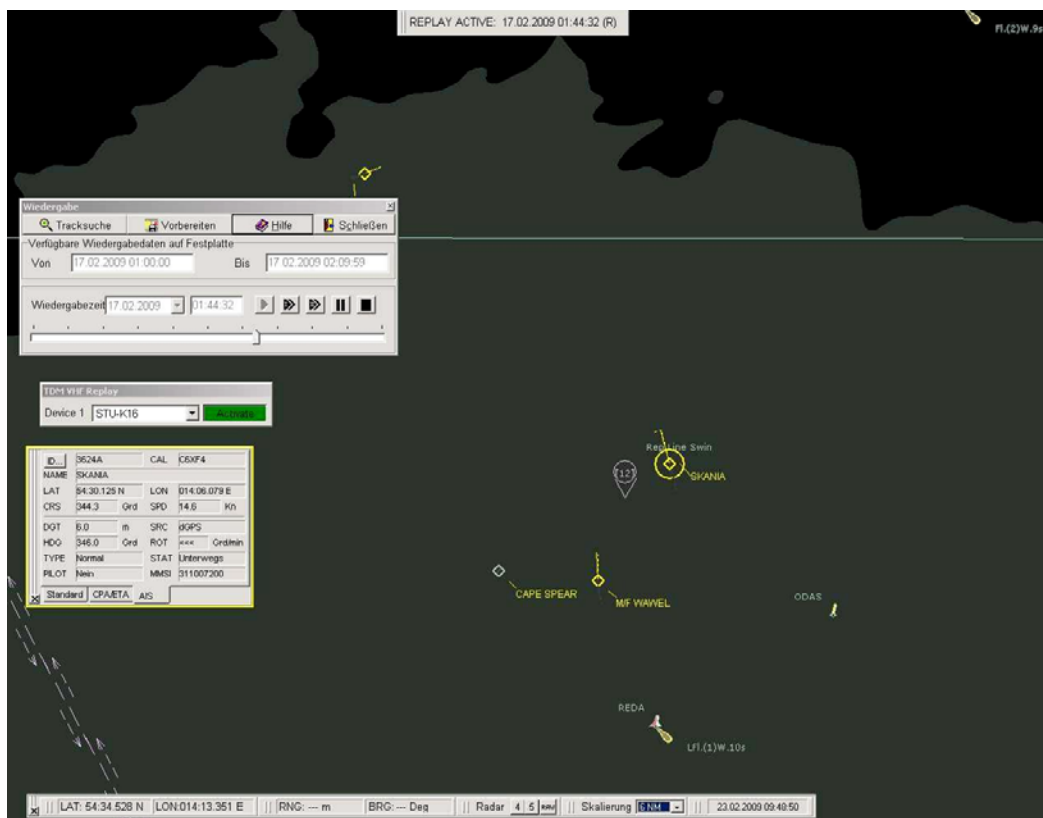


Figure 11: AIS signal of the MF SKANIA at 014432

During the period from 014432 to 014450 (see **Figs. 11 and 12**), the ferry suddenly lost 1.2 kts in speed and the course over ground changed by almost 8 degrees from 344.3 degrees to 336.6 degrees. Even when allowing for system-related AIS inaccuracies, this change in course and speed within 18 seconds shows clearly that the course and speed of the vessel must have been vigorously acted upon on the ferry during this period in response to the collision.¹³

