



**Bundesstelle für Seeunfalluntersuchung**  
**Federal Bureau of Maritime Casualty Investigation**  
Federal Higher Authority subordinated to the Ministry of Transport,  
Construction and Urban Affairs

**Investigation Report 250/08**

**Less serious Marine Casualty**

**Collision of M/V RABA with  
Special craft ARTUR BECKER  
on 1 June 2008  
Northwest of the Wittow/Rügen Peninsula**

**2 June 2009**

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

On the morning of 1 June 2008 the special craft ARTUR BECKER, operating under the German flag, was on an expedition voyage with passengers ca. 1.5 nautical miles northwest of the Wittow/Rügen peninsula.

After the ARTUR BECKER had anchored west of Wittow for the previous night, she weighed anchor at 0609<sup>1</sup>. The aim of the voyage was to visit a shipwreck north of Rügen. The weather conditions were good. There was visibility of more than 25 km with a moderate east to east-north-east wind of strength Force 4 Bft. The vessel headed on a course of 030° at a speed of 8.4 kts over ground. The bridge was manned by the Master, the Technical Officer and a Helmsman, all of them German nationality. At around 0630 a freight vessel was observed on the port side, the RABA operating under the Polish flag. The RABA was on her way with a cargo of grain from Boston/Great Britain to Szczecin/Poland. She was heading on a course of 073° at a speed of 8.6 kts over ground. The bridge of the RABA was manned by the Polish Chief Officer.

When the two vessels had approached each other to barely 1.5 cables, the RABA called the ARTUR BECKER on the VHF. They tried to reach an agreement for manoeuvring, but in doing so a misunderstanding resulted. The RABA held her course, but reduced speed to 5-6 kts. On the ARTUR BECKER, however, it was assumed that the RABA would pass astern of the ARTUR BECKER and then overtake on the starboard side. So they maintained their course and speed.

Only when the crew manning the bridge of the ARTUR BECKER observed the RABA not, as expected, on the starboard side but abeam on the port side at ca. 20-30 m distance, was a manoeuvre initiated to go "Hard to starboard" and the engine was ordered "Full astern". The collision could not be prevented through this. The two ships collided bow to bow at approximately 0645, and as a result the ARTUR BECKER then hit the RABA with her port side. Both vessels received material damage above the water line. The ships were able to continue under their own power.

No persons were injured because of the accident, nor did any environmentally hazardous substances leak.

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<sup>1</sup> All times mentioned in the report refer to Middle European Summer Time (MESZ) = Universal Time (UTC) + 2 hours.

## 2 Scene of the Accident

Type of Event: Less serious marine casualty  
Date/Time: 1 June 2008, 0645  
Location: Northwest of the Wittow/Rügen peninsula  
Latitude/Longitude:  $\phi$  54°41.6'N  $\lambda$  013°15.0'E

Excerpt from nautical chart (16) 162 (INT 1342), Federal Maritime and Hydrographic Agency (BSH)



Figure 1: Nautical chart



### 3 Vessel particulars

#### 3.1 ARTUR BECKER

##### 3.1.1 Photograph of the vessel



Figure 2: Photograph of the vessel ARTUR BECKER

##### 3.1.2 Vessel particulars

Name of vessel:	ARTUR BECKER
Type of Vessel:	Special craft
Nationality/Flag:	Federal Republic of Germany
Home Port:	Greifswald
IMO-Number:	8860860
Call sign:	Y7JH
Shipowning company:	Tauchsportclub Greifswald e.V.
Year of construction:	1951
Shipyard/Construction number	VEB Roßlauer Schiffswerft / 236
Classification society:	-
Length overall:	38.95 m
Breadth overall:	7.20 m
Registered tonnage:	331
Draught at time of accident:	3.50 m
Engine rating:	249 kW
Main engine:	SKL 6 NVD 26/36-1 UA
Speed:	9 kts
Hull material:	Steel
Number of crew:	5
Number of passengers:	30

### **3.1.3 Engine system and navigational equipment of the vessel**

The ARTUR BECKER has a main engine from SKL, Magdeburg, of type 6 NVD 26/36-1 UA, with a power output of 249 kW, which drives a right-handed, fixed pitch propeller.

The navigational equipment includes inter alia a magnetic compass, differential-GPS, two radar units without ARPA-function<sup>2</sup> as well as an echograph. Navigation was done by means of using official paper nautical charts.

As a special craft the ARTUR BECKER has neither AIS<sup>3</sup> nor a Voyage Data Recorder.

### **3.1.4 Registration and operation as a special craft**

According to the Sailing Permit and the Ship Safety Construction and Equipment Certificate, the ARTUR BECKER on the day of the accident had a valid registration as a special craft for voyages in national waters of the Baltic Sea. The See-Berufsgenossenschaft (See-BG) which is responsible for ship licences and certificates, has the vessel registered in its records as a special craft, subcategory training vessel.

Originally built as a logger, the ARTUR BECKER was converted into a diving vessel in 1982 and 1983. Since 1991, it has been used by the Tauchsportclub Greifswald e.V. as a diving base. Each year from March to November the diving club offers commercial diving and fishing voyages with the ARTUR BECKER. The duration of each voyage is usually three to six days.

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<sup>2</sup> Automatic Radar Plotting Aid

<sup>3</sup> Automatic Ship Identification System

## 3.2 RABA

### 3.2.1 Photograph of the vessel



Figure 3: Photograph of the vessel RABA

### 3.2.2 Vessel particulars

Name of vessel:	RABA
Type of Vessel:	Bulk carrier
Nationality/Flag:	Republic of Poland
Home Port:	Szczecin
IMO-Number:	8415172
Call sign:	SNBE
Shipowning company:	Baltramp Shipping SP. Z O.O.
Year of construction:	1984
Shipyard/Construction number:	Schiffswerft und Maschinenfabrik Cassens GmbH, Emden / 172
Classification society:	Polski Rejestr Statków
Length overall:	80.77 m
Breadth overall:	12.60 m
Registered tonnage:	1,843
Deadweight capacity:	2,325 t
Draught at time of accident:	fore: 4.18 m, aft: 4.35 m
Engine rating:	600 kW
Main engine:	Krupp MAK 6M332AK
Speed:	11 kts
Hull material:	Steel
Number of crew:	6
Number of passengers:	0

### **3.2.3 Engine system and navigational equipment of the vessel**

The fixed pitch propeller of the RABA is driven by a Krupp MAK 6M332AK engine with 600 kW power rating. The vessel also has a bow thruster with 100 kW power rating.

The advance distance from “Full ahead” to “Full astern” amounts to 16 cables and the required stopping time is 8 min. To change course, 20 secs are needed. The turning circle of the RABA, both to port and also to starboard, amounts to 9 cables.

The bridge equipment of the RABA includes an electronic chart system (ECS), two radar units without ARPA function, an echograph and AIS.

The vessel is not equipped with a Voyage Data Recorder. According to Section V, Rule 20.2 of the International Convention for the Safety of Life at Sea (SOLAS) it is not large enough to be subject to the carriage requirements.

## 4 Course of the accident

### 4.1 Course of the voyage

The special craft ARTUR BECKER, operating under the German flag, was on a diving expedition to the wreck of the cruiser SMS UNDINE that sunk in 1915 north of Rügen. The ARTUR BECKER put to sea for this from the port of Greifswald on 28 May 2008 with 30 passengers on board. The expedition team consisted of experienced wreck divers and a camera team.

The first four days of the expedition passed without any special events. On the night of 31 May to 1 June 2008 the ARTUR BECKER dropped anchor in a protected position west of the Wittow/Rügen peninsula. At 0609 on 1 June 2008 she weighed anchor. The weather conditions were good. According to the weather report obtained from Germany's National Meteorological Service (DWD), Rügen was cloudless and had a horizontal visibility of more than 25 km. The sun rose at 0437. There was a moderate east to northeast wind with a mean strength of Force 4 Bft and gusts  $\geq$  Force 6 Bft were not measured. The significant wave height of the sea state was ascertained by the DWD as ca. 1 m with a period of 5 secs.

The bridge of the ARTUR BECKER was manned by the Master on watch, a Helmsman and the Technical Officer, all German nationality. Radar and VHF were operated by the Master. On the radar, in the view of the Master, the display was in Head-Up mode with relative motion preset, and the chosen radius initially was 3 nautical miles.

The vessel initially kept clear to the north of the coast and then steered a course of 030° at "Slow ahead" speed towards the wreck of the SMS UNDINE. Most of the passengers were still asleep. Only two had already come up on deck. They noticed at some distance a cargo ship coming from the port aft quarter but did not pay much attention to it initially.

The cargo ship, RABA, operating under the Polish flag, was on its way from Boston/Great Britain to Szczecin/Poland. Loaded with grain up to the line, the RABA steered a course of 073° at a speed of 8.6 kts over ground. The bridge was manned by the Polish Chief Officer. He had taken over the watch at 0000 from the Master and was operating in autopilot mode.

At 0617 the ARTUR BECKER went to "Half ahead", and from 0627 was going at a speed of ca. 8.4 kts over ground at "Full ahead" rate of speed. At about this time, on the bridge of the ARTUR BECKER the approaching RABA was observed. The Master stood in front of the left of the two radar displays, which had been set for a radius of 6 nautical miles when the highest rate of speed was in operation. From this position, the Master could also observe the RABA through the side windows. Course

and speed were held. One of the passengers that had already arrived on deck came onto the bridge and watched the further approach.

At around 0642, the ship's command of the RABA noticed the ARTUR BECKER at ca. 4 cables distance. Shortly afterwards he determined that passing in front of the ARTUR BECKER was no longer possible. When the two vessels had approached each other to barely 1.5 cables, the RABA called the ARTUR BECKER on the VHF. They tried to reach an agreement for manoeuvring, but in doing so a misunderstanding resulted. The RABA held her course, but reduced speed to 5-6 kts. On the ARTUR BECKER, however, it was assumed that the RABA would pass astern of the ARTUR BECKER and then overtake on the starboard side. So they maintained their course and speed. The close-range situation was judged on the ARTUR BECKER as a situation that required no further attention on account of the VHF arrangement. In particular, the RABA was not watched any further on the radar display.

Only when the RABA was observed not, as expected, on the starboard side but abeam on the port side at ca. 20-30 m distance, was a manoeuvre initiated to go "Hard to starboard" and the engine was ordered "Full astern". The collision could not be prevented through this. The two ships collided bow to bow at an angle of ca. 30-45° at approximately 0645, and as a result the ARTUR BECKER then hit the RABA with her port side. Both vessels received material damage above the water line. Both were able to continue under their own power.

Police tests showed that the breath alcohol value of the responsible ship's commands for both vessels was at 0.0 ‰ in each case.

## **4.2 Accident damage**

### **4.2.1 ARTUR BECKER**

The port side of the ARTUR BECKER was damaged above the water line in the collision (see Fig. 4). On the aft superstructure there were deformations, and the plating was torn open.

The bulwark on the main deck was pushed inward from the bulwark gate to the aft bulkhead. On the shell plating there were the signs of scraping up to the sheer rail astern.

The aft area was pushed in for ca. 1.3 m<sup>2</sup> in the region where the shell plating joined the deck.

