



**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 20/09

**Less Serious Marine casualty**

**Collision on the Kiel Canal (NOK)**  
**between HANSE VISION and BIRKA EXPRESS**  
**on 12 January 2009 at 1424**

1 March 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

The HANSE VISION was sailing from Hamburg to Copenhagen. The vessel reached Brunsbüttel lock on 12 January 2009.

At 1350<sup>1</sup>, she began her eastward canal passage as a Traffic Group (VG) 4 vessel under pilot advice.

The collective call at 1345 informed the ship's command about upcoming vessels while they were passing through the lock. The ship's command was aware that they would pass the upcoming BIRKA EXPRESS in the Kudensee siding area.

Shortly before the encounter in the Kudensee siding area, the pilot reportedly observed the BIRKA EXPRESS began to turn to port and then pass through the canal axis with her forecastle. Following that, he reportedly gave the command 'FULL ASTERN'. An evasion manoeuvre was not possible without putting the ORKA at risk, which was sailing just ahead on the starboard side. Nevertheless, the canal helmsman reportedly tried to move as far as possible to starboard. However, a collision was no longer avoidable.

The BIRKA EXPRESS was sailing from Helsinki to Hull. She passed westward through the NOK as a Traffic Group 5 vessel under pilot advice on 12 January 2009. Due to the collective call at 1345, the ship's command knew that a Traffic Group 4 container vessel was approaching them and would be passed in the Kudensee siding area.

To reduce the vessel's speed in good time before reaching the stop signal without compromising the steerability, the pitch of the propeller was reportedly set to 'ZERO' and then to 50% astern. The hydrodynamic effect of this pronounced astern manoeuvre and the increasing wind pressure moved the vessel to port. The forecastle with the superstructure of the partially loaded vessel then turned further to port and the stern approached the dolphins on the northern side. In spite of all the subsequent manoeuvres, it was not possible to prevent a collision.

The impact was reportedly very severe. However, the vessels parted from one another immediately. Damage was assessed and the Vessel Traffic Service (VTS) informed. Both vessels were still fully manoeuvrable. While the HANSE VISION sailed onwards for Kiel, the BIRKA EXPRESS ended her canal passage in Brunsbüttel and moored on the dolphins in the inland port there.

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<sup>1</sup> Unless stated otherwise, all times shown in this report are local = CET = UTC + 1.

## 2 Scene of the accident

Type of event: Less marine casualty/collision  
 Date/Time: 12 January 2009, 1424  
 Location: Kiel Canal, canal kilometre marker (KKM) 8.85