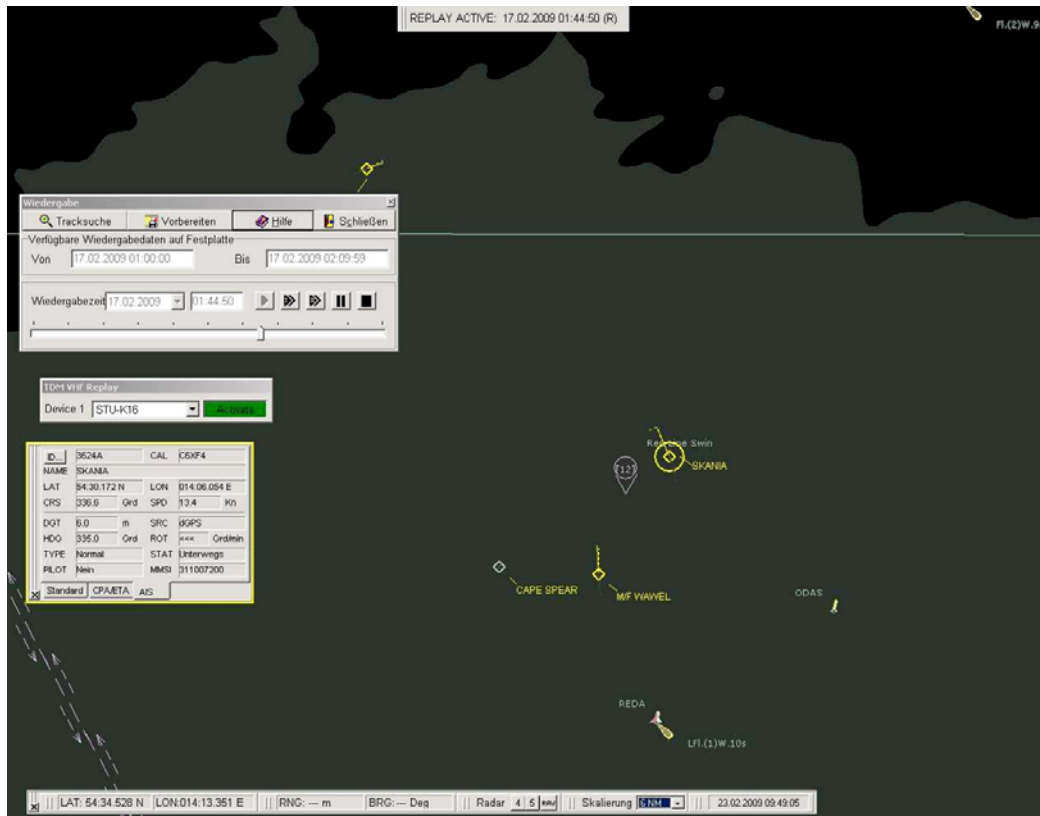


Figure 12: AIS signal of the MF SKANIA at 014450

Between 014450 and 014850 it was possible to stop the ferry, which during this period turned to port to 231 degrees (see **Fig. 13**).

¹³ The change in speed and in particular the significant change in course cannot be attributed solely to the collision (see further details in the comments in sub-para. 5.2.2. below).