The colour paint coating of the hydraulic crane on the main deck was cracked or chipped off in several locations. The hydraulic pipes at the aft bulkhead showed slight deformations.

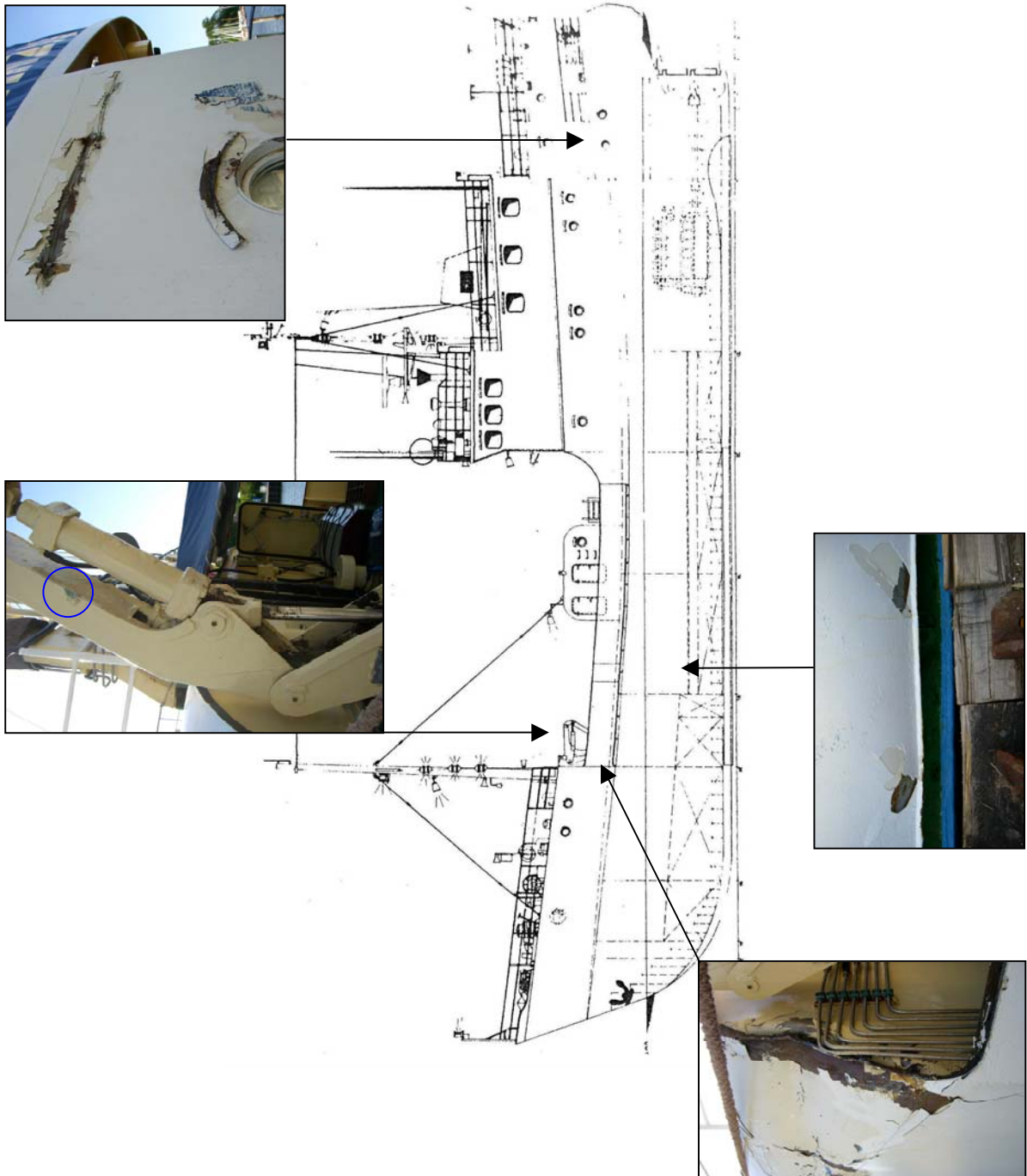


Figure 4: Damage on the ARTUR BECKER

#### 4.2.2 RABA

The RABA was damaged on her starboard side above the water line. The shell plating from bow to amidships showed the signs of scraping and deformations, and a steel pillar as well as parts of the railing were pushed inward (see Fig. 5).



Figure 5: Damage to the bow of the RABA

The bulkhead between the bosun store and the bow thruster room was deformed as well as the frames in that area (see Fig. 6).



Figure 6: Deformation of the frames on the RABA



Ref.: 250/08

Also on the starboard side of the stern there were abrasions on the shell plating (see Fig. 7).



Figure 7: Damage to the stern of the RABA

## 5 Investigation

During the investigation the Federal Bureau of Maritime Casualty Investigation (BSU) worked together with the Polish Maritime Office in Szczecin. Information and documents supplied in the course of the cooperation provided a comprehensive data base for the investigation of the collision and its consequences.

In addition the investigation is based on the field reports and photo documentation of the Sassnitz Water Police and the Federal Police, information from the ship operators involved, witness reports and their video footage, a sea weather report obtained from the DWD, cooperation with the See-BG as well as the AIS and VHF records of Sassnitz Traffic in Warnemünde.

### 5.1 Ship Surveys

#### 5.1.1 Survey of the ARTUR BECKER

The damage on board the ARTUR BECKER was documented on the day of the accident by the Sassnitz Water Police with photos. A staff member of the BSU went on board on 10 August 2008 and particularly surveyed the wheelhouse (see Figs. 8 and 9) as well as the visibility from there.



Figure 8: Wheelhouse of the ARTUR BECKER, view to starboard



Figure 9: Wheelhouse of the ARTUR BECKER, view to port

Because of the raised stern (see Fig. 10) the direct view astern is only possible to a limited extent (see Fig. 11).



Figure 10: Stern area of the ARTUR BECKER



Figure 11: View towards the stern of the ARTUR BECKER from the port side of the bridge through the aft bridge window

A diagonal view astern, however, is possible through the other three side windows without problem (see Fig.12).



Figure 12: View astern through both the port bridge window and the aft window

The left one of the three side windows on port is covered, however, when the door to the control room on the bridge of the ARTUR BECKER is open (see Fig. 9).

### 5.1.2 Survey of the RABA

On the day of the accident, the RABA was viewed by members of the Federal Police, who then provided the BSU with an extensive photo documentation of the collision damage as well as their investigation documents. The vessel was manned according to the requirements of the Minimum Safe Manning Certificate.

Since there had been an increasing number of defects identified on the RABA in spring 2008 during two port controls<sup>4</sup>, the BSU made contact with the British Maritime and Coastguard Agency (MCA). Through the MCA they became aware of deficiencies concerned with, among other things, incomplete voyage planning, an insufficient determination of compass deviation and numerous shortcomings in protective equipment. On 24 July 2008, the RABA came to the attention of the MCA when she passed a port fairway buoy on the wrong side while she was sailing out of Cardiff (see Fig. 13).

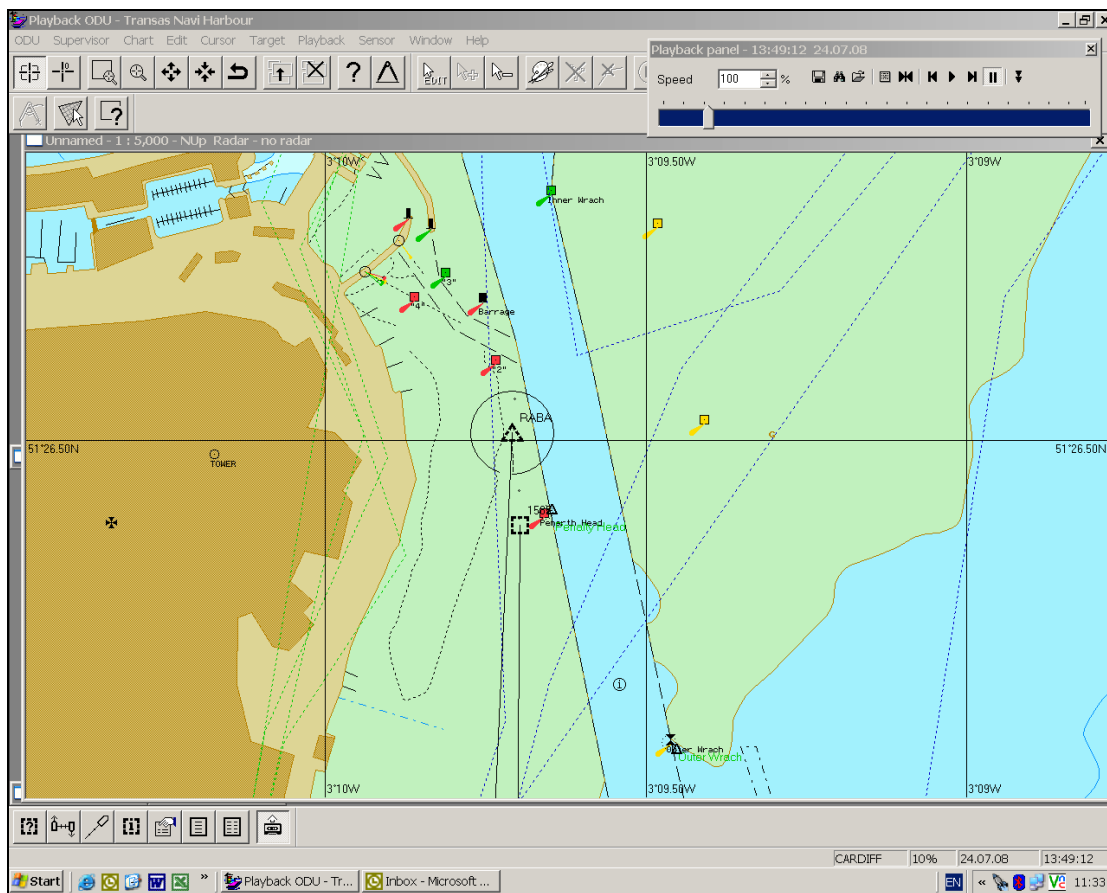


Figure 13: Record of the Vessel Traffic Service (Port of Cardiff) from 24 July 2008

In transmissions by the ship's command to the Vessel Traffic Service he was not certain about the vessel's position. The MCA took this as a reason to issue what is called a "Cause for concern (C4C) report" and to list the RABA for another Port State Control. It remained unclear whether the vessel's crew in Cardiff was identical to that on 1 June 2008 (the day of the accident).

<sup>4</sup> 11 deficiencies on 31 March 2008 in Goole/Great Britain, 15 deficiencies on 28 April 2008, also in Goole.

On 4 August 2008 during another port control in Great Britain, 14 defects were found. Meanwhile the BSU made contact with the competent Polish Maritime Office in Szczecin. As a result an inspector of the local Maritime Safety Inspectorate went on board the RABA on 14 August 2008, and checked the condition of the vessel with respect to the deficiencies discovered during the Port State Controls. The inspection report was made available to the BSU. According to this the Master of the RABA had taken care of the deficiencies and after the works were concluded had written a report about each item.