Excerpts from the Kiel Canal chart, WSD-North 1995

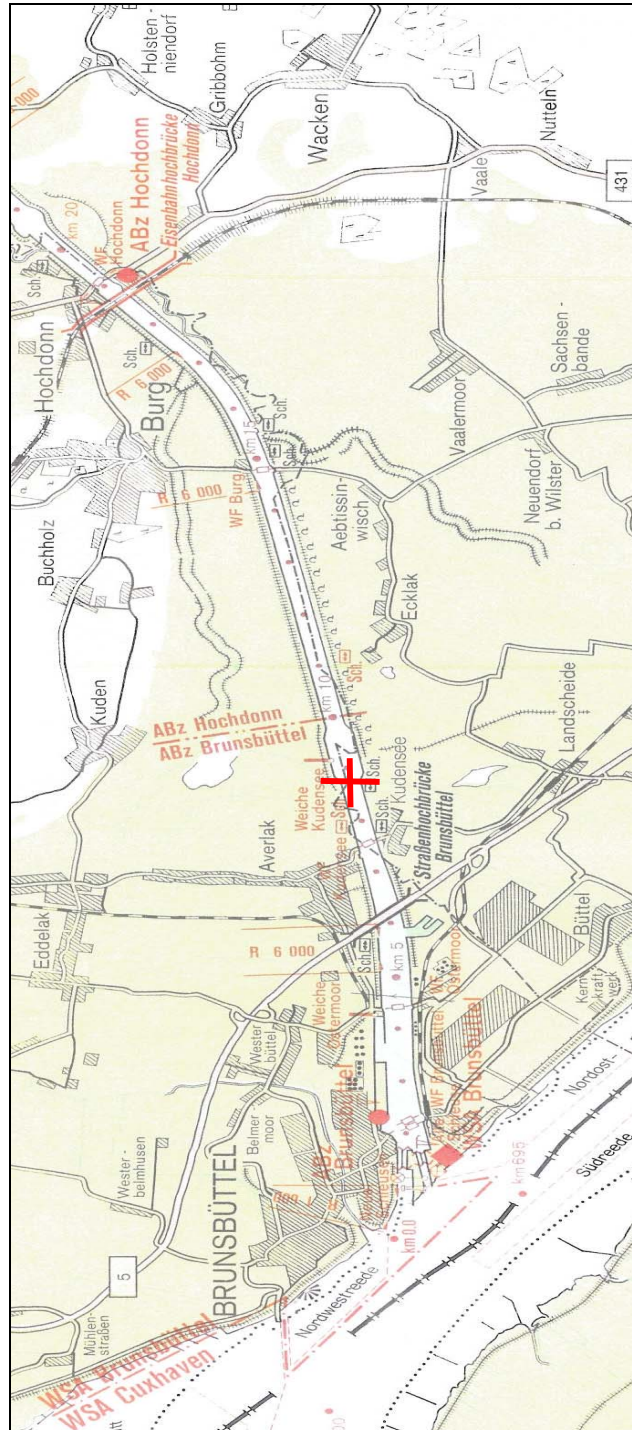


Figure 1: Scene of the accident – Overview

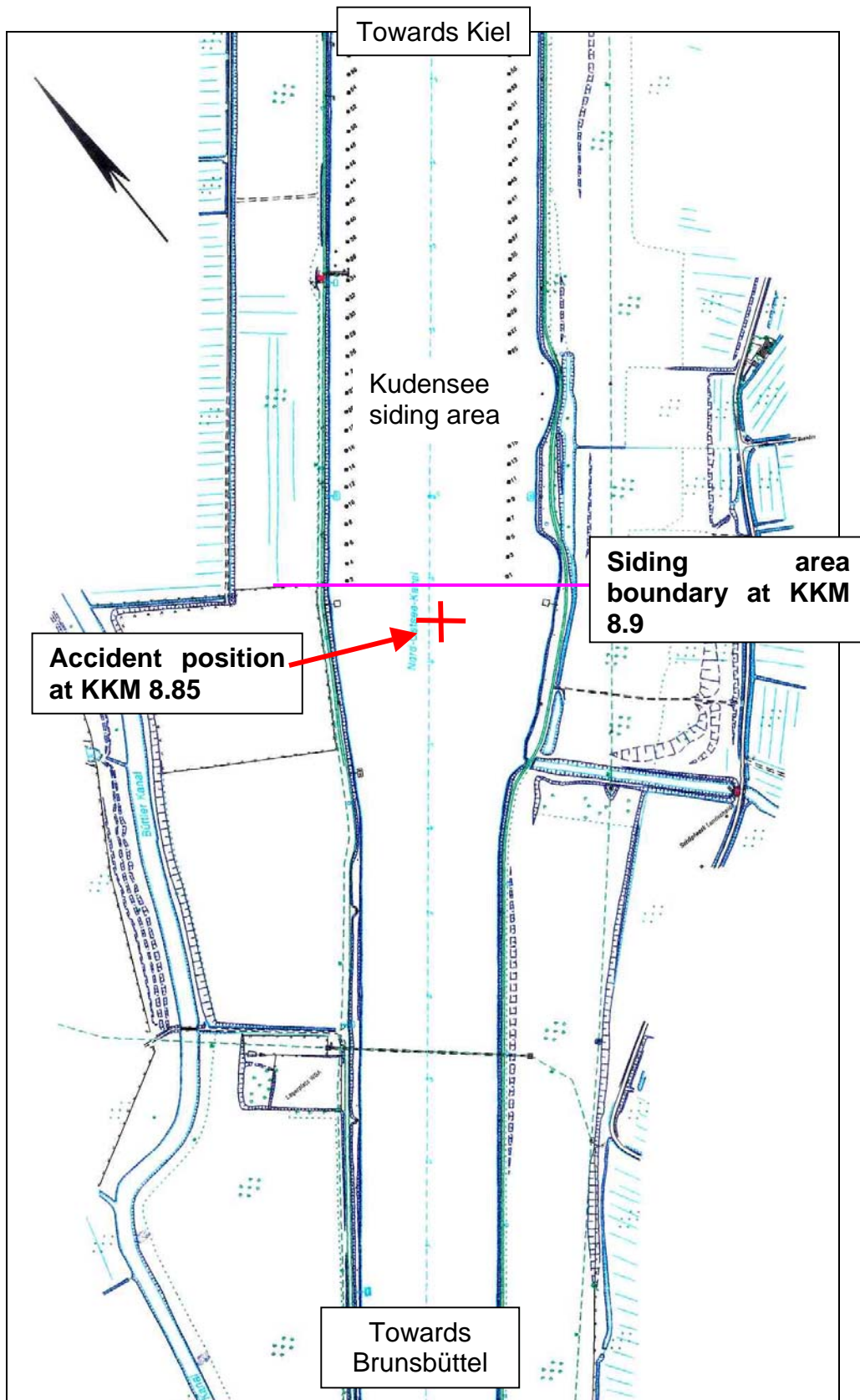


Figure 2: Scene of the accident in detail – Kudensee siding area

### 3 Vessel particulars

#### 3.1 Photo BIRKA EXPRESS



Figure 3: Photo BIRKA EXPRESS

#### 3.2 Particulars BIRKA EXPRESS

Name of the vessel:	BIRKA EXPRESS
Type of vessel:	Ro-Ro-Cargo
Nationality/flag:	Finland
Port of registry:	Mariehamn
IMO number:	9131993
Call sign:	OJHS
Vessel operator:	Birka Cargo Ltd.
Year built:	1997
Shipyard:	Santierul Naval Damen S.A.-Galati
Classification society:	Det Norske Veritas
Length overall:	154.50 m
Breadth overall:	26.02 m
Gross tonnage:	12,251
Deadweight:	8,843 t
Draught at time of accident:	5.20 m
Engine rating:	15,600 kW
Main engine:	Diesel Wärtsilä Vasa 16V46B
(Service) Speed:	20 kts
Hull material:	Steel
Number of crew:	13



### 3.3 Photo HANSE VISION



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Figure 4: HANSE VISION

### 3.4 Particulars HANSE VISION

Name of the vessel:	HANSE VISION
Type of vessel:	Container
Nationality/flag:	Cyprus
Port of registry:	Limassol
IMO number:	9302243
Call sign:	CAWN2
Vessel operator:	Thode Hamburg
Year built:	2005
Shipyard:	Aker Yards Oslo
Classification society:	Germanischer Lloyd
Length overall:	141.65 m
Breadth overall:	20.60 m
Gross tonnage:	7,713
Deadweight:	9,604 t
Draught at time of accident:	7.20 m
Engine rating:	9,240 kW
Main engine:	Diesel 8 L46D Wärtsilä Finland Oy
(Service) Speed:	19.0 kts
Hull material:	Steel
Hull construction:	Double bottom
Number of crew:	13

## 4 Course of the accident

The HANSE VISION was sailing from Hamburg to Copenhagen. The vessel reached Brunsbüttel lock on 12 January 2009.

At 1350, she began her eastward canal passage as a Traffic Group (VG) 4 vessel<sup>2</sup> under pilot advice. The Master, Second Officer, the pilot and a canal helmsman were situated on the bridge.

The collective call<sup>3</sup> at 1345 informed the ship's command<sup>4</sup> about the upcoming vessels while they were passing through the lock. The two first ones were of the VG 5 category. The ship's command was aware that a pass would take place in the Kudensee siding area. Therefore, on leaving the lock an attempt was made to arrive at Kudensee punctually<sup>5</sup>. However, the speed had to be reduced when passing the bunker station, the Ostermoor ferry, and off the Kudensee ferry shortly before the siding area.

The ORKA, a survey vessel, was sailing a slight distance ahead of the HANSE VISION. However, she remained close to the southern side of the canal and was to be overtaken in the Kudensee siding area.

About 15 minutes after leaving the lock, the Master reportedly handed the watch over to the Second Officer and left the bridge.

About 1,000 m before the Kudensee siding area, the pilot was reportedly able to discern that the BIRKA EXPRESS was already in the siding area. He reportedly assumed that the pass would unfold smoothly in the siding area.

The HANSE VISION then reportedly moved to starboard to provide the approaching vessel with more room. At this point, the BIRKA EXPRESS was reportedly still located well to the northern side and approaching at reduced speed. When she was in the last third of the siding area, the pilot of the HANSE VISION reportedly observed the BIRKA EXPRESS began to turn to port. He reportedly first thought that she intended to position herself more centrally. At any event, the HANSE VISION was to remain on the southern side and thus ensure a safe passage.

At a distance of less than 500 m, the pilot of the HANSE VISION reportedly noticed that the BIRKA EXPRESS was turning increasingly to port and that her forecastle was passing through the canal axis. Following that, he reportedly gave the command 'FULL ASTERN'. Shortly afterwards, the Master reportedly appeared on the bridge. An evasion manoeuvre to starboard was not possible without putting the ORKA at risk, which was situated ahead on the starboard side. Nevertheless, the canal helmsman reportedly tried to move as far as possible to starboard. However, since the BIRKA EXPRESS was blocking the canal, a collision at KKM 8.85 was no longer avoidable.

The impact was reportedly very severe. However, the vessels parted from one another immediately. Damage was assessed and the VTS<sup>6</sup> informed. Subsequently, the eastbound passage was continued.

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<sup>2</sup> Vessels are categorised into one of six Traffic Groups for the passage through the NOK, the smallest belonging to Traffic Group 1 and the largest to Traffic Group 6. This categorisation is based on the length, breadth, draught of the vessel and the dangerous nature of her cargo.

<sup>3</sup> A 'collective call' is transmitted via VHF by the Vessel Traffic Service (VTS) every half hour; this provides information on the movement of shipping on the NOK. This information should be forwarded to the ship's command by the pilot.

<sup>4</sup> Unless stated otherwise, the term 'ship's command' also includes the assigned pilot.

<sup>5</sup> See para. 6.6.

<sup>6</sup> VTS: Vessel Traffic Service; in this report reference is made to that of the NOK in Brunsbüttel.

The BIRKA EXPRESS was sailing from Helsinki to Hull. She passed westward through the NOK as a Traffic Group 5 vessel under pilot advice on 12 January 2009. At about 1025, a pilot change took place at the pilot station at Rüterbergen. The Chief Officer, the pilot and a canal helmsman were situated on the bridge at the time of the accident.