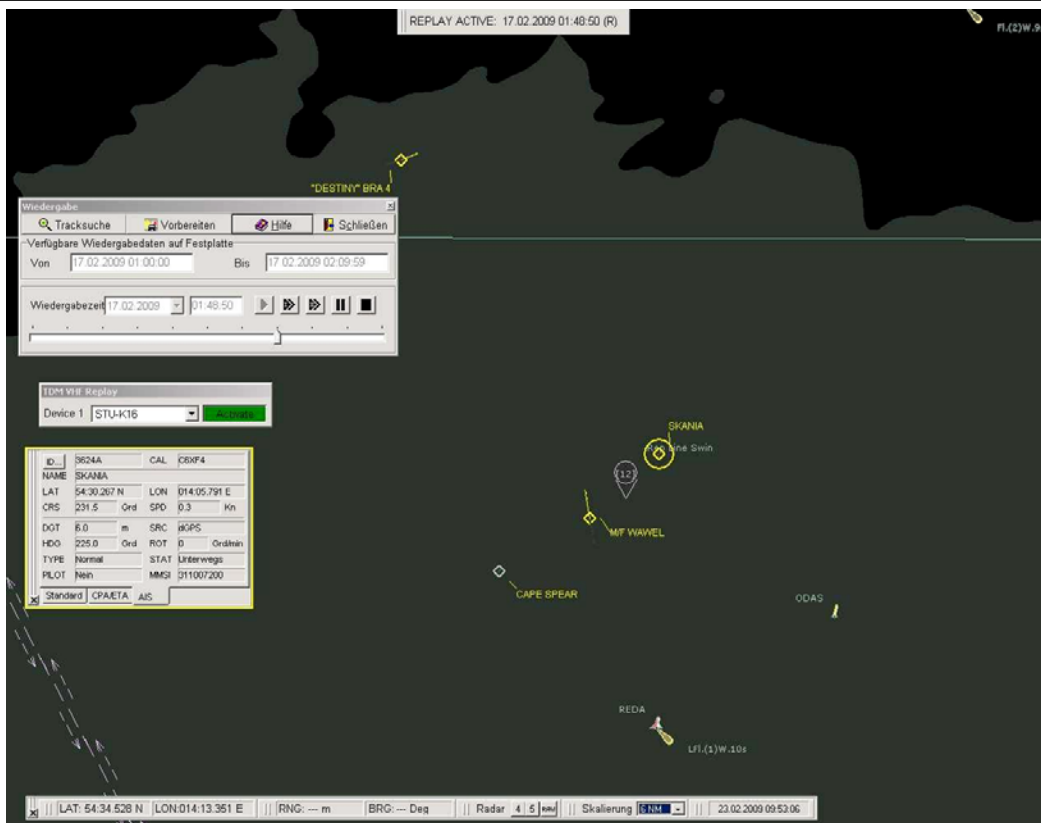


Figure 13: AIS signal of the MF SKANIA at 014850

The position of the fishing vessel was registered as follows by the satellite GPS system of the State Fisheries Inspectorate in the hours before and after the accident (see Fig. 14).

Rufzeichen	Name	Meldetyp	Meldezeitpunkt	Kurs	Knoten	Breitengrad	Längengrad	Rechteck	EEZ	Gebiet	Hafen
DKOC	Gitte	TPREP	17-02-2009 18:08	118	0.0	54°30.7	13°38.3	38G3	DEU	IIId24	SASSNITZ
DKOC	Gitte	TPREP	17-02-2009 12:08	96	0.2	54°30.7	13°38.3	38G3	DEU	IIId24	SASSNITZ
DKOC	Gitte	TPREP	17-02-2009 10:14	110	0.0	54°30.7	13°38.3	38G3	DEU	IIId24	SASSNITZ
DKOC	Gitte	TPREP	17-02-2009 08:18	270	7.6	54°30.0	13°44.7	38G3	DEU	IIId24	
DKOC	Gitte	TPREP	17-02-2009 06:24	282	4.8	54°29.3	14°05.5	37G4	DEU	IIId24	
DKOC	Gitte	TPREP	17-02-2009 04:28	70	2.6	54°29.0	14°07.4	37G4	DEU	IIId24	
DKOC	Gitte	TPREP	17-02-2009 03:16	88	2.2	54°28.6	14°09.2	37G4	DEU	IIId24	
DKOC	Gitte	TPREP	17-02-2009 00:08	42	0.8	54°29.2	14°06.5	37G4	DEU	IIId24	
DKOC	Gitte	TPREP	16-02-2009 18:52	272	4.8	54°29.0	14°08.6	37G4	DEU	IIId24	
DKOC	Gitte	TPREP	16-02-2009 17:54	280	2.8	54°29.2	14°07.0	37G4	DEU	IIId24	
DKOC	Gitte	TPREP	16-02-2009 16:56	192	8.2	54°34.9	14°08.5	38G4	DEU	IIId24	
DKOC	Gitte	TPREP	16-02-2009 15:02	198	7.6	54°49.8	14°17.6	38G4	DNK	IIId24	
DKOC	Gitte	TPREP	16-02-2009 11:12	308	0.6	55°05.8	14°24.9	39G4	DNK	IIId24	
DKOC	Gitte	TPREP	16-02-2009 09:30	294	0.6	55°05.6	14°24.4	39G4	DNK	IIId24	
DKOC	Gitte	TPREP	16-02-2009 07:20	20	1.8	55°02.5	14°21.2	39G4	DNK	IIId24	
DKOC	Gitte	TPREP	16-02-2009 06:08	314	0.0	55°03.2	14°20.4	39G4	DNK	IIId24	
DKOC	Gitte	TPREP	16-02-2009 00:08	140	0.2	55°03.2	14°20.5	39G4	DNK	IIId24	

Figure 14: Satellite positioning of the FV GITTE by the Fisheries Inspectorate¹⁴

¹⁴ The row above the red line probably relates to the position at which the fishing vessel anchored. The recorded 'speed' over ground is probably due to system-related inaccuracies and movements of the fishing vessel at anchor (so-called swinging). The reporting interval for the fishing grounds in question is usually two hours. Omitted position reports can be a result of transmission problems or an interruption to the shipboard power supply. If a vessel stands still for an extended period (at anchor or in port), the system switches to sleep mode and transmits position reports only at larger intervals.