After the survey by the Polish supervisory authority, there were two further Port State Controls of the RABA with 6 deficiencies still found in October 2008 and finally in Great Britain there were only two. Since any additional information was not expected, the BSU saw no reason for another independent inspection of the RABA. The photo documentation and reports made available, as well as the following picture from the shipowning company of parts of the bridge of the RABA, provide a sufficient picture of the spacious conditions.



© Baltramp Shipping

Figure 14: Radar unit on the bridge of the RABA

## 5.2 AIS records

Sassnitz Traffic plotted the course of the voyage of the RABA with the AIS information available on the day of the accident. Since the ARTUR BECKER is not fitted with AIS, her voyage could not be recorded. Radar recording was not possible for the accident area due to lack of sufficient coverage.

The BSU evaluated the recordings for the time period 1 June 2008, 0535 to 0730. The AIS data of the RABA could be extracted from the recordings (see Fig. 15).

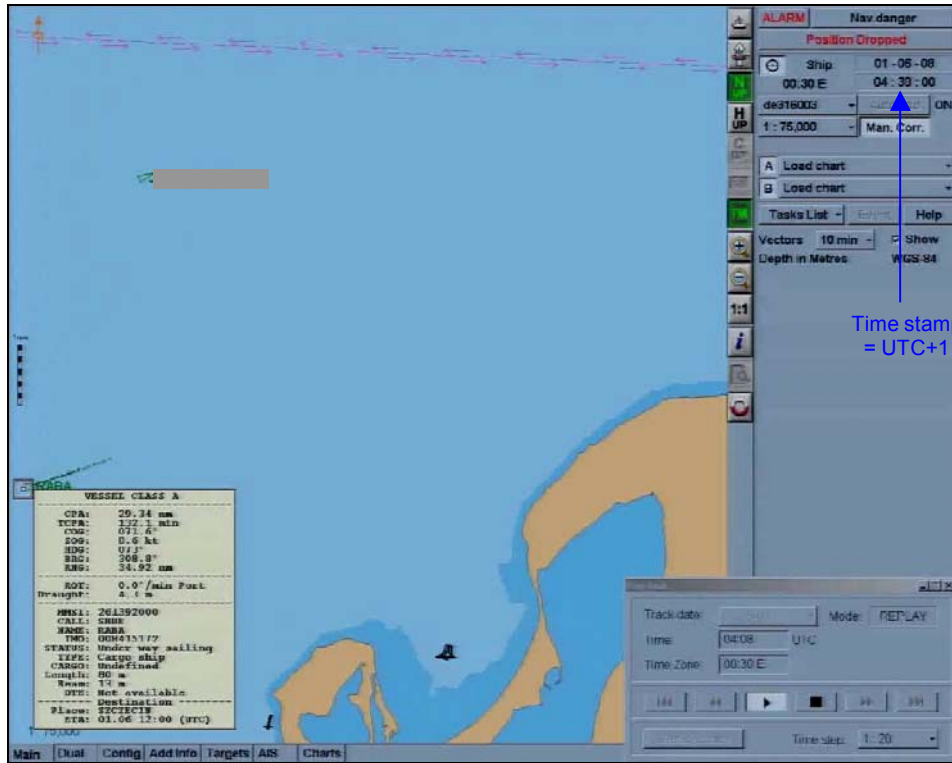


Figure 15: AIS record at 0538:00

Course and speed information, with the respective times, was transcribed into a voyage table, and there were then added the charted course of the ARTUR BECKER and her estimated speeds (see Table 1). The rate of speed records in the engine logbook provided the basis for the speed information for the ARTUR BECKER.

Time	RABA		ARTUR BECKER	
	Course over ground	Speed	Charted course	Speed
0610	074.8°	8.9 kts	354°	~ 4 kts
0611	074.5°			
0612	074.0°			
0613	074.4°			
0614	074.9°			
0615	074.5°			
0616	074.6°			
0617	074.5°			
0618	074.6°			
0619	074.4°			
0620	074.0°			
0621				
0622				
0623	073.8°	8.8 kts	030°	~ 6 kts
0624	074.0°			
0625				
0626	074.3°			
0627	074.0°			
0628				
0629	074.1°			
0630	074.0°			
0631				
0632	074.1°			
0633	074.2°			
0634	074.1°			
0635	074.3°			
0636	074.0°			
0637	074.2°			
0638	074.5°			
0639	074.4°			
0640				
0641				
0642				
0643	074.9°	8.6 kts		~ 8.4 kts
0644	075.9°			
0645	078.9°			
0646	083.8°			
0647				
0648	084.5°			
0649	085.4°			
0650				
0651	070.0°			
0652	069.8°			
0653	069.3°			

Table 1: Voyage Table

During the interpretation of AIS records it must be generally considered that the technical reliability of AIS is not yet certain to the desired extent. Particularly during the regular updating of AIS data, deviations can result<sup>5</sup>. The logged data of the RABA were contradictory to some extent. For instance, before the collision, between

<sup>5</sup> See the results of the field study by Baldau/Benedict/Fischer/Wilske/Grundevik, "AIS – Integrated navigation and technical reliability" in Schiff und Hafen, September 2008, p. 34 f.



0643:20 and 0644:20 a Rate of Turn (ROT) of  $> 5^\circ$  to port was shown (see Fig. 17) but the Heading changed to starboard in the same timeframe from  $073^\circ$  to  $086^\circ$ . Whether and how much the change of heading was caused by hydrodynamic interaction shortly before the collision with the ARTUR BECKER could not be clarified anymore after the event. However such an interaction would have been possible, which is why the heading records, in contrast to the Rate of Turn, can be regarded as plausible. The BSU is not familiar with the type of AIS installed on the RABA. It may be assumed however that the RABA does not have available its own interface for a Rate of Turn Indicator. Hence it can be further assumed that the Rate of Turn record is purely a calculated outcome from the heading readings. This makes all the more incomprehensible the display according to which the originally determined heading values a starboard manoeuvre is shown, but at the same time as the Rate of Turn shows a change to port of  $> 5^\circ$ . This contradictory display constitutes a deviation of the guidelines of the International Maritime Organization (IMO) for onboard AIS installation<sup>6</sup>. The reason for this malfunction is not known to the BSU. Through the extensive analysis of all the recorded AIS data at least it could be excluded that immediately before the collision a port manoeuvre was initiated or displayed after a time delay.

From the VTS records, regardless of the existing technical limitations of AIS, nonetheless reliable facts can be concluded with respect to the following circumstances: On the RABA, course and speed were maintained until shortly before the collision (see Fig. 16, RABA at 8 kts speed).

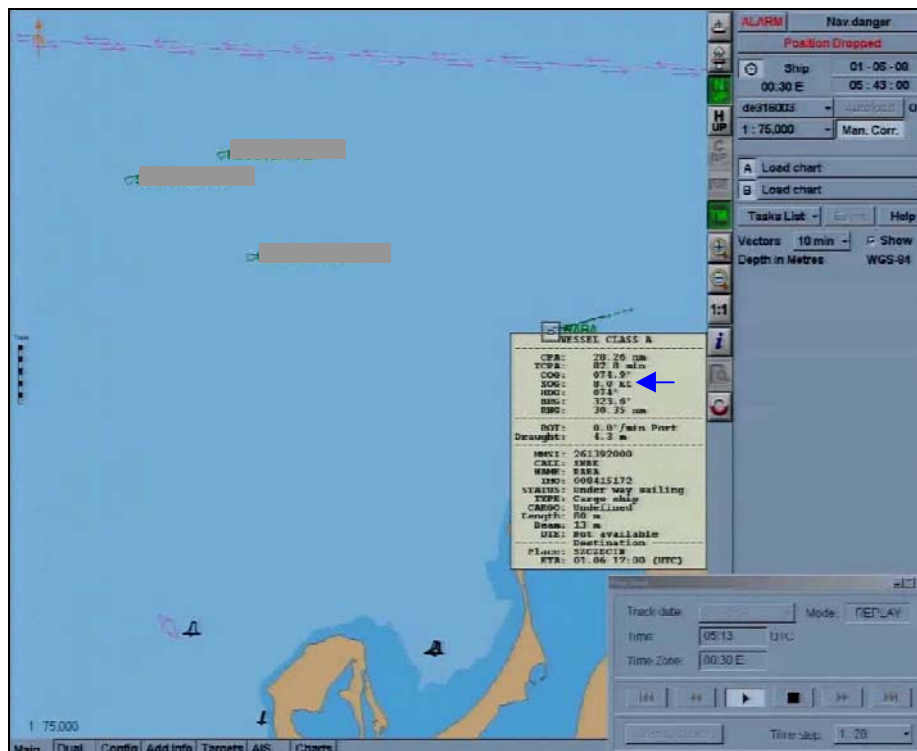


Figure 16: AIS record at 0643:00

<sup>6</sup> Guidelines for the Installation of a Shipborne Automatic Identification System (AIS)

Immediately before the collision speed was reduced (see Fig. 17, RABA at 6.5 knots). An evasion manoeuvre was not initiated.

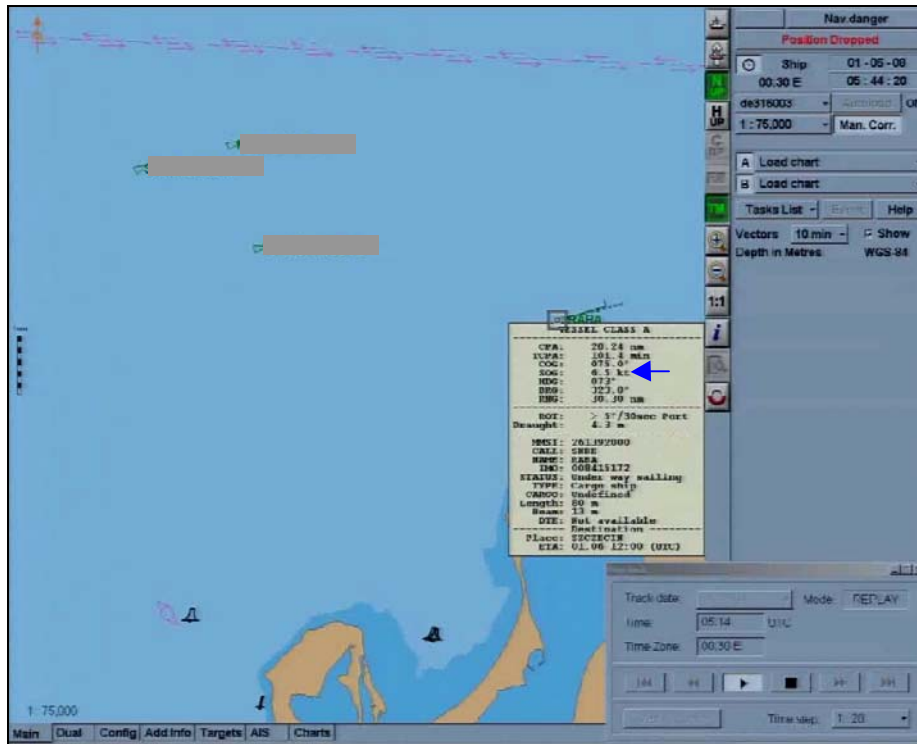


Figure 17: AIS record at 0644:20

Only after the accident is a port manoeuvre evident on the recorded heading data (see Fig. 18).