At about 1334, the Dükerswisch siding area was passed. Due to the collective call at 1345, the ship's command knew that a VG 4 container vessel would approach them, for which they were to wait in the Kudensee siding area.

The speed of the BIRKA EXPRESS on entering the Kudensee siding area was 8.3 kts. On passing the siding area station, some 300 m before the siding area boundary, the speed was reduced to 6.8 kts. At this point, the distance to the HANSE VISION was still about 2 km.

To reduce the vessel's speed in good time before reaching the stop signal without compromising the steerability, the pitch of the propeller was reportedly set to 'ZERO' and then to 50% astern. When passing through previous siding areas, the pilot reportedly found that this manoeuvre enabled the high forecastle to be positioned lengthways on the canal against the westerly winds. However, this time the wind pressure reportedly appeared to be stronger than the force of the propeller and the vessel moved to port. The forecastle with the superstructure of the partially loaded vessel then turned further to port and the stern approached the dolphins on the northern side. The propeller was then reportedly set to 'HALF AHEAD' again and the helm to 'HARD STARBOARD'. The thus induced current of the rudder was intended to turn the vessel back to starboard closer to the dolphins on the northern side. This was intended to prevent a collision with the HANSE VISION, which had now arrived. The ship's command was reportedly aware that this manoeuvre would cause them to move past the stop signal. However, it appeared to them that avoiding a collision was more important. In spite of every subsequent manoeuvre, including the use of the bow thruster, the port forecastle section of both vessels came into contact at 1424.

The VTS was informed and the damage assessed. The still fully manoeuvrable BIRKA EXPRESS sailed to Brunsbüttel and then moored on the dolphins in the inland port.

## 5 Consequences of the accident

There were neither injuries nor environmental pollution.

The BIRKA EXPRESS had heavy paint abrasions and deformations on the bow section.



Figure 5: Damage overview

BIRKA EXPRESS

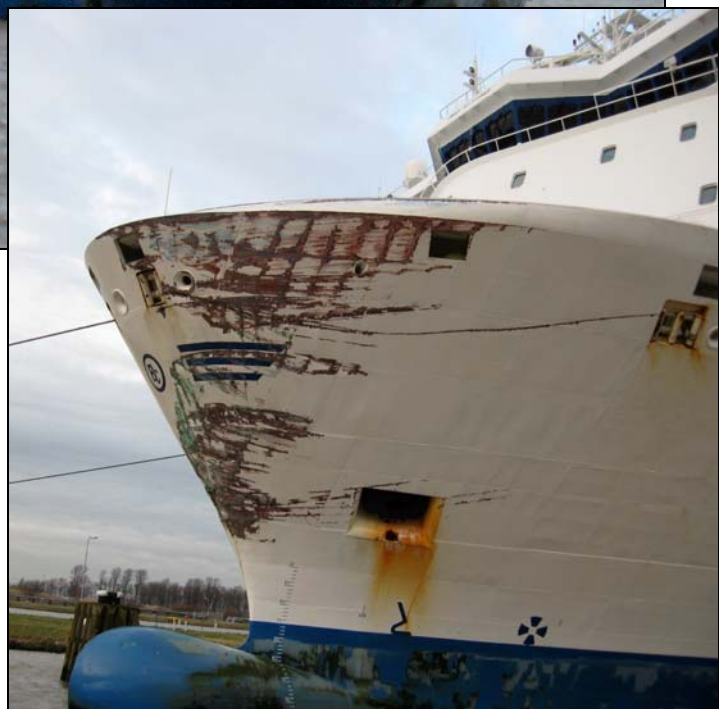


Figure 6: Damage detail BIRKA EXPRESS

The HANSE VISION was heavily dented on the port bow above the waterline. Various deck cargo containers were damaged.



Figure 7: Damage overview HANSE VISION



Figure 8: Damage detail HANSE VISION

## 6 Investigation

### 6.1 Investigations by the waterway police

After the accident, both vessels continued in their respective direction. Upon arrival of the BIRKA EXPRESS in Brunsbüttel and the HANSE VISION in Kiel, the waterway police (WSP) began its on-site investigations, the findings of which were made available to the BSU. Numerous photos were taken, documents inspected, witness accounts recorded and the AIS data<sup>7</sup> of Vessel Traffic Service Brunsbüttel secured. The BIRKA EXPRESS was equipped with a Voyage Data Recorder (VDR)<sup>8</sup>. The data were secured with the support of the BSU.

Based on the findings of the WSP investigation, the course of the accident was as follows:

The two vessels encountered one another on 12 January 2009 at about 1427 on the western exit of the Kudensee siding area, NOK. Visibility was clear and a moderate wind prevailed. The BIRKA EXPRESS sailed at a brisk speed to the western exit of the siding area. It was not permissible for a pass manoeuvre to take place en route due to the NOK regulations. As approaching vessel, the HANSE VISION sailed towards the BIRKA EXPRESS at approx. 15 km/h. Although the vessels were becoming increasingly closer, the speed was not reduced. The BIRKA EXPRESS neither made fast on the dolphins nor was her speed reduced to the extent that the vessels could pass on the wide part of the siding area. The two vessels did not coordinate with one another by radio.

Shortly before the encounter, the BIRKA EXPRESS made an abrupt turn to port and headed for the HANSE VISION. Due to the narrow fairway and the already short distance between each other, a collision was no longer avoidable. The port bow of the two vessels collided at practically undiminished speed.

It was not possible for the WSP to determine conclusively why the BIRKA EXPRESS made a sudden turn to port. It may have been due to a steering error or the vessel being 'drawn-in' to the embankment followed by her turning away to port. It was found that neither vessel involved in the accident had a technical fault.

### 6.2 Environmental conditions

An expertise by Germany's National Meteorological Service (DWD) states that on 12 January 2009 northern Germany was situated between a powerful high pressure system over the Balkans and a low pressure system extending from the Faroe Islands across northern Scandinavia to the Barents Sea. Simultaneously, increasingly mild air flowed to Schleswig-Holstein with a strong south-westerly current.

The wind came from south to south-west with a mean strength of 4 to 5 Bft and gusts of 6 Bft. This is also confirmed by the VDR records of the BIRKA EXPRESS at the time of the accident.

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<sup>7</sup> AIS stands for **A**utomatic **I**dentification **S**ystem and was introduced to improve maritime safety. All vessels equipped with this system transmit their current data, such as position, course and speed as well as possibly other information, which can be made visible on a monitor, via VHF.

<sup>8</sup> VDR: **V**oyage **D**ata **R**ecorder = So-called black box for gathering data to facilitate analysis of the causes an accident should one occur.

There was heavy cloud cover but no rainfall. Visibility was more than 10 km. Air temperature was 5 to 6 °C.

### 6.3 AIS recordings of the VTS

The NOK traffic safety system stores, inter alia, the AIS data of vessels located on the canal. These data are primarily used by the Vessel Traffic Service on a real-time display for controlling vessels on the NOK.

The records are also being increasingly used for the subsequent analysis of accidents.<sup>9</sup>

The following figures show the course of the voyage of both vessels up to the collision.

