



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

Investigation Report 189/14

Serious Marine Casualty

**Collision between the sailing vessel NOBILE  
and worksite craft WERKER in the  
Flensburg Firth on 30 May 2014**

24 February 2017

The investigation was conducted in conformity with the Law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Act – SUG). According to said Act, the sole objective of this investigation is to prevent future accidents. This investigation does not serve to ascertain fault, liability or claims (Article 9 para. 2 SUG).

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

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

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## Table of Acronyms Used

AG	Amtsgericht <i>Local court</i>
AIS	Automatic identification system
BinSchUO	Binnenschiffsuntersuchungsordnung <i>Inland Waterways Vessel Inspection Ordinance</i>
BSH	Bundesamt für Seeschifffahrt und Hydrographie <i>Federal Maritime and Hydrographic Agency</i>
BSR	Binnenschiffsregister <i>Inland shipping register</i>
BSU	Bundesstelle für Seeunfalluntersuchung <i>Federal Bureau of Maritime Casualty Investigation</i>
CEST	Central European Summer Time
COG	Course over ground
COLREGs	International Regulations for Preventing Collisions at Sea, 1972
DGzRS	Deutsche Gesellschaft zur Rettung Schiffbrüchiger <i>German Maritime Search and Rescue Association</i>
ENC	Electronic navigational chart
GPS	Global positioning system
GT	Gross tonnage
SeeSchStrO	Seeschiffahrtsstraßenordnung <i>German Traffic Regulations for Navigable Maritime Waterways</i>
UTC	Universal Time Coordinated
VHF	Very high frequency
VO-KVR	Verordnung zu den Internationalen Regeln von 1972 zur Verhütung von Zusammenstößen auf See <i>Ordinance to Implement the International Regulations for Preventing Collisions at Sea, 1972</i>
WSP	Wasserschutzpolizei <i>Waterway police</i>
ZSUK	Zentralstelle Schiffsuntersuchungskommission/Schiffseichamt <i>Ship Surveying and Weighing Office.</i>

## 1 Summary

At 1425<sup>1</sup> on 30 May 2014, the German worksite craft WERKER collided with the German traditional sailing ship NOBILE in the Flensburg Firth in Danish territorial waters. Both vessels were sailing into the Flensburg Firth. Due to the prevailing westerly winds, the NOBILE tacked close to the wind. After tacking north of the Holnis Peninsula, the NOBILE approached the WERKER on northerly courses. The WERKER was following the fairway on westerly courses. Adequate measures to address the emerging risk of collision were not taken on either vessel. During the collision, the NOBILE's bow rammed the WERKER on her port side. The NOBILE's bowsprit struck an excavator parked on the deck of the WERKER and snapped. Due to a second impact abaft, the hull of the WERKER was damaged below the waterline and she took on water. The crew of the WERKER responded to this by grounding her on a shoal near the scene of the collision. After the collision, the NOBILE also anchored in the vicinity.

The collision did not give rise to injuries, meaning no intervention was required by the crew of the boat deployed by the DGzRS.

Initial enquiries on board the two vessels were carried out by officers from the waterway police (Flensburg District), who went to the scene in a Rigid Inflatable Boat (RIB).

The NOBILE was later able to continue her voyage to Flensburg. The WERKER returned to the port of Gelting.

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<sup>1</sup> Times shown in this report are local (Central European Summer Time - CEST = UTC + 2) or where indicated Universal Time Coordinated (UTC).

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## 2 Factual information

### 2.1 NOBILE

#### 2.1.1 Photo of the ship



Figure 1: Photo of the NOBILE

#### 2.1.2 Ship particulars

Name of ship:	NOBILE
Type of ship:	Traditional ship, gaff cutter
Nationality/Flag:	German
Port of registry:	Wolgast
Call sign:	DIAN
Owner:	City of Wolgast/Department of Planning and Building Control
Operator:	Förderverein Traditionssegler e.V.
Year built:	1919
Shipyard:	J. W. Brooke & Co. in Lowestoft, England
Length overall:	38.03 m
Hull length:	26.00 m
Breadth overall:	5.50 m
Gross tonnage:	72
Displacement:	100 t <sup>2</sup>
Draught (max.):	6.20 m

<sup>2</sup> According to the association's website (retrieved on 17 January 2017).



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Draught (min.):	3.50 m
Engine rating:	220 kW
Main engine:	6-cylinder Caterpillar
(Service) Speed:	12
Hull material:	Steel
Hull design:	Retractable centreboard
Minimum safe manning:	5

### **2.1.3 Voyage particulars**

Port of departure:	Sønderborg, Denmark
Port of call:	Flensburg, Germany
Type of voyage:	Other shipping, international
Manning:	23
Draught at time of accident:	Approx. 5 m
Pilot on board:	No

## 2.2 WERKER

### 2.2.1 Photo of the ship



Figure 2: Photo of the WERKER

### 2.2.2 Ship particulars

Name of ship:	WERKER
Type of ship:	Worksite craft
Nationality:	German
Port of registry:	Kappeln
Call sign:	DK5100
Operator:	Taucher- und Wasserbaubetrieb Weihs
Year built:	1888
Shipyard:	Schichau Unterweser
Inland shipping register:	AG Rendsburg, BSR number 270
Classification society:	ZSUK <sup>3</sup>
Length overall:	28.64 m
Breadth overall:	8.90 m
Gross tonnage:	234
Displacement:	278.7 m <sup>3</sup>
Draught (max.):	1.50 m
Engine rating:	278 kW
(Service) Speed:	6.5 kts
Hull material:	Steel
Minimum safe manning:	2

<sup>3</sup> Ship Surveying and Weighing Office.