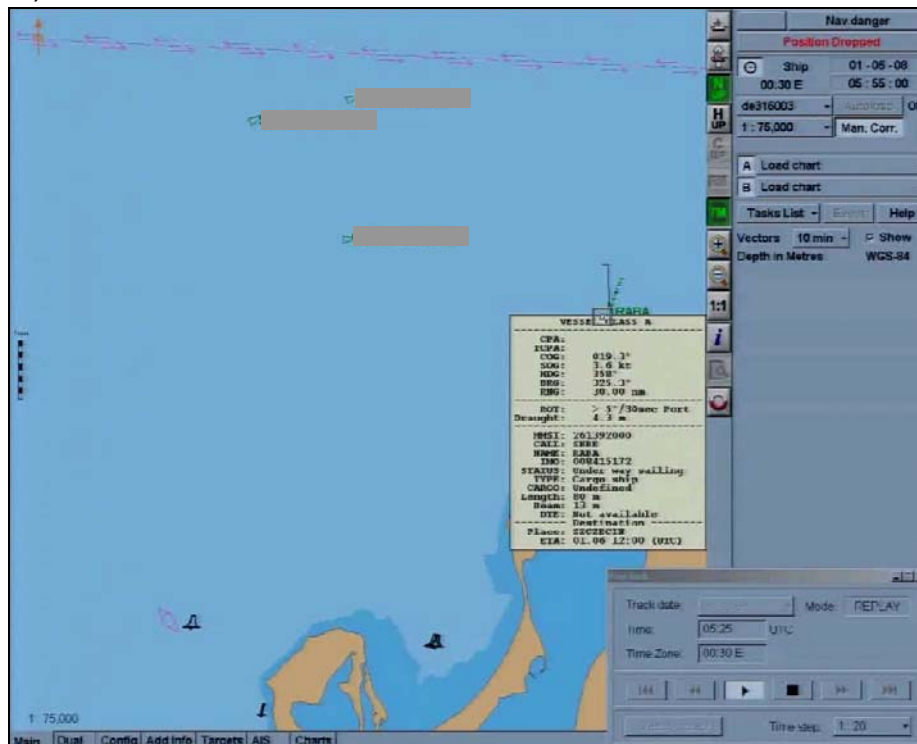


Figure 18: AIS record at 0655:00

From the comparison of the manoeuvre data of the RABA with the engine logbook entries of the ARTUR BECKER it can further be seen that the extra speed of the approaching RABA a quarter of an hour before the accident, according to the records, was only about 0.2 – 0.3 kts.

### 5.3 VHF Records

The AIS records of Sassnitz Traffic are logged together with the VHF records of VHF channel 67, so that simultaneous playing of both recordings is possible.

The following radio traffic was recorded between the RABA and the ARTUR BECKER:

0643:58	RABA	<i>“ARTUR BECKER. RABA.”</i>
0644:04	RABA	<i>“ARTUR BECKER for RABA.”</i>
0644:10	ARTUR B.	<i>“RABA. ARTUR BECKER.”</i>
0644:16 to 0644:36	RABA	<i>“Keep your... I decreasing my... my speed, you keep and altering course in port to your starboardside. Ok?”</i>
0644:40	ARTUR B.	<i>“Ok.”</i>

After the collision the following radio traffic was logged<sup>7</sup>:

0653:16	ARTUR B.	<i>“Bremen Rescue. Motor vessel ARTUR BECKER, Y7JH.”</i>
	Bremen Rescue	<i>“Here is Bremen Rescue.”</i>
	ARTUR B.	<i>“Yes, Bremen Rescue here is motor vessel ARTUR BECKER, call sign Y7JH. I just had a collision with the Polish cargo vessel RABA. We are in the process of determining the damage [...] <sup>8</sup>drove into our port side, and I would need to inform the coastguard so that it can be logged.”</i>
	Bremen Rescue	<i>“Y7JH, here is Bremen Rescue. Understood so far. What position precisely?”</i>
	ARTUR B.	<i>“My precise position is 54°41,53’N 013°14,82’E, hence we are directly outside Rügen here.”</i>
	Bremen Rescue	<i>“Spell the name of the Polish vessel.”</i>
	ARTUR B.	<i>[spells]</i>

<sup>7</sup> Translated from German for the parts up to 0657:28

<sup>8</sup> [...] = incomprehensible

	Bremen Rescue	<i>"Do you also have a call sign? [...] ok. Are there injured people on board your vessel or on the Polish ship?"</i>
	ARTUR B.	<i>"[...] nobody is injured here nor on the Polish vessel either. So far it remains as hull damage. But as I said, we are still in the process of checking watertightness."</i>
	Bremen Rescue	<i>"Yes ok, we will inform the coastguard."</i>
0657:14	ESCHWEGE	<i>"Bremen Rescue, coastguard vessel ESCHWEGE calling."</i>
	Bremen Rescue	<i>"ESCHWEGE, here is Bremen Rescue."</i>
	ESCHWEGE	<i>"Yes, we overheard that about the collision. We are 20 miles east of this position and are heading there now."</i>
	Bremen Rescue	<i>"Yes, ESCHWEGE, Bremen Rescue, I understood, thank you."</i>
0658:28	RABA	<i>"ARTUR BECKER, [...] RABA."</i>
	ARTUR B.	<i>"RABA. ARTUR BECKER."</i>
	RABA	<i>"Good morning sir, this is master [...] RABA, could you approach me? (short Pause) Hello?"</i>
	ARTUR B.	<i>"Yes, RABA, I have informed the... over Bremen Rescue the Coastguard, and the Coastguard vessel ESCHWEGE is coming to our position."</i>
	RABA	<i>"Ok, I wait."</i>
0659:36	RABA	<i>"Just moment I have stopped my engine, and I will wait for... wait for Coastguard [...] ok?"</i>
	ARTUR B.	<i>"Yes, that's ok."</i>
	RABA	<i>"I thank you very much."</i>

Of great interest for the accident investigation was the dialogue between RABA and ARTUR BECKER shortly before the collision:

*"Keep your... I decreasing my... my speed, you keep and altering course in port to your starboardside. Ok?"*

Apart from announcing a speed reduction of the RABA, the VHF announcement was not clearly understandable because of the choice of words. Nevertheless it was confirmed by the ship command of the ARTUR BECKER without further queries.

## **5.4 Witness statements**

The bridge crew of both vessels involved in the collision was questioned on the day of the accident by the Sassnitz Water Police. For the questioning of the Master and Chief Officer of the RABA a certified public translator for the Polish language was involved. The questions transcript was made available to the BSU.

Furthermore, members of the BSU conducted some questioning of the bridge crew of the ARTUR BECKER as well as some of her passengers.

### **5.4.1 ARTUR BECKER**

The bridge crew of the ARTUR BECKER was a regular crew with years of experience and was very familiar with the vessel. The Master had been going to sea since 1971 as a fisherman and later he had obtained what was then known as the Master's Certificate A2. On the day of the accident he held a valid Certificate of Proficiency as Master up to 6,000 gross tonnage for middle-range voyages. He had been sailing on the ARTUR BECKER since 1986. The Technical Officer had sailed as a trained ship engineer (CMA) intermittently since 1969, the last 4 years as a crew member of the ARTUR BECKER.

The following was reported from the ARTUR BECKER:

After weighing anchor, the ARTUR BECKER then held a northerly course on the day of the accident in order to keep clear of the land. The radar was set to a radius of 3 nm (relative motion). After a few minutes, they steered a chart course of 030°. When they attained the rate of speed "Full ahead" the radar radius was increased to 6 nm. The RABA was observed by sight approaching from port astern. The distance between the two vessels at the time was around 3 nm. Then during the further course of events the RABA made an announcement over the VHF that could not be fully understood and was furthermore interpreted to mean that they wanted to pass astern of the ARTUR BECKER. This is why the ARTUR BECKER did not turn to starboard to avoid them. The situation was then considered to be "cleared up". At the time of the arrangement the two vessels were level with each other. The extra speed of the RABA was considerable. Shortly before the collision, the stem of the RABA turned towards the port side of the ARTUR BECKER. Orders of "Full astern" and "Hard to starboard" were given.

### **5.4.2 RABA**

On the morning of the accident the Chief Officer was alone on the bridge as the responsible command of the vessel. There is no information available about his previous deployment on the RABA or about his professional experience. The Certificate of Proficiency valid at the time of the accident was issued in May 2004.

According to statements of the Master, who came onto the bridge after the accident, and of the Chief Officer, the navigation and communication equipment functioned perfectly on the morning of the accident. The RABA proceeded with a steady course and constant speed. Information was not provided whether prior to sunrise a lookout had been deployed on the bridge. The following was reported from the RABA: The approach to the ARTUR BECKER was observed by sight at ca. 4 cables distance. When it was noticed that passing in front of the ARTUR BECKER was no longer

possible, contact was established with the ARTUR BECKER by VHF. The intention had been to alter course to port and to reduce speed. The reaction of the ARTUR BECKER was understood to be a confirmation of this plan. After that the other vessel altered neither course nor speed. While the RABA executed a manoeuvre to port it was expected that the ARTUR BECKER would turn to starboard in order to avoid a collision. This had not happened.

## **5.5 Working times**

Adherence to the stipulated maximum working hours and minimum rest times could only be confirmed by the BSU to a limited extent.

There was no indication that the bridge crew of the ARTUR BECKER would not have been well rested. It was reported that the night had been passed at anchor and also during the first 4 days of the diving expedition the ship command had had sufficient opportunity to stick to the rest time stipulations. In contrast, the 65-year-old Chief Officer of the RABA had stated during the police investigation that, while he had felt physically fit on the morning of the accident, he had felt somewhat tired. Immediately before the collision he said he had been very agitated. The submitted time sheets covered entries for the time period from 18 hours before the collision until two hours afterward. For a complete verification of hours worked, documented evidence would be required for at least the 72 hours prior to the accident. From the information available it appears that on the day before the collision the Officer worked between 1400 and 2000. According to this he would have started the bridge watch duty at 0000 after 4 hours rest time. This record is contrary to the verbal statement, whereby the change of watch only happened at 0200.

The entries in the bridge logbook specify a change of watch at 0000. On 31 May 2008, the day before the accident, the vessel positions were only logged there for the time until 2000, hence to the end of the watch duty of the Officer. During his watch from 2000 to 2400 the Master did not write any entries. On the next day, in the same handwriting, the first vessel position of the day was recorded at 0015. There are further position entries for 0255 - shortly before reaching the point of the heading change from 090° to 072° - for 0400 and for 0600. When entering the position for 0255 a mistake was made. For longitude, the entry erred by 1 degree (013° instead of 012° E). The logged position is on the land at Rügen. The position logged for 0600 was on the route of the voyage again, but it deviated by about 1.5 nm from the AIS position that was logged by the Vessel Traffic Service.

The BSU does not have any statements about the general watchkeeping schedules on the RABA.

## **5.6 Voyage planning**

On the ARTUR BECKER the voyage planning for the respective dives was carried out according to weather. The official nautical paper chart 162 of the BSH was used for navigation, having been updated to the correct issue and revision status on the day of the accident. From weighing anchor on 1 June 2008 at 0609 to the accident at

around 0645 no vessel position was determined. The course of 030° has been charted during the police interrogation after the collision (see Fig. 19).