We can see from the recording that the fishing vessel dropped anchor sometime after 1852 on 16 February 2009 and in that regard was located at the position ϕ $54^{\circ}29.2'N$, λ $014^{\circ}06.5'E$ shortly after midnight (0008). The fishing vessel continued her voyage sometime before 0316 on 17 February.

5.2.2 Development of the collision

On the basis of the AIS positions of the SKANIA (blue) and GITTE's position at anchor (red, according to the satellite positioning of the Fisheries Inspectorate), it is easy to trace the collision of the two vessels on the nautical chart (see **Fig. 15**).

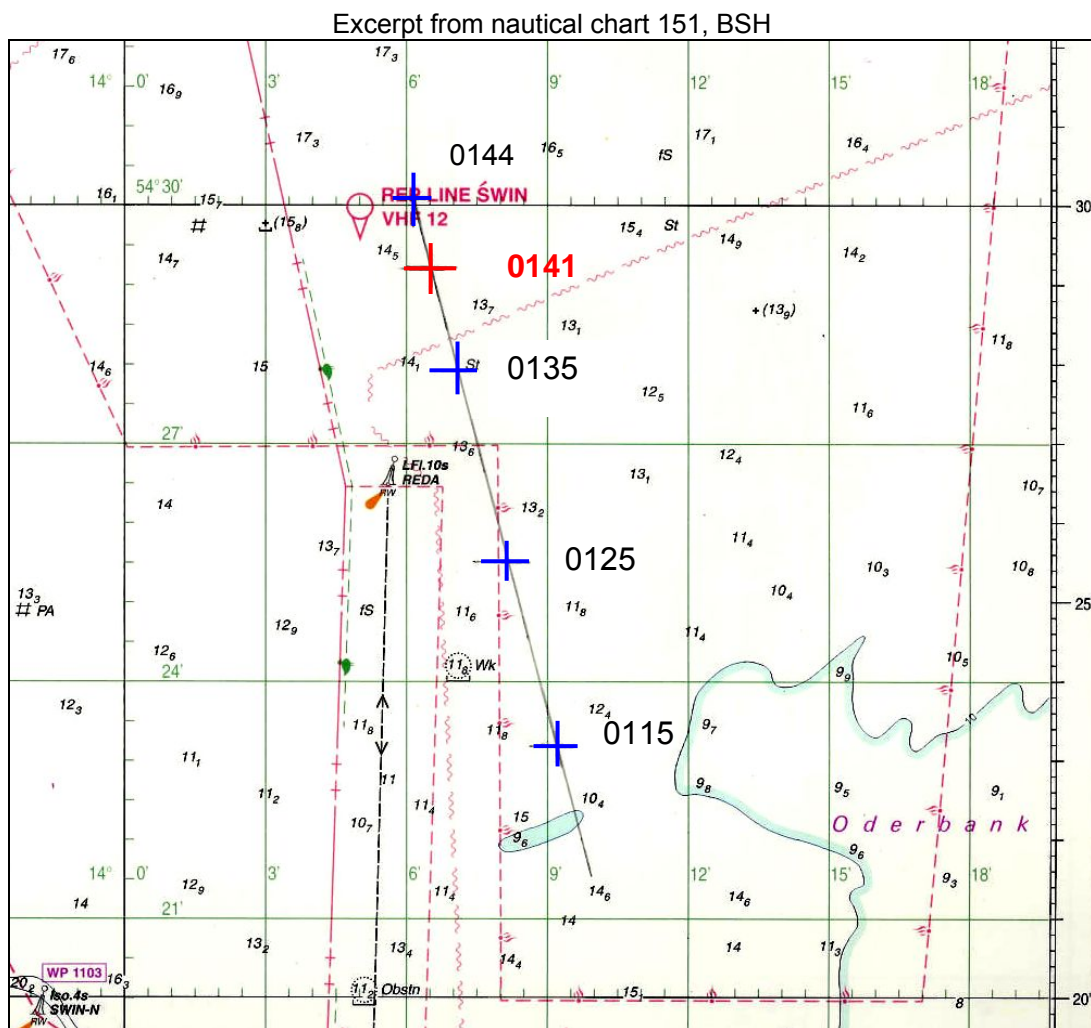


Figure 15: Development of the collision

It is clear that the statement that the Master of the fishing vessel reportedly identified an object at a distance of 3 nm with a CPA of 0.5 nm on his radar prior to leaving the bridge cannot have been in connection with the SKANIA. During the aforementioned thirty minutes up to the accident (and also before), the ferry sailed "as if on rails" directly for the anchored fishing vessel with absolutely steady course and speed values. However, the information that the collision was not initially perceived as such on the bridge of the SKANIA was confirmed.