### 2.2.3 Voyage particulars

Port of departure:	Gelting Bay
Port of call:	Schausende Marina
Type of voyage:	Merchant shipping, national
Cargo information:	One excavator and other equipment, 8 dolphin pipes
Manning:	3
Draught at time of accident:	$D_f = 0.90 \text{ m}$ , $D_a = 1.50 \text{ m}$
Pilot on board:	No
Number of passengers:	None

### 2.3 Marine casualty or incident information

Type of marine casualty:	Serious marine casualty, collision
Date, time:	30 May 2014, 142527
Location:	Flensburg Firth, north of Holnis
Latitude/Longitude:	$\varphi 54^\circ 53.20'N$ $\lambda 009^\circ 35.26'E$
Ship operation and voyage segment:	Estuary trading
Consequences:	WERKER: The collision caused indentations and penetrations in the hull with water ingress in a tank and heavy damage to an excavator parked on the deck NOBILE: Jibboom broken, bobstay's bow eye buckled

### 2.4 Shore authority involvement and emergency response

Agencies involved:	Maritime Rescue Coordination Centre Bremen, waterway police (Flensburg District)
Resources used:	Search and rescue vessel WERNER KUNTZE and one RIB from the waterway police
Actions taken:	Scene of the accident secured and damage surveyed
Results achieved:	The two vessels involved sustained material damage; no injuries or environmental pollution

## 2.5 Nautical chart

Extract from Nautical Chart ENC DE 421050, BSH

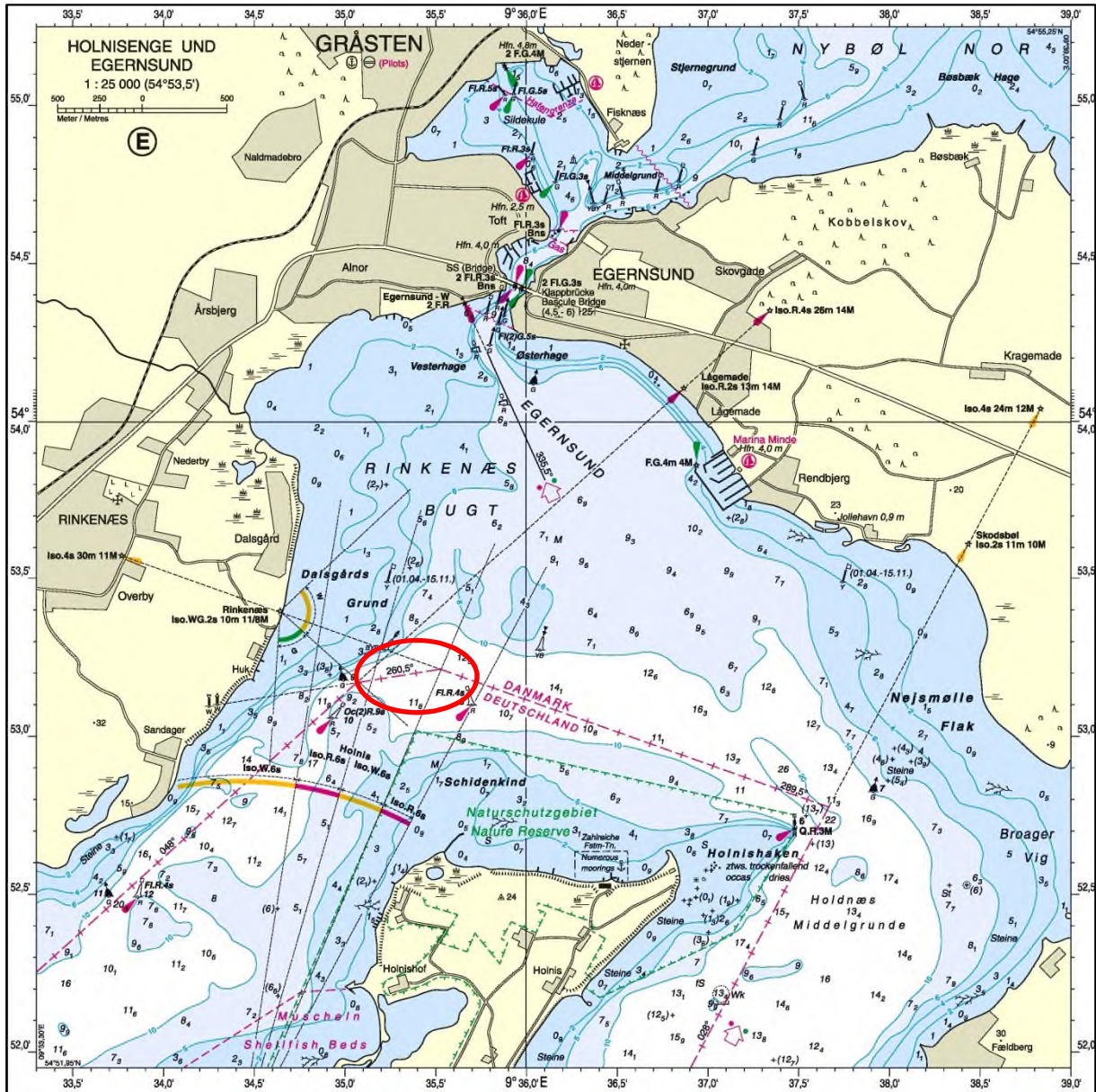


Figure 3: Nautical chart showing the scene of the accident<sup>4</sup>

<sup>4</sup> The entire section shown is within an area not designated as a fairway within the meaning of the SeeSchStrO. See also section 4.3.1.1 of this report.