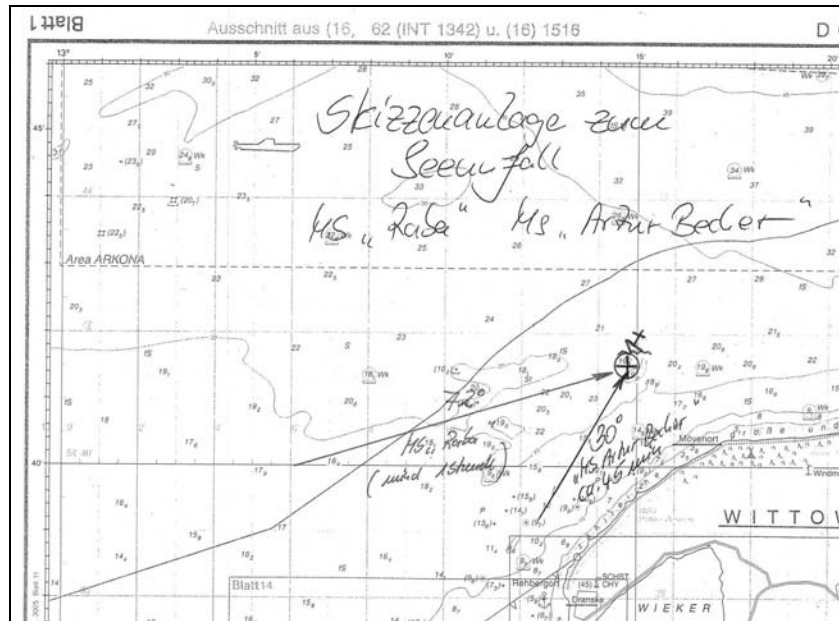


Figure 19: Copy of the nautical chart with voyage courses, excerpt from the Water Police's files of the enquiry

For the passage of the RABA from Great Britain to Poland a handwritten voyage planning tabulation was there. Navigation was with the official British nautical chart BA 2365, which did not provide the correct issue and revision status. The last logged correction was from official notice 48/2007. Since then, 5 further notices had been issued with corrections for the nautical chart, so that the chart should at least have been corrected to the status of the issue of 15 May 2008. Vessel positions were logged at the change of watch, with course changes, and otherwise every two hours (see section 5.5).

## 5.7 Reconstruction of voyage courses

In order to reconstruct the course of the vessels involved in the accident, the AIS logs of the Vessel Traffic Service, the bridge and engine logbook entries as well as the journey plans were compared to each other and put together graphically (see Fig. 20). The ship's position of the ARTUR BECKER is subject to estimation, as no voyage plan has been recorded in writing (see section 5.6). The vessel position logged on the RABA for 0600 was replaced with the position recorded by the Vessel Traffic Service (see section 5.5). The time of the accident, which is noted in the RABA bridge logbook for 0655, was assumed in accordance with the VHF and AIS records as well as the statements of the ARTUR BECKER crew as being at 0645.

Ref.: 250/08

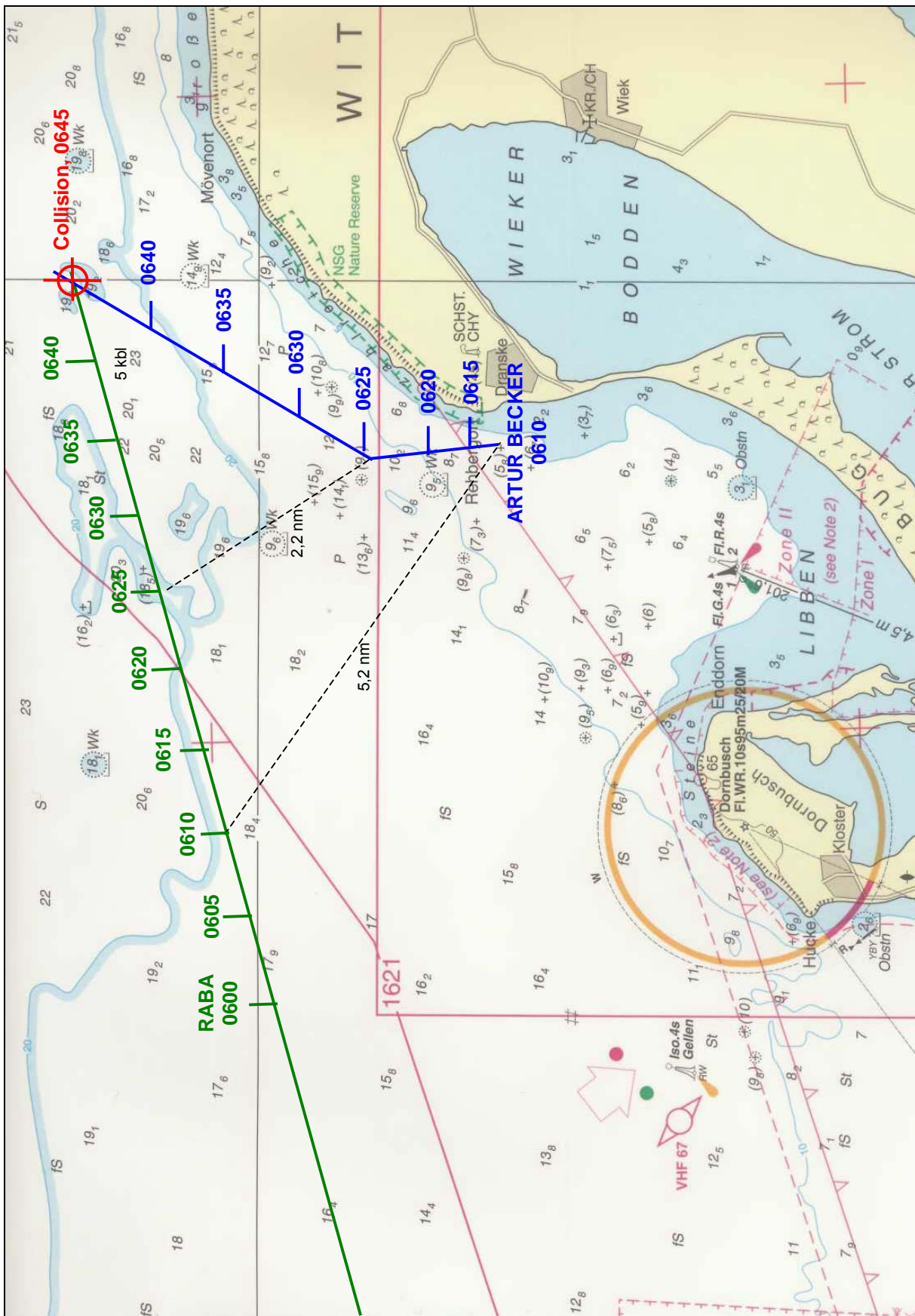


Figure 20: Reconstructed voyage courses, section of nautical chart 162, BSH



The following figure 21 shows an outline of the voyage courses from the beginning of the constant bearing (0625) until the collision. It is evident that from the time when the ship's command of the ARTUR BECKER first noticed the RABA (about 0625), the RABA must have always been forward of abeam to the ARTUR BECKER.

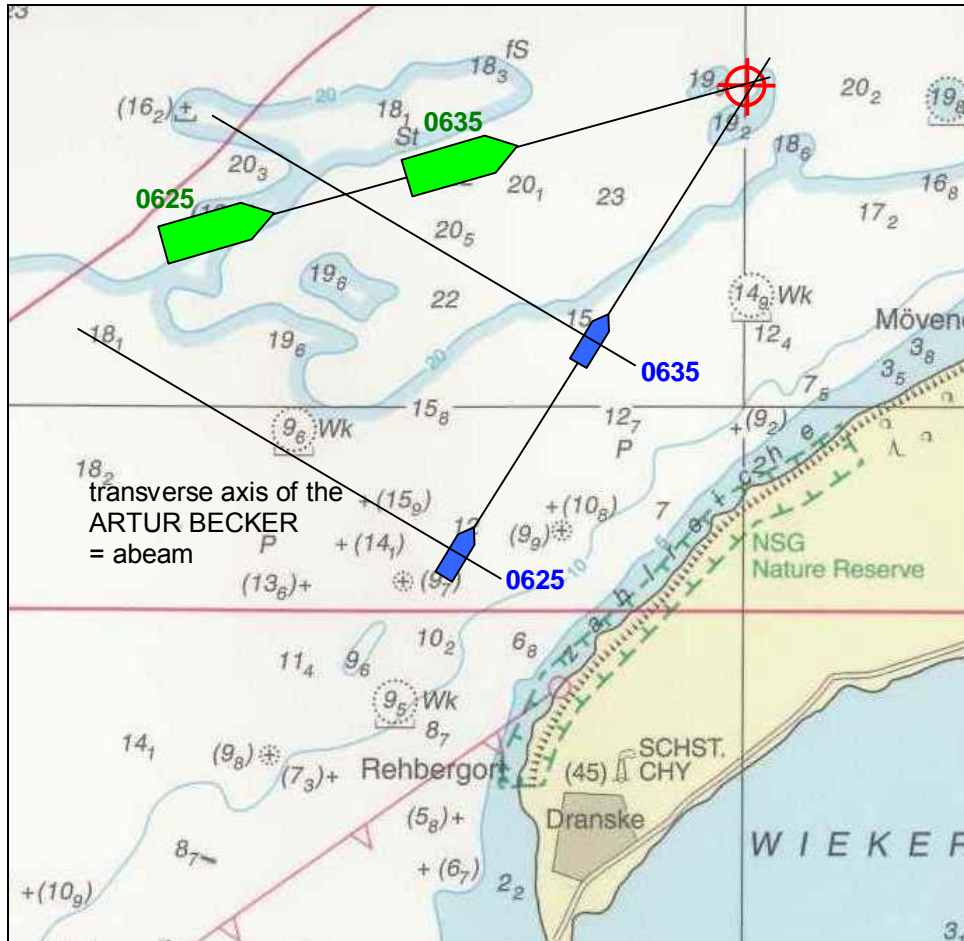


Figure 21: Detailed outline of the approaching ships from 0625 on

### 5.8 Video recordings of the passengers

Throughout the entire journey, the passengers on board the ARTUR BECKER had taken video and photos that afterwards were put together for a film report about the expedition for the science program Hitec on the 3sat television station. The film report was made available to the BSU for the maritime casualty investigation. The events leading up to the collision and the collision itself were not documented by this, since most of the expedition members were still below deck at the time. The images taken start immediately after the collision and therefore in particular provide information about the visibility and weather conditions at the time of the accident (see Figs. 22 and 23).



Figure 22: Excerpt from the video recording immediately after the collision



Figure 23: Further excerpt from the video recording immediately after the collision

The estimates made in the DWD opinion about wave heights and good visibility conditions were supported by the images.

## 5.9 Summary

The investigation has shown that both vessels on 1 June 2008 at 0609, when ARTUR BECKER weighed anchor, were within visual range of the other. At this time they were not yet aware of each other. On the radar of the ARTUR BECKER the RABA was only visible from about 0620 due to the selected radius of 3 nm. What radius was set on board the RABA remains open.