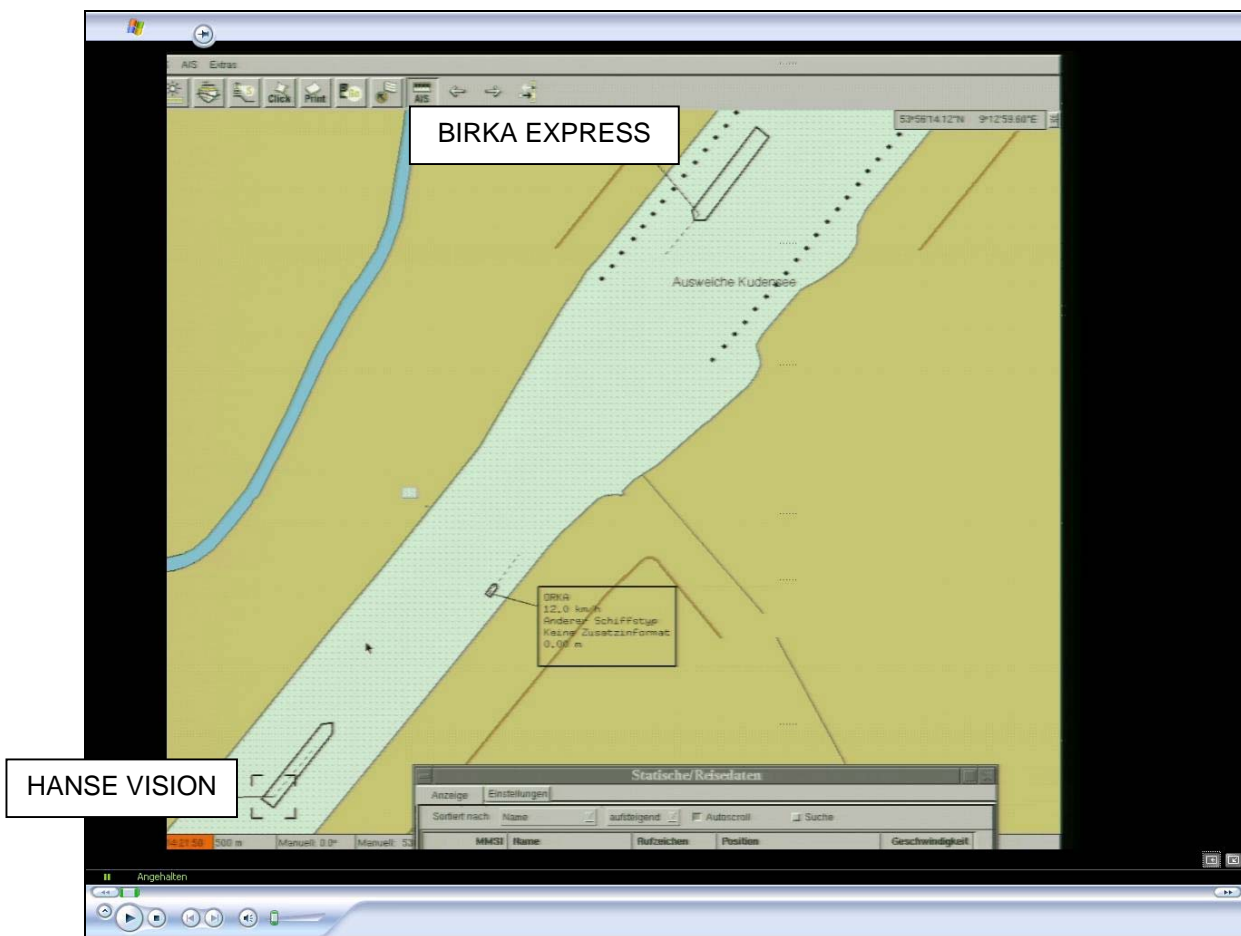


Figure 9: AIS display of the VTS at 142150

Figure 9 shows how the two vessels move towards each other. According to the numerical AIS data, graphically depicted in Figure 10, the BIRKA EXPRESS began to reduce her speed at 1421. At that time, she was located about 200 m from the siding area's western boundary. At about 1423, she increased her speed in order to improve the steering effect.

<sup>9</sup> With regards to the ongoing debate on the accuracy of transmitted GPS data and their graphic reproduction on screens as well as in print, it should be noted that the findings below only indicate the tendencies of the respective course of the voyage.