### 3 COURSE OF THE ACCIDENT AND INVESTIGATION

#### 3.1 Course of the accident

##### 3.1.1 NOBILE

The account of the course of the voyage by the NOBILE is based on the skipper's testimony taken by the WSP, his written submission to the BSU, the logbook, and the NOBILE's chart plotter display.

After leaving Sønderborg at about 1000 on 30 May 2014, the mainsail, foresail and jib were set. Nothing was changed in this respect up until the collision. According to the skipper's testimony, the sails selected promised balanced sailing and easy handling. Weather conditions were good. It was sunny with only a few clouds. A westerly wind of 4 Bft (slightly more in gusts) prevailed.

From 1100 onwards, the ship took part in the Flensburg-Fjord-Regatta, which as a feeder regatta for the Rum-Regatta should have taken a group of sailing vessels from Sønderborg to Flensburg. The regatta was an informal event<sup>5</sup> and did not have a regatta committee in the traditional sense. The finish was a pair of buoys in the Flensburg Firth and the participants were responsible for timekeeping. The positions were acknowledged during an award ceremony, however.

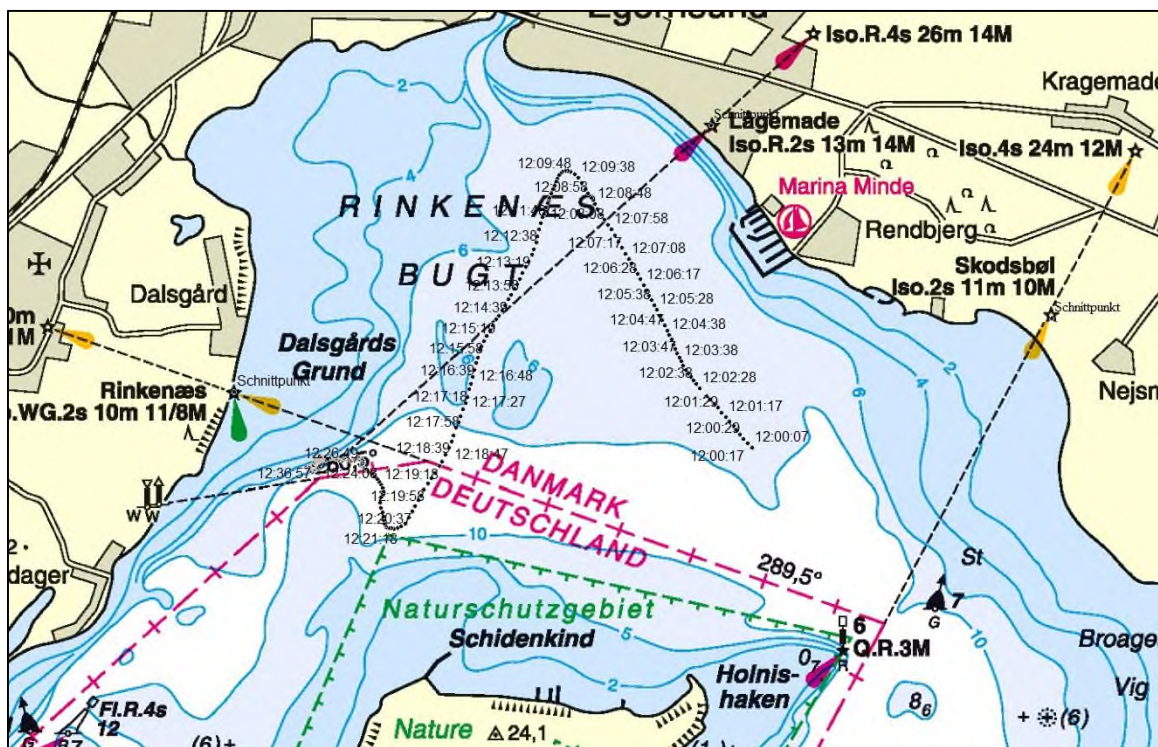


Figure 4: Course steered by the NOBILE (times in UTC)

<sup>5</sup> The competent Waterways and Shipping Authority had not issued a permit for a water sport event as defined in Article 57 para.1 No.6 SeeSchStrO.

They generally sailed on close hauled courses to reach the defined finish. To reduce drift, the centreboard was lowered to the extent that the draught stood at about 5 m. After passing buoy 6 (Holnis Haken), they port tacked further on a north-north-westerly course toward Egernsund, until the Lågemade leading light north of Marina Minde was passed. After tacking, they continued the voyage on a starboard tack and south-south-westerly course. The course took them between the two shoals with a water depth of less than 6 m. Buoy 8 was passed at a distance of 1 to 2 cbl. Shortly before the 10-m depth contour, they tacked again or rather started the turn so that it was completed before reaching the 5-m depth contour. The entire crew was on deck for this.

Shortly before the tack, the WERKER was seen passing buoy 8 at close proximity on a westerly course and sailing on for buoy 10. At the beginning of the tack the WERKER was also seen allowing another sailing vessel to pass.