From overrunning the position at which the fishing vessel anchored (= 0141¹⁵), it took until 0145, or about 4 minutes, for the SKANIA to change her course and speed in order to then come to a halt very quickly within a further 4 minutes (see **Fig. 13** above). The significant difference between the ferry and fishing vessel in dimension and mass explains why the course of the ferry was initially not appreciably impaired due to colliding or coming into contact with the side of and then dragging the fishing vessel by her anchor line. That the anchor of the GITTE as such had no particular obstructive affect is, in particular, understandable because in all likelihood the SKANIA only came into contact with the unwound part of the approx. 175 m long and 45 mm thick synthetic rope, which acts as a 'guy' and connects the approx. 40 m long fully extended chain with the fishing vessel's anchor windlass.

5.3 Radio traffic

At the request of the BSU, VTS Warnemünde provided the radio traffic of VHF channel 16 for the period 0100 to 0300. The recording contains only a brief conversation in German between the ship's command of the GITTE and presumably the VTS. The conversation was conducted at 0208 and the ship's command essentially confirmed that a collision had reportedly taken place with the SKANIA; that they were reportedly currently in the process of ascertaining the damage, that there was reportedly evidently no water ingress on the fishing vessel and that the situation was reportedly under control.

5.4 Weather and sea conditions

5.4.1 Expertise by the DWD

The BSU requested an official expertise on the wind/sea conditions and visibility east of the island of Rügen from the Maritime Division of Germany's National Meteorological Service (DWD) for the period 2000 on 16/02/2009 to 0300 on 17/02/2009. The expertise contains the following material information.

"Wind:

During the period under consideration, there was an easterly wind of some 3 Bft with a north-easterly wind of 4 Bft at the end of the period. Gusts reached a maximum of 5 to 6 Bft.

Swell:

Swell measurements and observations from the scene of the accident are not available. Swell measurements by the BSH off Zingst and estimates of the swell using the wind measurements indicate a height of about 0.5 m and later of 1 m.

Visibility:

During the period under consideration, visibility typically exceeded 10 km and was 30 km at times. There was occasionally light snowfall in which at times visibility would probably have been less than 10 km, with a minimum of 4 to 5 km."

¹⁵ The time of the collision results from dead reckoning when the position, according to satellite positioning, at which the fishing vessel anchored, is presumed to be the scene of the accident, since the course and speed of the ferry are confirmed by AIS.

5.4.2 Observations on board the vessels

The expertise on the weather conditions by the DWD largely corresponds with the observations reported by the ship's commands. In that respect, it should be emphasized that the reports of both ship's commands in terms of visibility reportedly not being reduced and reportedly no rainfall at the time of the accident were consistent.

6 Conclusion

The BSU was unable to determine the causes of the accident conclusively. With regard to the essential question as to whether or not the GITTE was displaying lights at the time of the accident, one statement stands against another. However, it should be noted that mixed navigation lights for 'not under command at anchor' are not provided for under the Regulations for Preventing Collisions at Sea (see regulations 27 and 30 COLREGs).

Indeed, anchoring the GITTE on or at least in the immediate vicinity of the course line of the Świnoujście/Ystad ferry service, with which the Master of the fishing vessel is familiar, is not prohibited; however, is very risky as the accident clearly demonstrates. Even if we make the assumption that the fishing vessel was not entirely free to choose the position at which she anchored because of her engine problems, it would have been possible to gain a safe distance from the course used by the ferry by drifting, without being exposed to the risk of running aground.

It remained unclear how long the bridge of the GITTE was unmanned. The object at a distance of 3 nm that the Master noticed before going to the engine room cannot have been the SKANIA at any event. According to the AIS position evaluation, the CPA of the SKANIA during the last thirty minutes before the accident (and also prior to that), i.e. at a distance of more than 7 nm, was undoubtedly 0 nm and not 0.5 nm. Regardless of that, it was irregular and very dangerous to leave the bridge of the fishing vessel at all in the sea-room under consideration since continuous monitoring of the position at which she anchored and, where applicable, also unexpectedly fast approaching shipping traffic was thereby impossible.