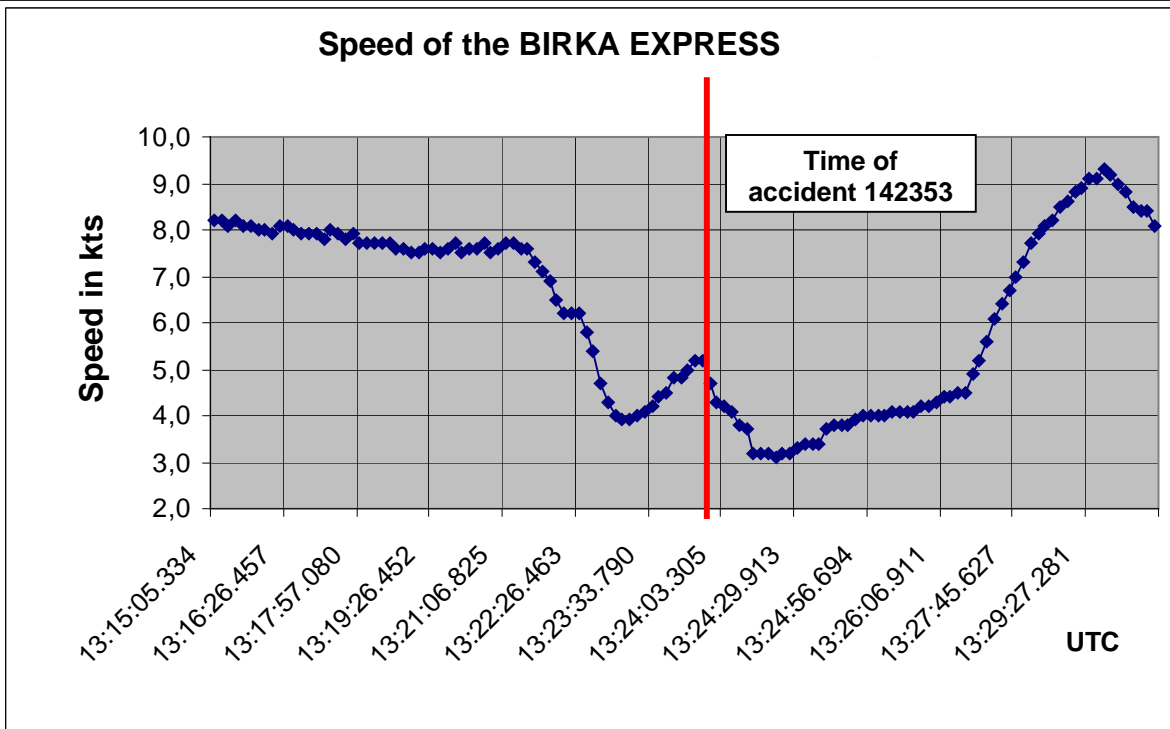


Figure 10: AIS speed data of the BIRKA EXPRESS

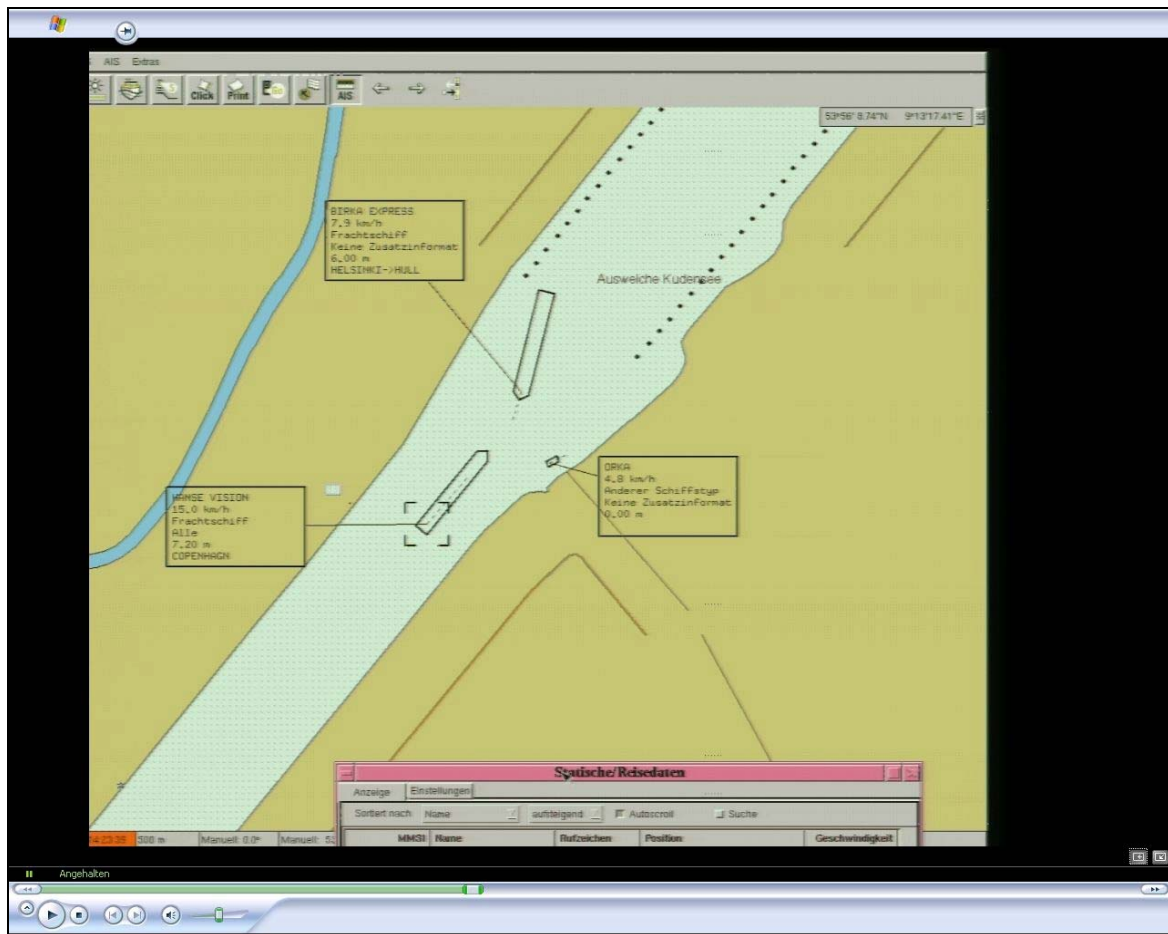


Figure 11: AIS display of the VTS at 142335



Ref.: 20/09

In Figure 11 we see clearly that the BIRKA EXPRESS was moving at 11 km/h when she passed the boundary of the Kudensee siding area. In the process, she began to turn to port.

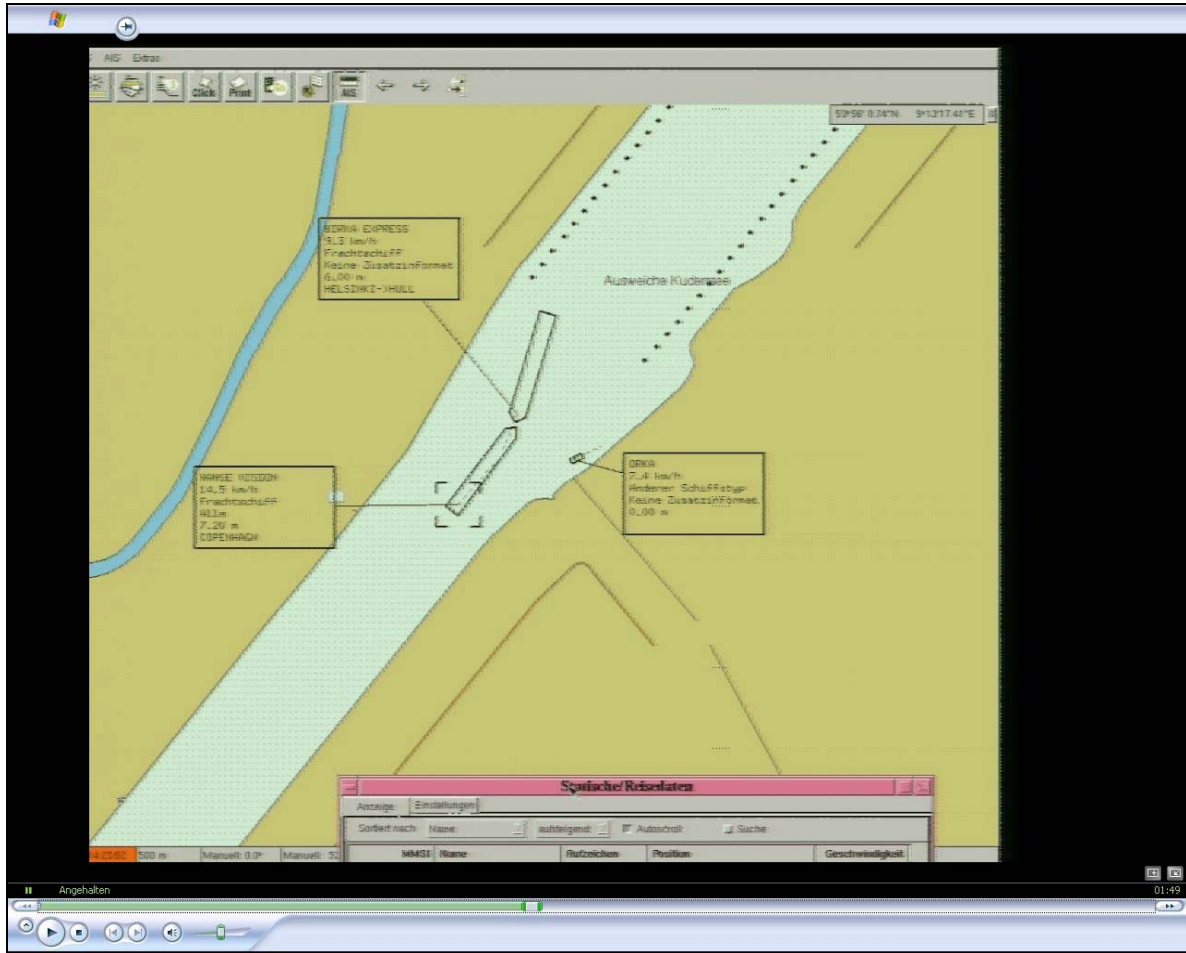


Figure 12: AIS display of the VTS at 142352

Figure 12 shows the time of the collision. The speed of the BIRKA EXPRESS was still 9.3 km/h and the HANSE VISION 14.5 km/h.