After the tack, they picked up speed again on a north-north-westerly course. The WERKER was now on the starboard side of the NOBILE and the two vessels were approaching each other on crossing courses. The NOBILE's skipper, who was on the aft deck, therefore signalled to the WERKER by hand to indicate that she should pass aft of the NOBILE. The NOBILE's skipper did not notice any response to begin with. Shortly afterwards, the WERKER increased her speed, which was evident from the bow wave and wake. Furthermore, it was evident that the bearing was veering to ahead, i.e. to port. The skipper therefore concluded that the WERKER intended to pass forward of the NOBILE's bow. The skipper then ordered the helmsman to put the rudder hard to starboard, so as to pass aft of the WERKER. His intended action to avoid collision by manoeuvre was not sufficient to prevent the collision, however. The WERKER was struck at an angle of about 90° roughly amidships on her port side at 1426. The NOBILE's jibboom struck an excavator parked on the deck of the WERKER in the process and snapped. Furthermore, the bow eye on the NOBILE's bobstay buckled due to the impact with the hull of the WERKER. The bow eye penetrated the hull of the WERKER, which led to water ingress.

In the testimony taken by the WSP, it was stated that the NOBILE's skipper signalled to the WERKER when passing buoy 8 again after the tack.

### **3.1.2 WERKER**

The course steered by the WERKER is based on the female skipper's submission to the BSU.

The WERKER started her voyage in Gelting Bay at about 1300. The ship was en route to Schausende Marina to carry out works there. The right-hand side of the fairway was used for entering the Flensburg Firth. The ship sailed at about 6 kts and visibility was clear. Shipping traffic on the firth was heavy and included a large number of traditional ships and yachts under sail, which were headed for the Rum-Regatta in Flensburg. A traditional sailing ship well ahead of the WERKER was crossing the fairway from starboard.

This vessel tacked outside of the fairway, while the WERKER continued to follow the green buoy line and maintained her speed. After tacking, the sailing vessel steered toward the WERKER at a distance of about 250 m. It was only at a distance of about 50 m that the WERKER's skipper realised the other vessel would ignore the rules governing right of way, was not making way for her, and thus a risk of collision prevailed. Consequently, the skipper of the WERKER initiated a last-minute avoiding action and set the engine to astern. The collision occurred shortly afterwards. The crew of the WERKER did not determine the location of the collision.

### **3.1.3 Other findings**

Neither of the vessels involved issued a sound signal. An attempt to coordinate using VHF radiotelephony was not made by neither the NOBILE's nor the WERKER's skipper.

The collision occurred at a point in time when the WERKER was still moving ahead, as the second point of impact (NOBILE's bow with the WERKER's hull) was 7 m abaft of the first (jibboom with the excavator).

### **3.1.4 Subsequent events**

Due to the accident, the NOBILE's bobstay, jibboom guys and jib netting were caught in the WERKER's stanchions. The WERKER's crew released them first. Shortly after, the crew noticed that their vessel was listing to port. After the two vessels had parted, the WERKER was grounded in an area of shallow water about 100 m away to prevent her from foundering. The two pipes normally used for anchoring the ship at a work site were also lowered to the ground there. The WSP was notified shortly after. A headcount was made on the NOBILE and her fore section inspected for leaks after the collision. The crew took in the sails, raised the centreboard and cleared the anchor gear and fore section so as to make it possible to let go the anchor. The skipper contacted Bremen Rescue after anchoring. A request to inform the WSP was made, amongst other things.

The WSP arrived at the scene at about 1545 and started to log the accident. The search and rescue vessel WERNER KUNTZE had already arrived shortly beforehand and made fast alongside the NOBILE. Ultimately, the assistance of the rescuers was not required on either of the vessels concerned.

The NOBILE continued her voyage toward Flensburg at about 1930. The WERKER returned to the port of Gelting.

## **3.2 Investigation**

### **3.2.1 Weather and current**

Good visibility prevailed at the time of the accident. The temperature was approximately 19°C. A westerly force 4-5 Bft wind prevailed, which increased to a constant 5 Bft as the afternoon progressed.

The current charts provided by the BSH indicate that the current was setting westward at 2.5 cm/s (0.05 kts) at about 1430 on the day of the accident. See also the chart at section 8.2. The investigators assume that any local currents would not have reached significant values. Accordingly, potential effects of the current are not considered further.

### **3.2.2 Local circumstances**

#### **3.2.2.1 Flensburg Firth**

The Flensburg Firth is a bay in the area of the western Baltic Sea with a length and breadth of about 18 nm and largely less than 2 nm respectively. The Holnis Peninsula stretches into the firth. This means that three course alterations of almost 90° are necessary if the course of the fairway is followed. Several areas of shallow water extend well into the firth. Consequently, the body of water available between the 10-m depth contours of the facing banks is generally less than 1.5 nm. The area around Holnis Peninsula is limited even further due to extensive areas of shallow water.

The fairway through the Flensburg Firth is marked accordingly by fairway buoys and beacons. Particular shoals are indicated by cardinal marks.

In the area north of buoy 9 and the east cardinal mark on the edge of the Dalsgårds Grund, shallow waters are immediately adjacent to the buoys. The water in the area south of buoy 10 is about 5 m deep (see Figure 3).

Both vessels were moving east to west through the sea area. Due to the expansion of areas with lower water depths in this direction, the room for manoeuvre outside the fairway decreased continuously. Because of the water depths, the two vessels would only have been able to move safely south of the east cardinal mark and buoy 9<sup>6</sup>. Moreover, the area south and east of buoy 10 would have been ruled out for the NOBILE owing to her current draught. For the NOBILE, in particular, this means that the manoeuvring space in the vicinity of buoys 9 and 10 was reduced to the area between the buoys, where 1.3 cbl (240 m) would have been available for tacking into the west wind when moving under sail.

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<sup>6</sup> Hazardous underwater cliff with depth uncharted west of buoy 9 within the 4-m depth contour.