The vessel command of the RABA showed clear signs of fatigue. After only 4 hours of rest time, about 3 hours after the start of the watch there was a faulty log of the vessel position. Also, the delayed observance of the ARTUR BECKER despite a visibility range of more than 13 nm is a sign of fatigue of the vessel command of the RABA, finally also confirmed by the feeling of tiredness stated in the police questioning.

Both vessel skippers in each case only observed the other vessel late, around 0625 (ARTUR BECKER, vessel distance: ca. 2.2 nm) and around 0642 respectively

(RABA, vessel distance: ca. 4 cables). It can be assumed that the bearing remained constant since 0625. The ARTUR BECKER, which saw the RABA approaching at that time, held course and speed. The extra speed of the RABA could not have been more than 0.2 to 0.3 kts from this time point onward, since the ARTUR BECKER, with speed "Full ahead" proceeded at 8.4 kts and the RABA at ca. 8.6 kts. Statements of witnesses on board the ARTUR BECKER about the alleged significantly faster speed of the RABA must therefore be considered as being a subjective estimation.

The attempt to reach agreement over the VHF failed for one due to the unclear wording of the RABA vessel command in English and for another because of insufficient questioning even though parts of the call were barely understandable.

The allegedly intended manoeuvre to port by the RABA was not documented through the records of the Vessel Traffic Service. The same goes for the alleged starboard manoeuvre of the RABA that was described by the witnesses on board the ARTUR BECKER. Rather, the RABA clearly held her course although she was able still to reduce speed by ca. 2.5 kts. The hope stated by the vessel command of the RABA, that the ARTUR BECKER would deviate to starboard was not fulfilled since, on board the other vessel, they assumed, owing to the misunderstanding in the arrangement, that the RABA would pass by within a short time. After the attempt to make the arrangement, the RABA initially was not watched any further by the vessel command of the ARTUR BECKER, although she was in close range and approaching from port so that observing her would have been possible through the bridge windows. Only upon looking again when the RABA was at ca. 20-30 m distance and still to port, was an attempt made to undertake a last minute manoeuvre. The collision could not be prevented because of this small distance between the vessels, neither through this manoeuvre nor through the last-minute stop of the ARTUR BECKER.

## 6 Analysis

The outside conditions on the day of the accident (wind conditions, sea state and visibility) when considered objectively left hardly any scope for a collision of 2 seagoing vessels that had approached each other over a duration of just under 40 minutes. The accident investigation of the BSU, apart from finding causes, also extends to other safety-relevant aspects connected to the operation of the seagoing vessels involved.

### 6.1 Approval of the ARTUR BECKER

During the marine casualty investigation it could initially not be clearly ascertained how many persons the ARTUR BECKER was approved for as the maximum. On the day of the accident there were altogether 35 persons on board, 5 crew and 30 passengers. The construction and equipment safety certificates issued by the See-BG do not specify the maximum limit for carrying people on board. Under the point "Details about life-saving equipment" of the Ship Safety Construction and Equipment Certificate, the following is recorded:

"Total number of persons for which life-saving equipment is provided: 31"

The entry, however, does not have the character of being a certification restriction for carrying a maximum of 31 people, but only makes a statement regarding the life-saving equipment actually available on board.

At the See-BG the ARTUR BECKER is registered as a special craft and as such is permitted for national voyages. As such it is subject to the Ship Safety Ordinance (SchSV) as amended and promulgated in 1997<sup>9</sup>. This can be concluded from the transition regulation in § 15 para. 1 No. 2 of the current SchSV 98<sup>10</sup>, whereby the older version of the SchSV continues to apply to vessels for which no directive has yet been issued<sup>11</sup>, unless international ship safety regulations conflict with this. The Federal Ministry for Traffic, Construction and Urban Development (BMVBS) has hitherto not defined in a directive the requirements for ship safety of special craft.

The ARTUR BECKER is registered in the documents of the See-BG as a special craft, sub-category training vessel. On such vessels a maximum of 12 passengers may be carried for training purposes. In the sense of the applicable SchSV, several types of vessel fall into the category "special craft"<sup>12</sup>:

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<sup>9</sup> Ordinance on Ship Safety (Ship Safety Ordinance) of 8 December 1986 (Federal Law Gazette - BGBl. - I p. 2361) as amended and promulgated on 3 September 1997 (Federal Law Gazette - BGBl. - I p. 2217), amended by the ordinance of 19 June 1998 (Federal Law Gazette - BGBl. - I p. 1431)

<sup>10</sup> Ship Safety Ordinance of 18 September 1998 (Federal Law Gazette - BGBl. - I p. 3013)

<sup>11</sup> See § 6 SchSV 98

<sup>12</sup> See § 2 para. 5 No. 4 of the SchSV as amended and promulgated on 3 September 1997 (Federal Law Gazette - BGBl. - I p. 2217); informal translation from the German text

4. Special craft:

- a) a watercraft in public service as well as a pilot boat,
- b) a tugboat with a registered tonnage of less than 500,
- c) a small vessel up to a registered tonnage of 100, where commercially no more than 12 passengers are carried or that is approved for the commercial transport of no more than 12 passengers,
- d) a training vessel where commercially not more than 12 people are trained for operating sea-going pleasure craft,
- e) a watercraft without own engine (like lighter, barge),
- f) floating work equipment (like dredger, floating crane, pile driver, lifting vessel, drilling and elevating platform, production platform)

As a commercially used vessel for diving and fishing expeditions with 331 registered tonnage, the ARTUR BECKER does not fit into any of these sub-categories. Since it was assigned by the See-BG the ship category “training vessel”, however, it would strictly only be allowed to carry 12 passengers. The See-BG had made allowances regarding this when, as part of the German reunification, the ARTUR BECKER changed from the German Democratic Republic flag to the Federal German flag.

Prior to the reunification the vessel had technical approval as motor training vessel issued by the Society for Sport and Technology (GST). The ARTUR BECKER was used by the former marine school “August Lütgens”, a civil institution in Greifswald that, among other things, was for training future officers of what was then the People’s Navy. The approval allowed for use with a maximum of 39 persons. The checking of the adherence to stipulations and technical regulations by the ARTUR BECKER in the German Democratic Republic was done by the technical ship surveillance of the People’s Navy, the German Ship Review and Classification (DSRK), the state organ for the review and classification of watercraft, and also the Seafaring Administration.

As part of preparation for German reunification there was specified in the appendix to the Unification Treaty of 31 August 1990<sup>13</sup>, among other things, a regulation how ships flying the German Democratic Republic flag would be handled in future under the Ship Safety Ordinance. The regulation<sup>14</sup> says in excerpts:

For vessels that were operated under the national flag of the German Democratic Republic on the day of the union becoming effective, the requirements (of the SchSV<sup>15</sup>) in the version valid on that day were considered as having been fulfilled as long as the ships met the

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<sup>13</sup> Federal Law Gazette - BGBl. - 1990 II p. 889

<sup>14</sup> Appendix I Chapter XI (Division of the Federal Minister for Traffic) Subject Area D – Maritime Traffic, Section III No. 7 a to the Unification Treaty (found in the Appendix I of the Unification Treaty: Federal Law Gazette - BGBl. - II 1990, p. 1098 - 1113); informal translation

<sup>15</sup> Ship Safety Ordinance of 8 December 1986 (Federal Law Gazette - BGBl. - I p. 2361), amended by the Ordinance of 26 June 1987 (Federal Law Gazette - BGBl. - I p. 1570)

stipulations and technical requirements that applied to them thus far. The existing certifications issued under the stipulations of the German Democratic Republic are considered valid certifications (...) in the meaning of [§ 13 SchSV] as long as, within 3 months after the union becoming effective, a submission was made for the issue of new certification. In this case the issue is without fee. Official licences, inspections and their marking (...) are considered as official licences, inspections and markings for the purpose [of the SchSV]. (...)

In January 1991, the ARTUR BECKER passed into the ownership of the Hansestadt Greifswald, which, in turn, allowed the current operator the use of the vessel. On 15 April 1991 the operator applied in writing to the See-BG for the continuation of the approval as “training vessel” with a maximum crew load of 39 persons. On 8 May 1991 a ship inspection was conducted by the See-BG. In the inspection report, among other things, the following entry can be found<sup>16</sup>:

“The vessel is approved for 39 persons as a training vessel for scuba diving.”

The preliminary Ship Safety Construction and Equipment Certificate issued without fee by the See-BG on 31 July 1991 refers explicitly to this inspection report. Hence the ARTUR BECKER was issued with an approval for carrying 39 persons that had not been envisioned in this form by the Ship Safety Ordinance. According to the number of passengers, the ARTUR BECKER was in fact being used as a passenger vessel. Although there are still training voyages, they are however for the diving sport and not, as envisioned by the Ship Safety Ordinance, for training for the pleasure craft skipper’s licence. For most of the time in the season from March to November, the vessel is available for hire to 3rd parties for diving and fishing trips. This type of use is openly advertised by the operator and was also notified to the See-BG in the above-mentioned application of 15 April 1991. It is, however, contrary to the registration of the vessel as a training vessel in the meaning of the Ship Safety Ordinance.

Later, on request of the operators of the ARTUR BECKER, the maximum number of permitted passengers was reduced to 31 persons. This change was documented in writing for the first time in an inspection report of the See-BG from March 1997.

The relevant special approval with respect to the number of passengers allowed to be on board was not evident to 3rd parties from the certifications that were taken along on board. It was not yet included in the Ship Safety Construction and Equipment Certificate. By itself, through being registered therein as vessel type "special craft" meaning that according to the Ship Safety Ordinance there is a restriction to 12 passengers maximum, this would have meant that the ARTUR BECKER on the day of the accident would have had an excess of at least 18 persons

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<sup>16</sup> Informal translation from the German text.

on board<sup>17</sup>. The See-BG now intends, when the current certificate runs out on 31 March 2009, to specify in the new certificate that the maximum number of people on board is explicitly 12 passengers. This would mean transparency for the future, but considerable hindrance of the operation of the ARTUR BECKER in its current form. But an investigation into the consequences resulting from this is not the purpose of the BSU. On the other hand, the fundamental question of how many people are permitted on board is highly relevant for safety and therefore was investigated in detail by the BSU and this was done by involving everyone concerned.

The problems that the See-BG had with the initial classification of the ARTUR BECKER were caused by the specified vessel categories of the Ship Safety Ordinance, which were not designed for the challenges presented by the German reunification. As part of the Unification Treaty, there was an attempt to avoid these types of problems at least initially. The See-BG at the time of the transfer of registration of the ARTUR BECKER, rightly saw the necessity not to undermine the thus far longlasting and successful operation of the vessel by rigid application of the Ship Safety Ordinance. It permitted the use by initially 39 and later 31 persons and did not charge a fee for the first issued preliminary Ship Safety Construction and Equipment Certificate. This approach, in essence, corresponded to the regulation in Attachment 1 to the Unification Treaty (see Fn. 14). According to the opinion of the BSU, however, it would have been required either to consequently register the ARTUR BECKER as ship category "Passenger Vessel" and then, in the course of further regular checks, verify adherence to the technical and legal stipulations of that category, or to leave the vessel by special permission outside the existing categories and then encourage the Federal Ministry of Traffic, Construction and Housing (today: Federal Ministry for Traffic, Construction and Urban Development) to implement a regulation requirement for the creation of further special categories. Instead, the approval as training vessel for 39 or 31 persons respectively led to the situation that the required verification and possible addressing of the "correct" ship category problem only happens 18 years later.