The following two figures show how each vessel passes the other on her port side.

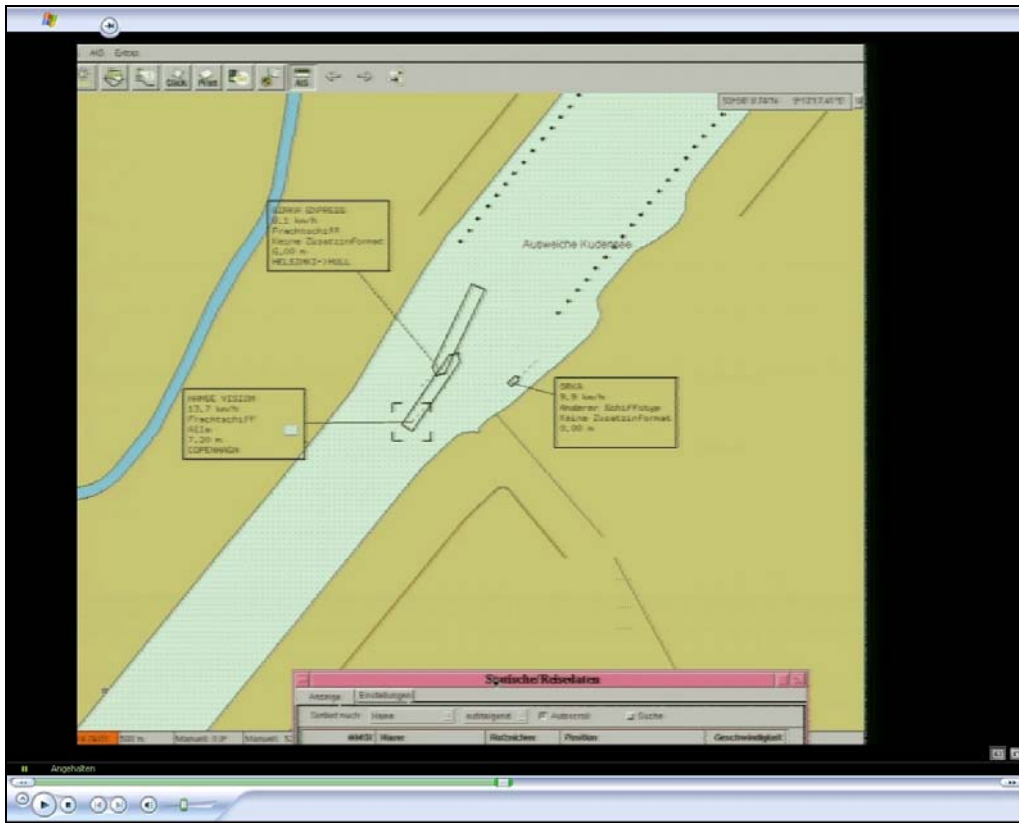


Figure 13: AIS display of the VTS at 142402

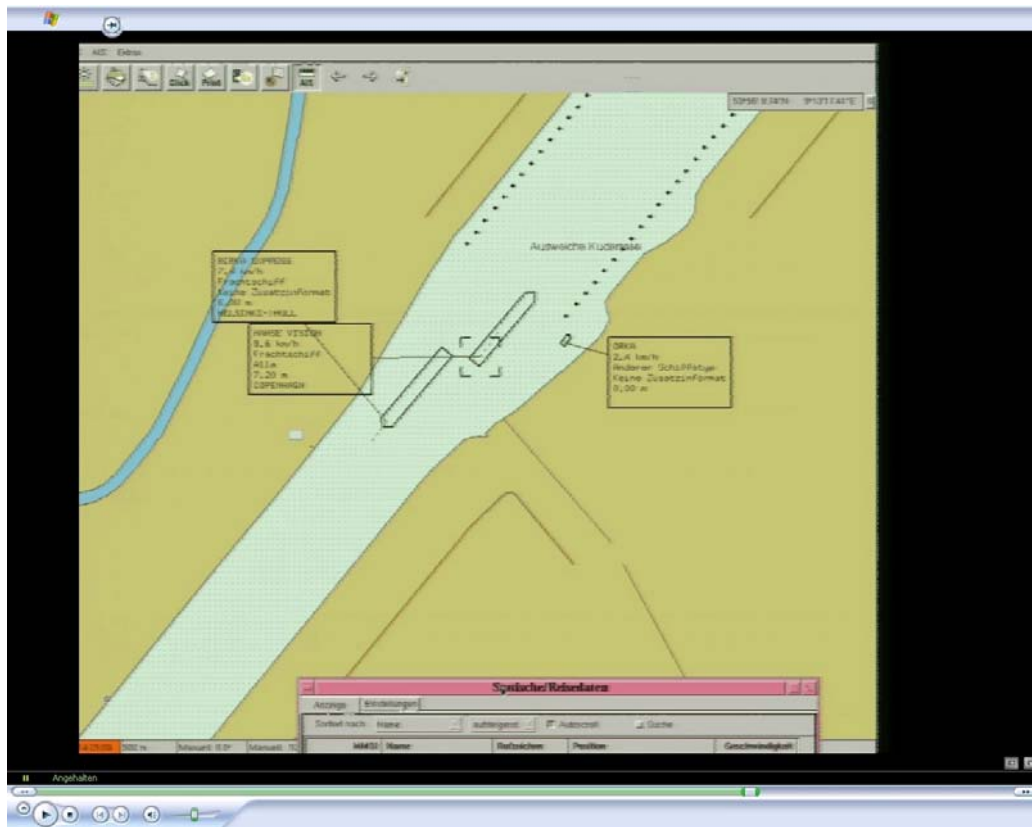


Figure 14: AIS display of the VTS at 142502

## 6.4 VDR data of the BIRKA EXPRESS

Since there was no VDR on board the HANSE VISION, only the data from the BIRKA EXPRESS could be secured and evaluated. This was an S-VDR<sup>10</sup> made by Rutter and distributed by SAM Electronics. This is important in so far that an S-VDR is equipped with all interfaces, but these are only connected if technically possible. In this case, the interfaces to the engine and steering gear were not in use. Therefore, it is not possible to trace the engine and helm manoeuvres directly.

### 6.4.1 Radar records of the VDR of BIRKA EXPRESS

The AIS representation of the VDR is omitted here because it was not underlaid with a nautical chart; therefore, reference is made to the records of the VTS under para. 6.3. The following radar images further illustrate the course of the accident. Figure 15 shows the initial situation of each vessel at about 1422. In the figure below we see how the BIRKA EXPRESS reaches the siding area boundary at the end of the row of dolphins and begins to turn to port while the HANSE VISION approaches her.



Figure 15: Radar image of the BIRKA EXPRESS at 1422

<sup>10</sup> The 'S' stands for 'simplified' and means that data are recorded only to a limited extent if technically feasible (this concerns an option for older vessels being upgraded).