### **3.2.2.2 Border**

The German-Danish border runs through almost the entire length of the Flensburg Firth, where in certain areas (between buoys 1 and 3, 7 and 9, 9 and 11, in particular) the border is located in or near the middle of the fairway. Moreover, the border is marked by the Skodsbøl, Rinkebøl and Lågemade leading lights, as well as the middle of the Holnis sector light (see Figures 3 and 4). All the leading lights and the sector light can also be used for navigation.

### **3.2.3 NOBILE**

The NOBILE was in possession of a valid provisional safety certificate for traditional ships issued by the Ship Safety Division (BG Verkehr) at the time of the accident. The 'range of trade' was confined to 'trade in near coastal waters (restricted)'. This means that the certificate issued for the NOBILE was not valid internationally. Consequently, international voyages could only be made with the approval of the port State. Such an approval had not been obtained.

The condition in the safety certificate regarding voyages of 20 nm from the coastline only in good weather was observed. This also applies to the condition in the safety certificate that sailing instructions must be observed and the wind force limits for the use of certain sails contained therein adhered to.

#### **3.2.3.1 Course steered by the NOBILE**

To begin with, the WSP's photograph of the NOBILE's chart plotter showing the course steered by the sailing ship was analysed for the investigation. However, only the course of the speed over ground (SOG) is shown. The image does not allow any conclusions as to times, courses or speeds. According to the skipper's testimony taken by the WSP, it was not possible to copy the course of the voyage to an external storage device. Whether displaying the course, speed and time at each point of the track was possible is not known.

Copies of the NOBILE's logbook pages from the two days preceding and day of the accident were submitted during the investigation.

It was possible to trace the skipper's account of the course of the voyage at least up until the tack north of the Holnis Peninsula (area of land outside the bottom edge of the image at Figure 5).



Figure 5: Photograph of the NOBILE's plotter showing her track<sup>7</sup>

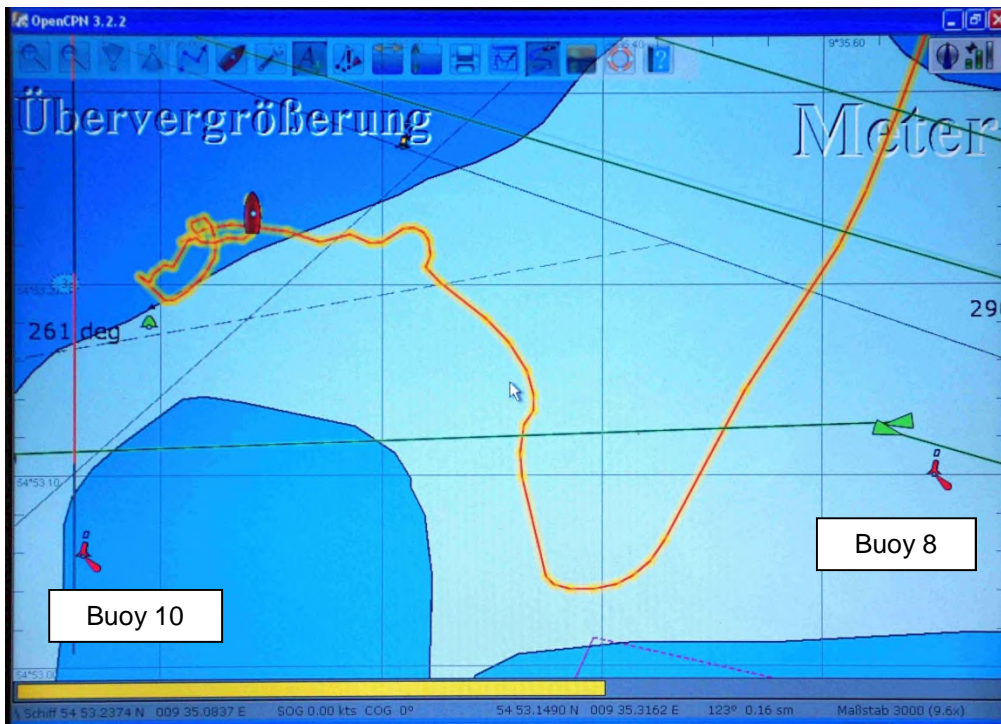


Figure 6: NOBILE's track, magnified view of the last leg

The Shipping Administration provided the recorded AIS data from the NOBILE for the investigation. The BSU edited this to make different representations possible.

<sup>7</sup> The other AIS targets shown in green in Figures 5 and 6 are not related to the accident.

Figure 7 shows the resulting course over ground (COG) north of the Holnis Peninsula from 1400 (analogously also Figures 4 and 5). The COG on this leg was about 330°.