Neither for the officials investigating after the accident nor for crew, charterer and passengers of the ARTUR BECKER could it be determined from the ship certificates for how many people and to what purpose the vessel had been approved. Through their being on board long-term, the crew knew about the granted special allowance. However, from the Ship Safety Construction and Equipment Certificate, it was possible for charterer and officials to see that the vessel was only allowed, as a special craft, to operate with a maximum of 12 trainees for pleasure craft skipper licence purposes. But the prerequisite for such a recognition was a deep knowledge of the Ship Safety Ordinance. In order to resolve the contradiction of such information, the BSU considers it important generally for all vessels within the area of responsibility of the See-BG to explicitly specify the maximum number of permitted

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<sup>17</sup> 35 Persons in total less permanent crew of five persons as well as 12 permissible passengers, none of whom however was being trained for skippering pleasure craft, so that they do not count as trainees according to the SchSV.



people on board in the respective Ship Safety Construction and Equipment Certificate.

For the collision itself the number of passengers on board the ARTUR BECKER, independent of general safety relevance, was not of importance.

## **6.2 Fatigue of the vessel command of the RABA**

The BSU considers the fatigue of the vessel command of the RABA as having contributed towards causing the collision. The Maritime Safety Committee (MSC) of the International Maritime Organisation (IMO) describes fatigue in the Guidelines for Fatigue Relief and Fatigue Management<sup>18</sup> as

“A reduction in physical and/or mental capability as the result of physical, mental or emotional exertion which may impair nearly all physical abilities including: strength; speed; reaction time; coordination; decision making; or balance.”

In the Guidelines it is further specified:

“The effects of fatigue are particularly dangerous in the shipping industry. The technical and specialized nature of this industry requires constant alertness and intense concentration from its workers. Fatigue is also dangerous because it affects everyone regardless of skill, knowledge and training.”

The fatigue of the vessel command of the RABA is sufficiently documented through the faulty position entry after 3 hours of watchkeeping, not observing the ARTUR BECKER until the distance apart was 4 cables despite best visibility conditions, lengthy pauses while speaking and to find words during the VHF arrangement and finally also the self-assessment of the relevant nautical officer. In the opinion of the BSU, the fatigue on the morning of the accident was the result of previous work overload, which happened despite the manning of the vessel being in accordance with the Minimum Safe Manning Certificate.

According to the STCW Code<sup>19</sup>, the general minimum period of ten hours rest within 24 hours can be reduced to not less than six consecutive hours in exceptional circumstances provided that any such reduction shall not extend beyond two days and at least 70 hours rest are guaranteed in each period of seven days<sup>20</sup>. European

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<sup>18</sup> See MSC/Circ.1014 of 12 June 2001, published in Nachrichten für Seefahrer (Notices to Mariners - NfS), insert to issue 18/2002.

<sup>19</sup> Seafarer's Training, Certification and Watchkeeping Code.

<sup>20</sup> See Chapter VIII, Section A-VIII/1, Number 4 of the STCW-Code.

specifications also stipulate a minimum rest time of 6 consecutive hours<sup>21</sup>. These required six hours could not be met with the scheduling of the Chief Officer for bridge watch duty that had happened. The rest hours required for the fitness for duty of the watch officers and the ratings scheduled for navigational watch were thus not met by a significant amount. Whether this finding applied to the entire voyage or only the day of the accident cannot be conclusively determined as a result of missing detailed work hour records.

The fatigue of watch officers and its impact on safe ship operation has been investigated for years in seafaring circles. The ITF<sup>22</sup> published in 2007 the results of an extensive study by Cardiff University<sup>23</sup> where, over the period of several years, 1,856 seamen were questioned, among others. The analysis of the study resulted in the following:

- One in four seafarers said they had fallen asleep while on watch.
- Almost 50 % of seafarers taking part in the study reported working weeks of 85 hours and more.
- Around half said their working hours had increased over the past 10 years, despite new regulations intended to combat fatigue.
- Some 37 % said their working hours sometimes posed a danger to the safe operation of their ship.

In the course of a safety study of the Finnish Accident Investigation Board in 2007<sup>24</sup>, 290 seamen participated in a survey which led to the following results:

- More than 40 % of the respondents had been close to nodding off during the watch at least once during the past 5 years. Altogether 17.6 % had indeed nodded off at least once.
- Near-miss cases resulting from fatigue had occurred at least once to almost 20 % of the respondents.
- Of the respondents, nearly 50 % reported that they had been in a marine accident at least once in their lifetime.

The British Marine Accident Investigation Branch (MAIB) in 2004 had already conducted a safety study for bridge watch duty<sup>25</sup>. For this, all marine accidents investigated or pre-investigated by the MAIB between 1994 and 2003 were analysed that involved merchant ships with > 500 registered tonnage and that happened without pilot assistance. These criteria corresponded to 66 accidents (collisions, groundings and near-collisions) with 75 vessels involved out of a total number of 1,648 accidents.

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<sup>21</sup> See § 5 para. 2 of the European Agreement on the Organisation of Working Time of Seafarers, reproduced in an Appendix to the Council Directive 1999/63/EG of 21 June 1999 on the Organisation of Working Time of Seafarers (Official Journal L 167/33).

<sup>22</sup> International Transport Workers' Federation

<sup>23</sup> "Adequate Crewing and Seafarers' Fatigue: the International Perspective" by Prof. A. Smith, available under <http://www.itfglobal.org/seafarers/fatigue.cfm> .

<sup>24</sup> "Factors contributing to fatigue and its frequency in bridge work", Accident Investigation Board, Finland.

<sup>25</sup> MAIB Bridge Watchkeeping Safety Study, accessible under [www.maib.gov.uk](http://www.maib.gov.uk) .

The safety study led to the following results:

- A third of all groundings involved a fatigued officer alone on the bridge at night.
- Two thirds of all vessels involved in collisions were not keeping a proper lookout.
- Fatigue was considered to be a contributory factor in 82 % of the groundings in the study which occurred between 0000 and 0600.
- Of all vessels grounded with sole watchkeepers, all were dry cargo/container vessels 84 % were less than 3,000 gt.
- All of these groundings occurred in clear or good visibility.

The results of these studies show the evident connection between high work load, fatigue and the resulting marine accidents. From the perspective of the marine casualty investigation it must be considered as alarming that fatigue - as in this case - can grow to the extent of impairing ship safety even when the vessel meets the minimum manning requirements. The BSU had already pointed out several times the high workload<sup>26</sup>, especially for those on watch, which, despite the crew number being according to minimum manning requirements, often leaves little room for adhering to the legal work and resting times. It would be desirable if the flag states, when specifying the minimum manning requirements, would consistently factor in a more realistic workload for Officers on watch, especially due to increased maintenance works, administration work and drills and exercises. Independent of this, each ship operator is asked to consider the safety of crew, vessel, cargo and environment through an effective control of the duty capacity of the crew. For this, a safety culture is necessary that takes into account causes and signs of fatigue. This must be expressed in the Safety Management System according to the stipulations of the International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code<sup>27</sup>). If and to what extent there were corresponding procedure instructions available on board the RABA and if they were implemented, is something that could not be clarified conclusively. A valid Safety Management Certificate was provided.

Nothing points to the fact that the reduced concentration ability of the Chief Officer, resulting from fatigue, was noticed during the change of watch prior to the collision. Handing over the watch to a relieving officer for whom there is cause to assume he might not be fit for his watch duty according to requirements is a violation of the stipulations of the STCW Code<sup>28</sup>. It can only be confirmed for certain that despite the

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<sup>26</sup> See a.o. the investigation report ref. 450/07 (HANJIN GOTHENBURG ./. CHANG TONG) and ref. 495/05 (ARCTIC OCEAN ./. MARITIME LADY ./. SUNNY BLOSSOM), accessible on the internet site of the BSU under [www.bsu-bund.de](http://www.bsu-bund.de) .

<sup>27</sup> IMO Resolution A.741(18)

<sup>28</sup> See Chapter VIII, section A-VIII/2, Part 3-1 Number 18 of the STCW Code; see appendix to the third German Ordinance of 18 June 1997 about the changes becoming effective to the appendix of the STCW Law.

crew conforming to the regulations there was a shortfall in the required resting times, which decreased the concentration ability and reaction time of the Officer on watch.

### 6.3 Legal view of the approach of the vessels

The collision occurred within the jurisdiction of the German Traffic Regulations for Navigable Waterways (SeeSchStrO<sup>29</sup>), the International Regulations for Preventing Collisions at Sea (COLREGs<sup>30</sup>) as well as the German Ordinance on the COLREGs.

The approach of the two vessels (see Fig. 19) did not constitute an overtaking situation since the RABA from the view of the ARTUR BECKER did not approach from a direction of more than 22.5° abaft her beam and therefore was not positioned in a manner that would have meant that, at night, only the stern light of the ARTUR BECKER but none of the sidelights would have been seen (see rule 13 b COLREGs). Furthermore, the RABA approached with a constant bearing forward of abeam (see Fig 21). The two vessels, from the beginning of the voyage of the ARTUR BECKER, found themselves in a crossing situation.

Rule 15 of the COLREGs – Crossing Situation – stipulates:

When two power driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way (...)

According to this the RABA was obliged to yield and according to rule 16 of the COLREGs was also obliged to act early and take substantial action in order to keep well clear of the ARTUR BECKER. Since the ARTUR BECKER - owing to fatigue of the skipper of the RABA - was only observed shortly before the collision, there was little time to meet the duty to avoid them. Instead they opted to use the VHF arrangement as the assumed means of collision prevention. At least the speed was reduced as well, but that was not enough to meet their obligations as a give-way vessel.

Through the crossing courses the ARTUR BECKER was stand-on vessel according to Rule 17 COLREGs and obliged to keep both course and speed, which she did – though shortly before the collision due to a faulty assumption of a corresponding VHF arrangement. Owing to this error the ARTUR BECKER also did not take such action as will best aid to avoid collision as stipulated in Rule 17 b COLREGs. The later attempt at a last-minute avoiding action through reducing speed and initiating a “Hard to starboard” manoeuvre, when the RABA was noticed at a distance of ca. 20 m to port, was no longer able to be successful. At least by this it was prevented that the

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<sup>29</sup> German Traffic Regulations for Navigable Waterways in the revised version of 22 October 1998 (Federal Law Gazette - BGBl. - I p. 3209), last amended through para. 2 of the Ordinance of 15 April 2008 (Federal Law Gazette - BGBl. - I p. 741).

<sup>30</sup> International Rules of 1972 for the Prevention of Collisions at Sea of 13 June 1977 (Federal Law Gazette - BGBl. - I p. 813), last amended through para. 4 No. 6 of the Ordinance of 7 December 1994 (Federal Law Gazette - BGBl. - I p. 3744) in the respective version valid for Germany; see § 1 para. 4 SeeSchStrO.

RABA hit the ARTUR BECKER amidships, something through which in particular the passengers still sleeping below deck could have been injured.