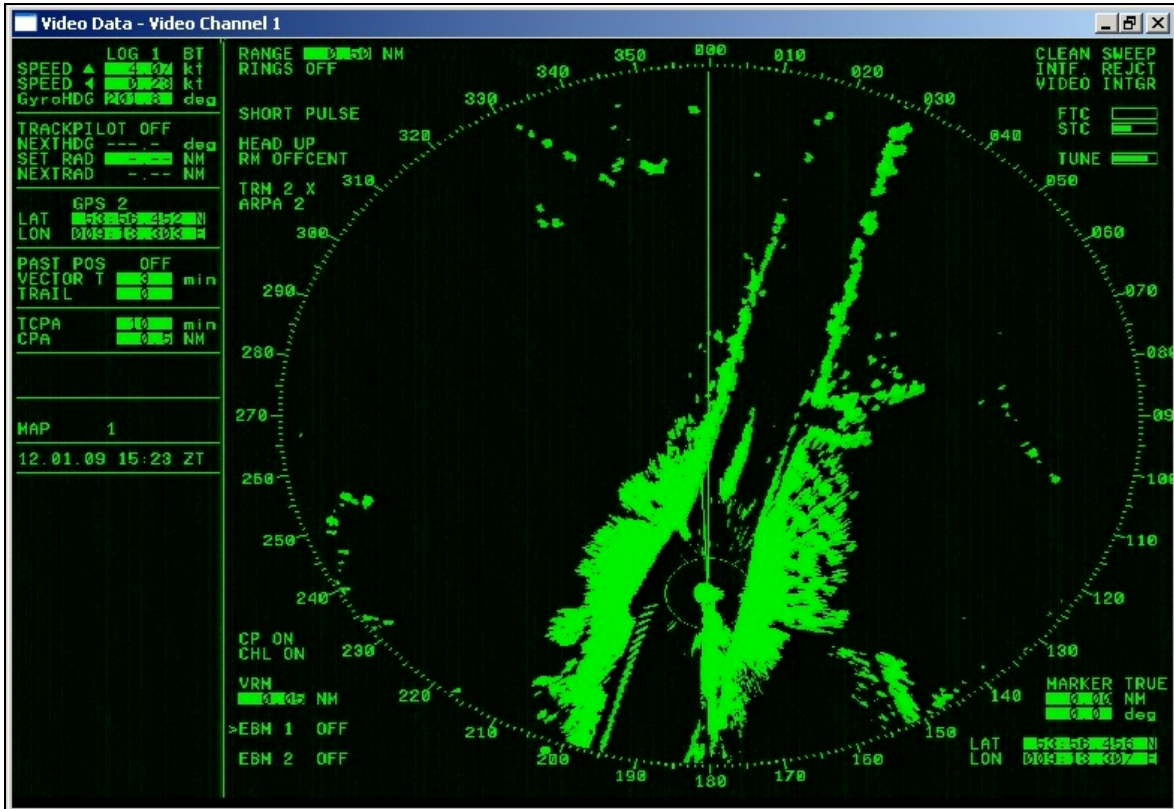


Figure 16: Radar image of the BIRKA EXPRESS at 1423

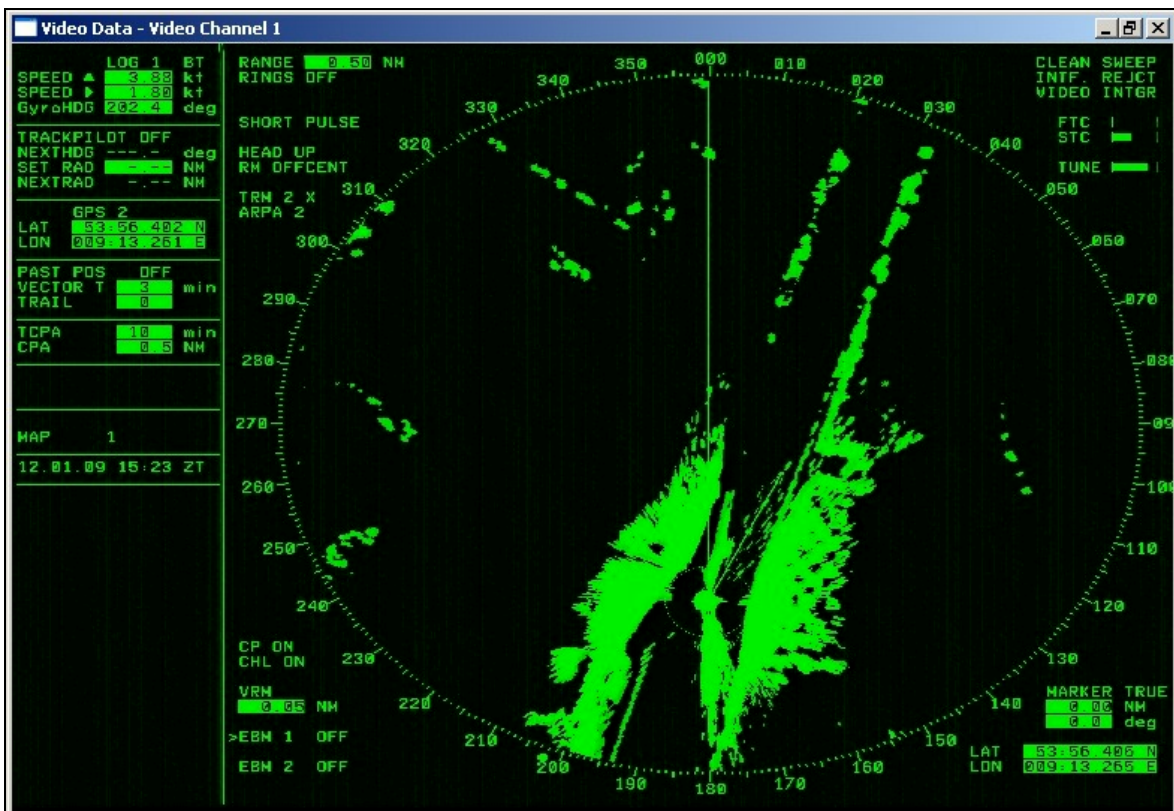


Figure 17: Radar image of the BIRKA EXPRESS at 1424

The radar images confirm the manner in which the AIS records of the VTS represent the course of the accident.