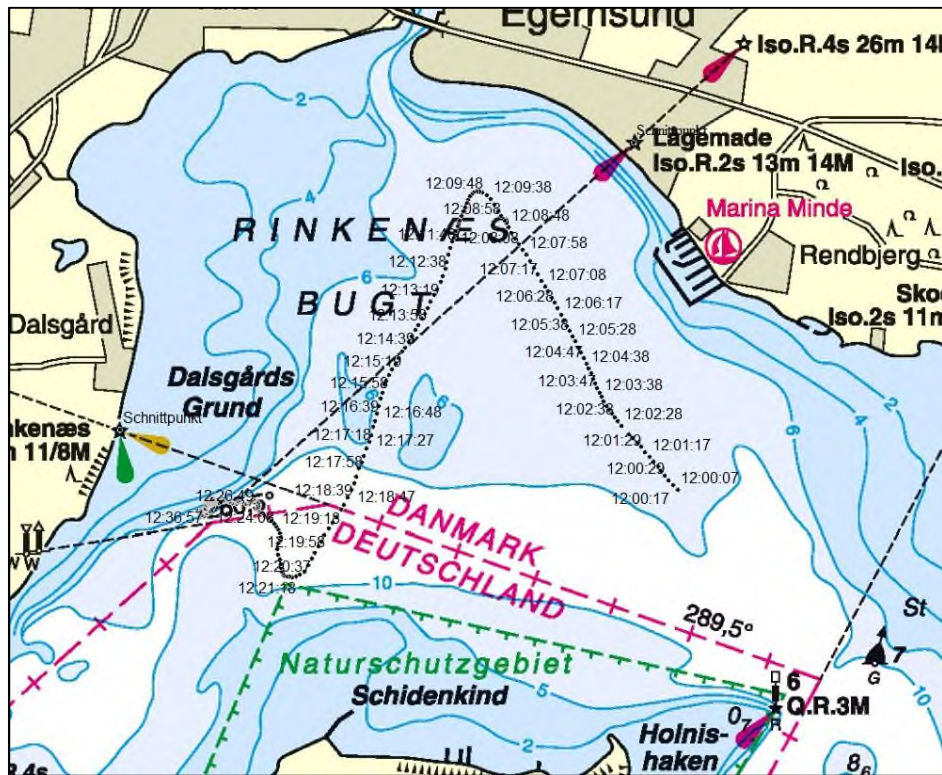


Figure 7: COG of the NOBILE (times in UTC)

The tack after passing the Lågemade leading light was made at 1409. Up until that point, the ship had sailed at between 4.5 and 6.5 kts over ground. The tack was executed quickly and the ship accelerated again. She then reached 5.5 to 6.9 kts over ground. The two shallower areas (less than 6 m charted depth) in the middle of the Rinkenæs Bugt were passed between 1416 and 1417, where the more westerly was slightly crossed. This tack was completed at about 205°.

It is important to note that the following, more detailed examination of the situation shortly before the collision is based on the data for the COG and SOG, meaning the actual heading is not shown. Moreover, the data transmitted by the AIS and originating from the GPS of the NOBILE may be affected by filtering or smoothing within the GPS device. The data are available at intervals of about 10 seconds.

Figures 7 and 8 show the course of the voyage relevant to the development of the collision.

The NOBILE crossed the imaginary line linking the more westerly east cardinal mark and the south cardinal mark situated in this sea area at 141839. At 141858, she crossed the imaginary line linking the south cardinal mark and buoy 9. The NOBILE passed the Rinkenæs leading light at 141922. The imaginary line linking buoys 8 and 10 was crossed at 142037.

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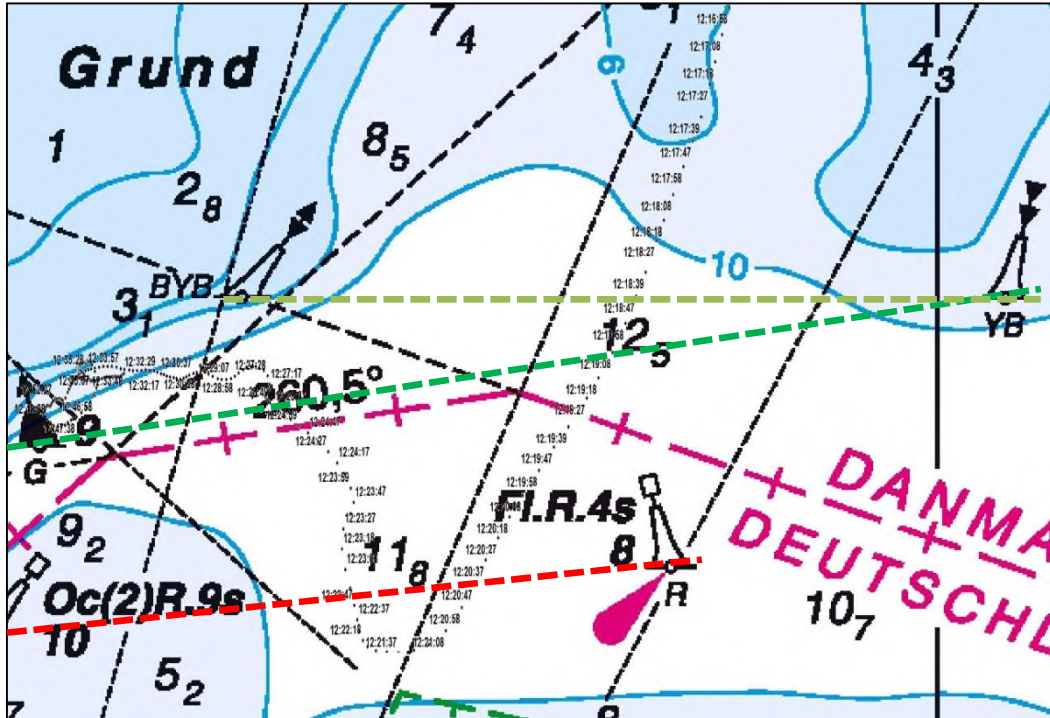


Figure 8: COG of the NOBILE, detail<sup>8</sup> (times in UTC)