The basic rules for conduct in traffic according to § 3 para. 1 SeeSchStrO, § 3 para. 1 of the German Ordinance on the COLREGs and good seamanship would have demanded that the close range situation resulting from the constant bearing be dealt with early on through relevant manoeuvres like course changes and/or speed changes. The cause for the development of a constant bearing in this case was that the ARTUR BECKER, in order to be clear of the coast in a short time, set a course of 030° and by ordering the maximum rate of speed, continually increased speed, which means that the extra speed of the RABA could have been no more than 0.2 kts. The ignoring by the ARTUR BECKER of the self-caused constant bearing, over a time period of 20 min (from first noticing the RABA) even as stand-on vessel did not correspond to good seamanship.

Both commands, therefore, did not undertake all necessary action to prevent someone else being exposed to any damage or put at risk.

#### **6.4 VHF arrangement as means of collision avoidance**

In the course of the investigation of previous marine accidents, the BSU has already established that a use of VHF promoted countless incidents<sup>31</sup>.

The German Notices to Mariners (Nachrichten für Seefahrer - NfS) have been pointed out the dangers of making manoeuvre arrangements over the VHF for years<sup>32</sup>:

„Past experience has shown that the use of VHF radio by ships to agree manoeuvres in collision avoidance may in fact be the cause of serious risk situations, in particular due to

- the difficulty of clearly identifying other vessels at sea,
- misunderstandings caused by imprecise communication or insufficient language skills,
- collision avoidance manoeuvres not complying with the steering and sailing rules of the Regulations for Preventing Collisions at Sea.

Besides, in close-quarters situations, valuable time may be lost in establishing contact on VHF radio, which should be better used to take early and effective action according to the Regulations for Preventing Collisions at Sea. When taking action to avoid collision, the vessel's master should be aware of the fact that collision avoidance action using VHF involves risks and potentially serious consequences.“

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<sup>31</sup> See a.o. reports about the collision of ARCTIC OCEAN ./ MARITIME LADY ./ SUNNY BLOSSOM (ref. 495/05); LYKES VOYAGER ./ WASHINGTON SENATOR (ref. 126/05).

<sup>32</sup> Last in NfS 1/2009, 1/2008 and 1/2007.

The British MCA, in its MGN 167<sup>33</sup> (Marine Guidance Note), has also pointed out the dangers of VHF use for collision avoidance and specifically warned against it:

„Although the use of VHF radio may be justified on occasion in collision avoidance, the provisions of the Collision Regulations should remain uppermost, as misunderstandings can arise even where the language of communication is not a problem. (...)

Uncertainties can arise over the identification of vessels and the interpretation of messages received. At night, in restricted visibility or when there are more than two vessels in the vicinity, the need for positive identification is essential but this can rarely be guaranteed. Even where positive identification has been achieved there is still the possibility of a misunderstanding due to language difficulties however fluent the parties concerned might be in the language being used. An imprecise or ambiguously expressed message could have serious consequences. (...)

Valuable time can be wasted whilst mariners on vessels approaching each other try to make contact on VHF radio instead of complying with the Collision Regulations. (...)

Also in the case at hand, the attempt was made to deviate from standard steering rules<sup>34</sup> through a VHF arrangement, which failed.

The VHF records of the Vessel Traffic Service confirm language difficulties from the side of the ship command of the RABA in wording the intended passing manoeuvre. According to that wording, only after transcription of what was said is it possible at least basically to find out what manoeuvre the RABA intended and what action they wanted to prompt from the ship command of the ARTUR RABA.

„Keep your... I decreasing my... my speed, you keep  
and altering course in port to your starboardside. Ok?“

Understandable is the announcement of a speed reduction. Less intelligible is the announcement of a change of course to port and the subsequent passing on the starboard side of the ARTUR BECKER. Despite the barely comprehensible announcement it was confirmed from the side of the ARTUR BECKER with a simple “Ok” without them having understood the intention of a full circle rotation. Through this the watch officer on the bridge of the RABA felt confirmed in his planned manoeuvre although the ARTUR BECKER was now expecting him on the starboard side. Good seamanship would have now dictated to probe further because of the contradictory announcement of the RABA and bring about a clear arrangement. In this, however, we need to take into account the approach of the vessels to a distance of only about 4 cables which left those involved generally little time still to make VHF

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<sup>33</sup> MGN 167 (M + F): Dangers in the Use of VHF Radio in Collision Avoidance, accessible under [www.mcga.gov.uk/c4mca/mgn167.pdf](http://www.mcga.gov.uk/c4mca/mgn167.pdf).

<sup>34</sup> See section 6.3 .

arrangements. Furthermore, on the bridge of the ARTUR BECKER they presumably expected to have understood the manoeuvre announcement despite the language problems. Since they now expected the RABA to pass astern and then overtake to starboard, from this time onward in the view of the ARTUR BECKER it was neither reasonable to make an evasion manoeuvre to starboard nor to reduce speed.

The failed arrangement attempt at a distance of only 4 cables therefore turned out to be the cause of the accident. If both ship commands, instead, would have adhered to national and international steering and basic rules then, even with the remaining distance of 4 cables between the vessels, there would still have been time to initiate effective collision prevention action.

Whether the English language abilities of the vessel command of the RABA were also hampered as a result of fatigue is not known to the BSU. A questioning in English by the police was not possible following the collision. This may have also been due to the situation-related excitement of the Polish officer.

## **6.5 Proper lookout and radar use**

On the day of the accident, in the accident area there was only a small amount of vessel traffic and also optimal visibility and weather conditions. Under legal aspects and by means of good seamanship it was still absolutely important to keep a proper lookout and use radar as a technical aid for safe navigation, consistently and with the appropriate settings.

According to the STCW-Code and Rule 5 of the COLREGs it is required that at all times a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances<sup>35</sup>. Furthermore, officers of the navigational watch shall make the most effective use of all navigational equipment at their disposal<sup>36</sup>. Whenever radar is in use, it shall be observed carefully<sup>37</sup>.

On the bridges of both vessels the radar units were operational before the accident. Nothing points to the RABA radar being defective or ARTUR BECKER not being there as a radar target. The circumstance of the late perception of the ARTUR BECKER by the RABA is in the opinion of the BSU due to the fatigue of the Watch Officer. For this reason there was a decreasing watchfulness as lookout as well as less attentive observing of the radar display. But also on the bridge of the ARTUR BECKER principles of good seamanship were not followed as much as they should have been. For one thing, during the course and speed change at 0625 it was not checked in advance and hence was not recognized that this would lead to a constant bearing being maintained with the RABA. For another thing, adherence to the supposed VHF arrangement about passing astern was neither confirmed on the radar display nor by sight. Through the bridge window, the approach of the RABA was observable without problem. Additionally, the steering of the RABA could have

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<sup>35</sup> Chapter VIII, Section A-VIII/2, Part 3-1 Number 13.1 of the STCW-Code.

<sup>36</sup> Chapter VIII, Section A-VIII/2, Part 3-1 Number 27 of the STCW-Code.

<sup>37</sup> Chapter VIII, Section A-VIII/2, Part 3-1 Number 39 of the STCW-Code.

been observed on the radar through selecting a suitable radius. Through this, the misunderstanding about the content of the VHF arrangement and the manoeuvre to be expected by the RABA could have been recognized sooner and time could have been gained. Moreover, according to Rule 17 b of the COLREGs, it would have been recognizable that the RABA would not be able to achieve collision avoidance without the ARTUR BECKER also taking action.

## **6.6 Summary**

The collision between the ARTUR BECKER and the RABA was significantly caused by the fatigue of the command of the RABA in conjunction with the failed VHF arrangement, through which both vessel commands diverged from the International Regulations for Avoiding Collisions at Sea.



## **7. Actions taken**

### **7.1 Operator of the RABA**

The operator of the RABA, on the prompting of the Polish Supervisory Authority for Ship Safety, has changed the RABA's crew.

### **7.2 Operator of the ARTUR BECKER**

On the outside of the bridge house of the ARTUR BECKER, rear mirrors were installed on both sides to optimize the view aft.

### **7.3 See-BG**

The See-BG restricted the number of permitted passengers on board, in the Ship Safety Construction and Equipment Certificate for the ARTUR BECKER, explicitly to 12 people.

## **8 Safety recommendation(s)**

The following safety recommendations shall not create a presumption of blame or liability, neither by form, number nor order.

### **8.1 Vessel command**

The Federal Bureau of Maritime Casualty Investigation recommends to all commands on sea-going vessels to ensure proper lookout throughout the navigational watch according to the stipulations of the STCW-Code and the International Regulations for Preventing Collisions at Sea, and also always to attentively monitor the radar display and to select an appropriate range scale.

Furthermore, it is recommended in case a possible danger of a collision with another vessel is determined, to adhere to the stipulations of the International Regulations for Preventing Collisions at Sea. Using the VHF radio as a means of collision avoidance is advised against.

### **8.2 Operator of the RABA, Vessel command**

The Federal Bureau of Maritime Casualty Investigation recommends to the operator of the RABA and its vessel command to assure adherence to the minimum rest times stipulated according to the STCW-Code and to control their adherence. The crew numbers should be adapted to the requirements of the respective voyage.

### **8.3 Federal Ministry for Traffic, Construction and Urban Development**

The Federal Bureau of Maritime Casualty Investigation recommends to the Federal Ministry for Traffic, Construction and Urban Development to check into the necessity for a new special craft status in the Ship Safety Ordinance, which would cater to the special requirements of historical seagoing vessels in operation, which since reunification are operating under the Federal German flag according to the approval stipulations of the former German Democratic Republic.

## 9 Sources

- **ARTUR BECKER:**
  - Excerpts from the Deck Log Book, the Bell Book and the Engine Log Book
  - Crew list and Certificates of Proficiency
  - Ship Certifications
  - Master's report
  - BSU questionnaire filled in by the operator
  - Witness protocols of the Sassnitz Water Police
  - Interview with the Master, 1<sup>st</sup> Technical Officer and several passengers
  - See-BG inspection reports
  - Safety plan
  - Technical approval by the German Democratic Republic
  - Application documents of the ship operator for changing the flag through the See-BG
- **RABA:**
  - Excerpts from the Deck Log Book
  - Crew list and Certificates of Proficiency
  - Ship Certifications
  - Voyage planning
  - Record of the statement of the Chief Officer and the Master to the Sassnitz Water Police
  - Time sheet of the Chief Officer
  - Inspection reports from Port State Controls
  - Report of damage inspection of the classification society
  - Cause for Concern (C4C) report of the British MCA and AIS logs of the Vessel Traffic Service for the Port of Cardiff
  - Inspection protocol of the Polish Supervisory Authority for Ship Safety
- Investigation documents and reports, photo documentations of the German Federal Police and the Sassnitz Water Police
- AIS and VHF logs of Sassnitz Traffic
- **Statements:**
  - See-BG
  - Operator of the ARTUR BECKER
  - Polish Marine Safety Inspectorate, Maritime Office Szczecin
- Film material about the expedition of the ARTUR BECKER, with kind permission of the ECO Media TV-Produktion GmbH
- Official sea weather report of the DWD
- Official nautical chart 162 of the BSH