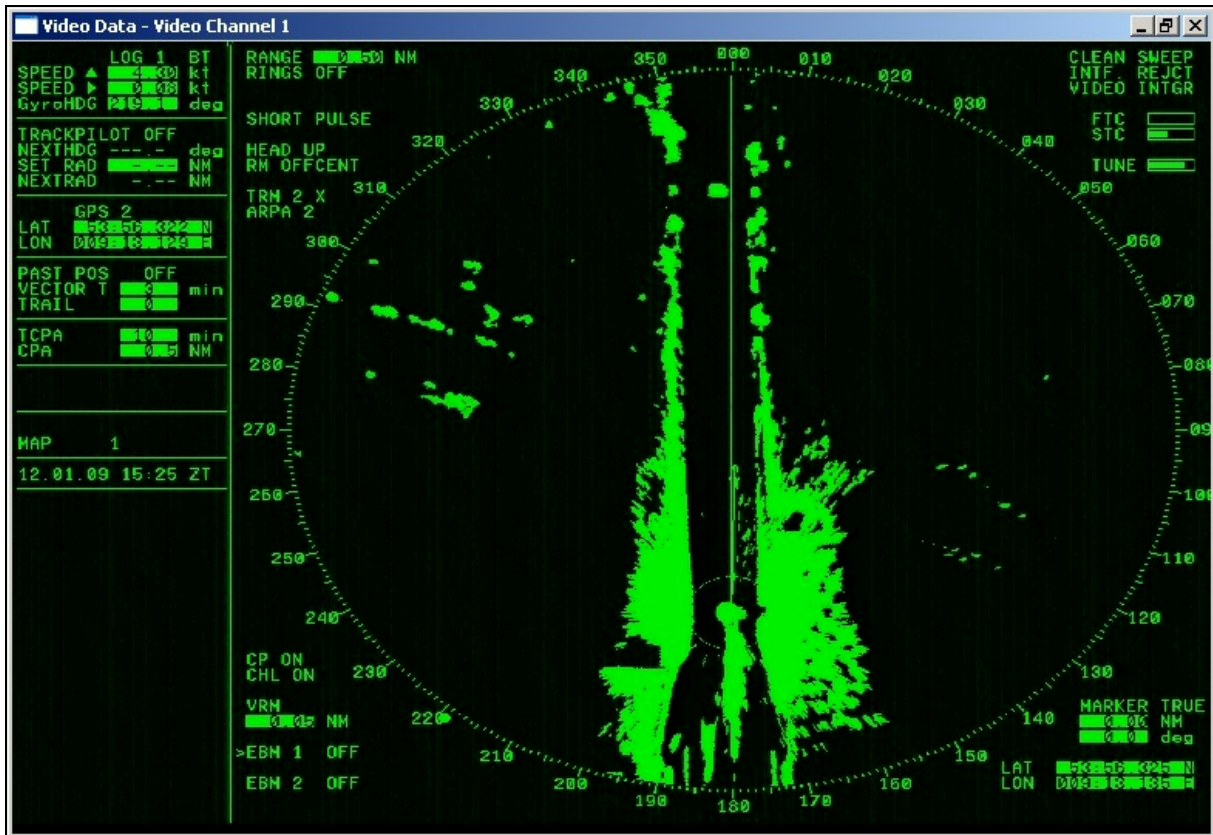


Figure 18: Radar image of the BIRKA EXPRESS at 1425

#### 6.4.2 Audio records of the VDR of BIRKA EXPRESS

The pilot and the canal helmsman converse until 1422. Neither engine nor helm commands can be heard. Two minutes of relative silence then follow and finally the collision. This can be heard plainly at 1424 via the bridge microphones. Using special audio software, the BSU was able to filter out a few brief, quiet words from the recording of the last minute before the accident, from which it can be concluded that at least one engine command and one helm command was given.

#### 6.5 Manoeuvring behaviour of the BIRKA EXPRESS

The BIRKA EXPRESS is driven by a left-hand controllable pitch propeller, which acts as a right-hand propeller when moving astern. As the command 'HALF ASTERN' was given by the pilot while the BIRKA EXPRESS was moving ahead in the Kudensee siding area, hydrodynamic forces began to act on the underwater hull, which led to the stern of the vessel being pushed to starboard<sup>11</sup>.

<sup>11</sup> See also page 111 of Müller/Krauß – 'Handbuch der Schiffsführung (ship's command manual), ninth edition, volume two, part A' - Springer Verlag 1988

The south-westerly wind, which was initially still coming directly from the front, therefore acted from starboard on the sail area of the forecastle caused by the superstructure and thus reinforced the vessel's turning motion to port.

Setting the bow thruster to 'FULL STARBOARD' should have compensated. However, the vessel's speed (more than 6 kts) at that time was too high for the transverse thruster to take effect<sup>12</sup>.

## **6.6 Planning for the passage**

Shipping on the Kiel Canal is governed by the German Traffic Regulations for Navigable Waterways and its notices. The system is based, inter alia, on the fact that vessels of a certain size may only encounter one another in the siding areas. To facilitate this, vessels are categorised into Traffic Groups when entering the canal. Through making use of simple rules, these Traffic Group numbers (1 to 6) can be organised so that only correspondingly small vessels pass each other en route on the NOK. All other vessels must wait for their upcoming traffic in the siding areas.

A further simplification for protection of the canal and vessels is standardisation of the speed. Most of the vessels may only move at a maximum of 15 km/h. Furthermore, a few are categorised as so-called slow-movers, which means they may not exceed 12 km/h on the canal.

On the basis of these predefined speeds, Vessel Control and the pilots are always able to calculate the position at which vessels will pass. That is the basis for the specific time at which the HANSE VISION should theoretically have reached Kudensee. On one hand a reduction in the speed of the BIRKA EXPRESS was based on that and on the other the pilot of the HANSE VISION wanted to arrive at Kudensee 'punctually', punctually in terms of the time of arrival as calculated by the two pilots.

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<sup>12</sup> See also page 108 of Müller/Krauß – 'Handbuch der Schiffsführung (ship's command manual), ninth edition, volume two, part A' - Springer Verlag 1988. Basically, a modern transverse thruster is expected to perform up to a forward speed of 5 kts.

## 7 Conclusion

The accident was only minor. There were neither injuries nor environmental pollution. The damage was purely of a material nature.

Based on an evaluation of all the available information, the course of the accident is as follows:

The ship's command of the BIRKA EXPRESS was required to wait in the Kudensee siding area for the upcoming HANSE VISION. The BIRKA EXPRESS is particularly susceptible to wind due to the high superstructure in the area of her forecastle. The ship's command and the pilot were aware of this. As with the previous siding areas, the vessel was manoeuvred so that she was positioned lengthways on the canal while she waited for the upcoming vessel. This manoeuvre was based on the calculations of the pilot for the time at which his vessel would pass the HANSE VISION in the Kudensee siding area. Nevertheless, a collision occurred for the following two reasons:

The HANSE VISION arrived in the siding area later than the pilot of the BIRKA EXPRESS had calculated for his schedule because she had to reduce her canal speed several times for reasons of safety. This led to the pilot of the BIRKA EXPRESS being compelled to bring the vessel to a standstill more abruptly than he had originally intended in the second half of the siding area, so as to ensure that the passage with the HANSE VISION would be executed in the siding area.

Therefore, the BIRKA EXPRESS experienced an unexpectedly strong turning motion due to the thus caused hydrodynamic effects. This turning was further exacerbated by the south-westerly wind.

The decision to sail through the signal as a final manoeuvre rather than colliding is understandable. However, the overall situation shows that in future the pilot should allow for a larger time frame for a pass manoeuvre in a siding area.

That the BIRKA EXPRESS did not warn the HANSE VISION via VHF, preferably when she began to turn to port, appears to have facilitated the accident.

It was not apparent to the ship's command of the HANSE VISION that a collision might occur until it was too late. Therefore, her manoeuvres could not prevent the collision.

Since this marine casualty yielded no new findings of particular importance for safety at sea, the investigation thereof was concluded by the Federal Bureau of Maritime Casualty Investigation with a summary investigation report.<sup>13</sup>

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<sup>13</sup> See art. 15 para. 1 SUG in conjunction with art. 18 para. 4 FIUUG.

## 8 Sources

- Investigations by Waterway Police (WSP) Brunsbüttel
- Written statements
  - Ship's commands
  - Vessel operators
  - Classification societies
- Witness accounts
- Kiel Canal chart, Waterways and Shipping Directorate North (WSD-N)
- Records of the VDR of BIRKA EXPRESS
- Official weather expertise by Germany's National Meteorological Service (DWD)
- Records of Vessel Traffic Service NOK Brunsbüttel
- Page 108 et seq of Müller/Krauß – 'Handbuch der Schiffsführung (ship's command manual), ninth edition, volume two, part A' - Springer Verlag 1988