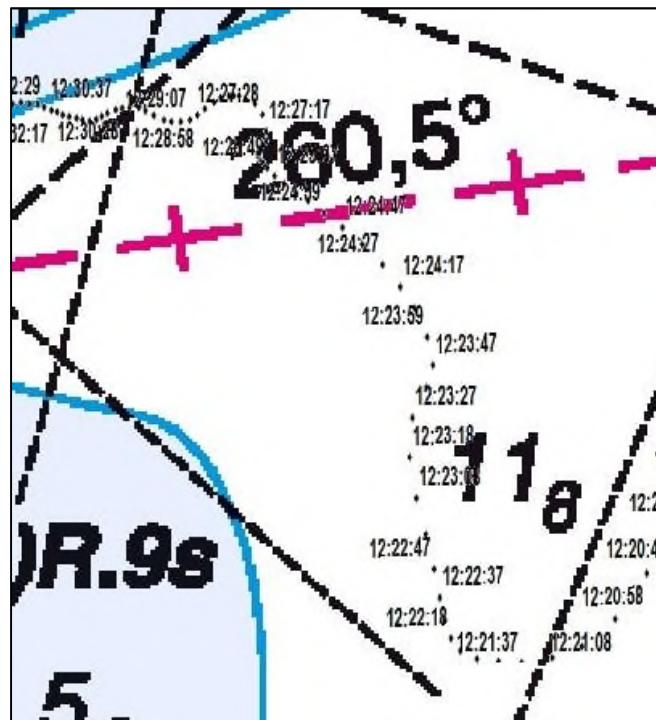


Figure 9: COG of the NOBILE, detail (times in UTC)

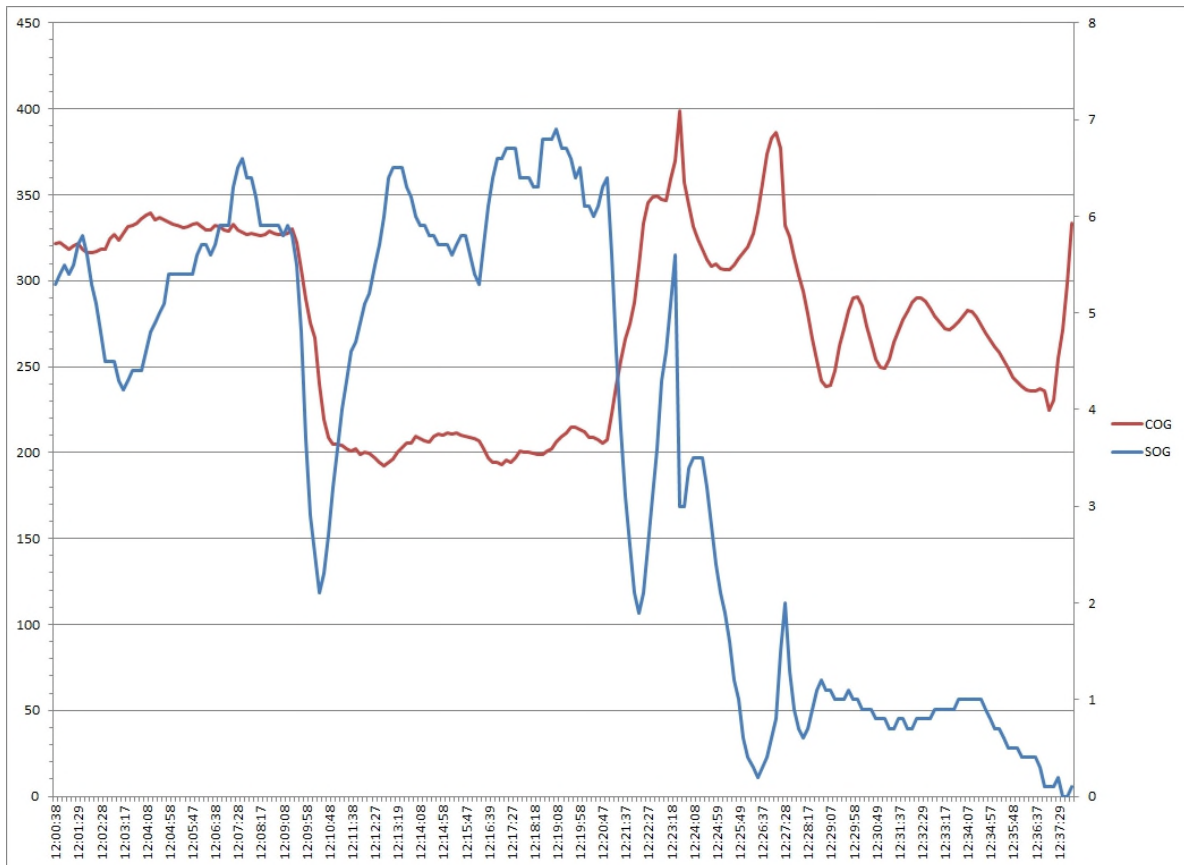
The tack before the 10-m depth contour off the Holnis Peninsula was started at 142058. The course at 142247 on the new tack was 350°, meaning it was similar to the one steered previously on a port tack. Shortly afterwards at 142307 they fell off the wind, causing the speed to drop to about 3 kts after a short increase, and briefly

<sup>8</sup> The coloured lines between the buoys were added by the BSU in the interest of clarity.

steered a course of 39°. Immediately after, the NOBILE headed up again, reaching a course of 309° over ground at about 142447.

A change in the COG to 23° is then evident from 142527, which coincided with a further drop in speed. The SOG dropped to almost zero at 142627.

Graph 1 shows the corresponding development of the COG and SOG. The annex (Spreadsheet 1 in section 8.1) contains an extract from the data set provided by the Shipping Administration, which is based on the AIS data for the period 141958 to 142807.