It is also unexplainable why the fishing vessel was not identified on the bridge of the ferry up until the very last. Even if one accepts the assertion of the ship's command of the ferry, that the GITTE was reportedly not displaying any lights, the echo of the almost 17-metre-long steel vessel must have been clearly visible on the radar. At any event, the prevailing weather conditions (in particular, no rainfall and only light swell) could not be seriously regarded as a reason for the fishing vessel being insufficiently identifiable on the radar screen.

Information as to the visibility of the fishing vessel on the SKANIA's radar would have been provided by an analysis of the VDR recording. Moreover, the ferry's VDR could have indirectly provided valuable insights in relation to the question of the fishing vessel's lighting before until shortly after the accident, in particular, with respect to the recorded communication on the bridge. It can reasonably be assumed that heated discussions would have taken place on the bridge if an unlit object was overrun on which – as asserted by the SKANIA – lights were suddenly switched on after the accident. The admission with respect to being solely responsible for the accident, which the SKANIA alleges the Master of the GITTE reportedly stated several times to the ship's command of the SKANIA via VHF, could also not be verified.

It is regrettable that the SKANIA's shipping company was not prepared to substantiate the corresponding assertions by surrendering the VDR data.

If many questions have therefore remained open, it is clear that the marine casualty was the result of an accumulation of blatant omissions on board the two vessels. That the accident passed without serious consequences is thanks only to fortunate circumstances. If we consider the 'unabated' force with which the SKANIA collided with the GITTE, without any attempt at an evasion manoeuvre, it becomes clear that a slightly different collision angle would have in all likelihood led to the total loss of the fishing vessel with fatal consequences for all of her crew. Damage to the ferry's bow visor with dramatic consequences for her buoyancy is also conceivable.

Since the identified or highly probable shortcomings do not concern any findings that are new or require particular repetition, the BSU is abstaining from issuing safety recommendations and is concluding the investigation with this summary investigation report.

However, the Federal Bureau of Maritime Casualty Investigation is using this accident as an opportunity to stress that the increased fitting of AIS equipment on smaller vessels (especially fishing vessels and tugs) on a voluntary or mandatory basis would lead to an increase in safety.¹⁶ The current coexistence of vessels with and without AIS leads to a risk of the radar operator focussing more selectively on AIS targets and not paying sufficient attention to other echoes.

¹⁶ In that respect, see Safety Recommendation 8.1 in BSU's Investigation Report 09/06 dated 1 July 2007 about the collision between MV TOR DANIA and EMS TUG on 10 January 2006 at 0012 CET on the river Elbe.

7 Action taken

The SKANIA's shipping company conducted an internal investigation of the marine casualty and informed the BSU of its conclusions in a letter dated 10 April 2009. Excerpts of the essential findings are discussed below¹⁷.

- 1. Early and accurate identification of small and unlit objects can be difficult and sometimes impossible. The bridge crew should ensure that proper and efficient radar observation is provided for at all times; that applies by analogy for the lookout. The Officer on Watch must ensure that the range of the radar equipment is changed at sufficient intervals so that small objects can be detected at the earliest possible stage. It should be noted that small or weak echoes can be lost or remain undetected due to interference.*
- 2. The Officers on Watch on both vessels did not observe the rules set out in part A, chapter VIII, section A-VIII/2, part 3 for Watchkeeping at Sea.*

Following the internal investigation of the accident, the measures shown below were recommended for the shipping company:

- 1. Implementation of additional training programmes for all Masters and Officers on Watch in the area of bridge watch duty and preventing collisions in relation to small vessels*
- 2. Implementation of additional training programmes in the area of radar observation for all Officers on Watch*

¹⁷ The BSU is abstaining from conveying those conclusions which are one-sided and/or attribute blame to the FV GITTE that is ultimately unsubstantiated.

8 Sources

- Written statements of the ship's commands of both vessels
- Written statements/photos of the shipping companies of both vessels
- Contact with the representative of the Flag State BAHAMAS
- Findings of the Federal Police Sea (Maritime Investigation and Detection Group Neustadt)
- Recordings of Vessel Traffic Service Warnemünde
- Official expertise from the Marine Division of Germany's National Meteorological Service (DWD) dated 24 February 2009
- Nautical charts and vessel particulars, Federal Maritime and Hydrographic Agency (BSH)