Graph 1: NOBILE: COG<sup>9</sup> [°] and SOG<sup>10</sup> [kts]<sup>11</sup>

According to the submission on the draft of the report of the legal counsel of the NOBILE's skipper, a private tablet computer that had plotter software installed on it was in the vicinity of the helm in addition to the installed chart plotter. The screenshots contained in the submission did not exhibit times.

<sup>9</sup> Courses of more than 360° are x - 360° = course.

<sup>10</sup> COG: course over ground; SOG: speed over ground.

<sup>11</sup> Times in UTC.

Therefore, the data from the tablet computer were referred to on the spreadsheets contained in the submission on the draft of the expert Dipl.-Ing. Henftling<sup>12</sup>. It was noticed here that the data recorded using the tablet computer differed from that transmitted by the AIS (see also Spreadsheet 1 in section 8.1). This applies to the period after the time at which the BSU presumes the collision occurred, in particular. The other observations of the BSU are based on the AIS data, as it is available in a higher data density. This does not mean it is of greater significance, however.

### **3.2.3.2 Manning**

According to information given by the skipper, the crew of the NOBILE had "for the most part [...] participated in various voyages and operated proficiently on board." The skipper himself exhibited to the WSP a Sportbootführerschein-See (international certificate for operators of pleasure craft on waterways navigable by seagoing ships) and a Sporthochseeschifferschein (recreational offshore skipper licence), which contained an entry for traditional ships up to 55 m. The recreational offshore skipper licence was acquired in 2007. He also holds a master's certificate.

The crew list submitted shows 23 people, including seven with a specific role noted (skipper, engineer, two riggers, and three deckhands). All the other people are listed as trainees. The WSP's marine casualty report only contains one of the deckhands from the crew list as a witness, however. In turn, two other witnesses specified in the crew list as trainees are now referred to as deckhand. Another trainee in the crew list is referred to as helmsman in the WSP's marine casualty report. He also holds a master's certificate.

### **3.2.3.3 Performance of the watch**

The copies of the logbook submitted permit no conclusions as to the type of navigation, as no navigational entries were made on the day of the accident between casting off in Sønderborg and the collision. Similarly, courses, distances, sea state information, passing distances or the use of the centreboard were not documented. The entries concerning position fixing were not very meaningful for the other two days, either. For example, for the leg of the voyage from Holtenau to Sønderborg on the previous day, there were four references to the position over a period of more than ten hours. However, these were relatively vague with such entries as "Gybe S'l Kegnæs" [sic].

No information can be obtained from the logbook with regard to maintaining a lookout, either. However, the investigators assume that the restriction in visibility toward the WERKER because of the sails, especially the mainsail, was compensated for by appropriate measures in the case of both impacts.

It is also assumed that the skipper was in command throughout the entire period.

### **3.2.4 WERKER**

The WERKER is an inland waterway vessel. At the time of the accident, she was in possession of a community certificate for inland waterway vessels (as a worksite craft) issued by the ZSUK.

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<sup>12</sup> Expert on behalf of the WERKER's owner.

### **3.2.4.1 Course steered by the WERKER**

The WERKER did not transmit an AIS signal. Moreover, radar recordings of traffic in the Flensburg Firth are not made by a vessel traffic service. The WERKER did not keep a logbook or bell book. Consequently, it is only possible to reconstruct the course steered by the WERKER on the basis of several items of key data. According to the testimony of the WERKER's crew, the vessel sailed on the right-hand side of the fairway. The speed run was indicated at 5.7 kts and about 6 kts.

### **3.2.4.2 Manning**

The WERKER's crew consisted of three people. According to the certificate concerning the crew of the WERKER issued by the ZSUK, one skipper and one rating were required. The skipper exhibited to the WSP a certificate of proficiency as 'Officer up to 500 GT'. The Directorate-General for Waterways and Shipping (Kiel) advised that this certificate is sufficient for commanding the WERKER according to Article 5 para. 1 Nr. 5 Binnenschifferpatentverordnung (Regulation on boatmasters' certificates for inland waterway navigation). A corresponding rating was also on board. The skipper was also in possession of a recreational offshore skipper licence with an entry for traditional ships up to 55 m in length, which was issued in the year 2006.

### **3.2.4.3 Performance of the watch**

No evidence on the organisation of a lookout could be obtained.

### **3.2.4.4 Approved area of operation**

The WERKER had been issued with a certificate that authorised operating in Zone 2 at the time of the accident. Operating on Danish territorial waters was not permitted, however.

The WERKER was on a voyage from Gelting Bay to Schausende in the Flensburg Firth on the day of the accident. Annex I of the BinSchUO<sup>13</sup> defines Zone 2 as follows in the area referred to: Landward the line linking Kegnæs Lighthouse/Birknack and northward to the German-Danish border in the Flensburg Firth. When looking at the nautical chart, it becomes evident that in certain places the German-Danish border is in the middle of the fairway marked by buoys or stretches up to the port side fairway buoys (buoy 4 and beacon 6) in two places (see Figure 10). An alternative choice of course outside the fairway inland is not possible because in the area of beacon 6 a shoal and a nature reserve extend up to the beacon (see also Figure 3). This means that within Zone 2 it is virtually impossible for such vessels to reach the inner areas of Flensburg Firth from Gelting Bay without violating traffic regulations (keeping to the right-hand side of the fairway) or the conditions under BinSchUO.

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<sup>13</sup> BinSchUO: Binnenschiffsuntersuchungsordnung (*Inland Waterways Vessel Inspection Ordinance*).

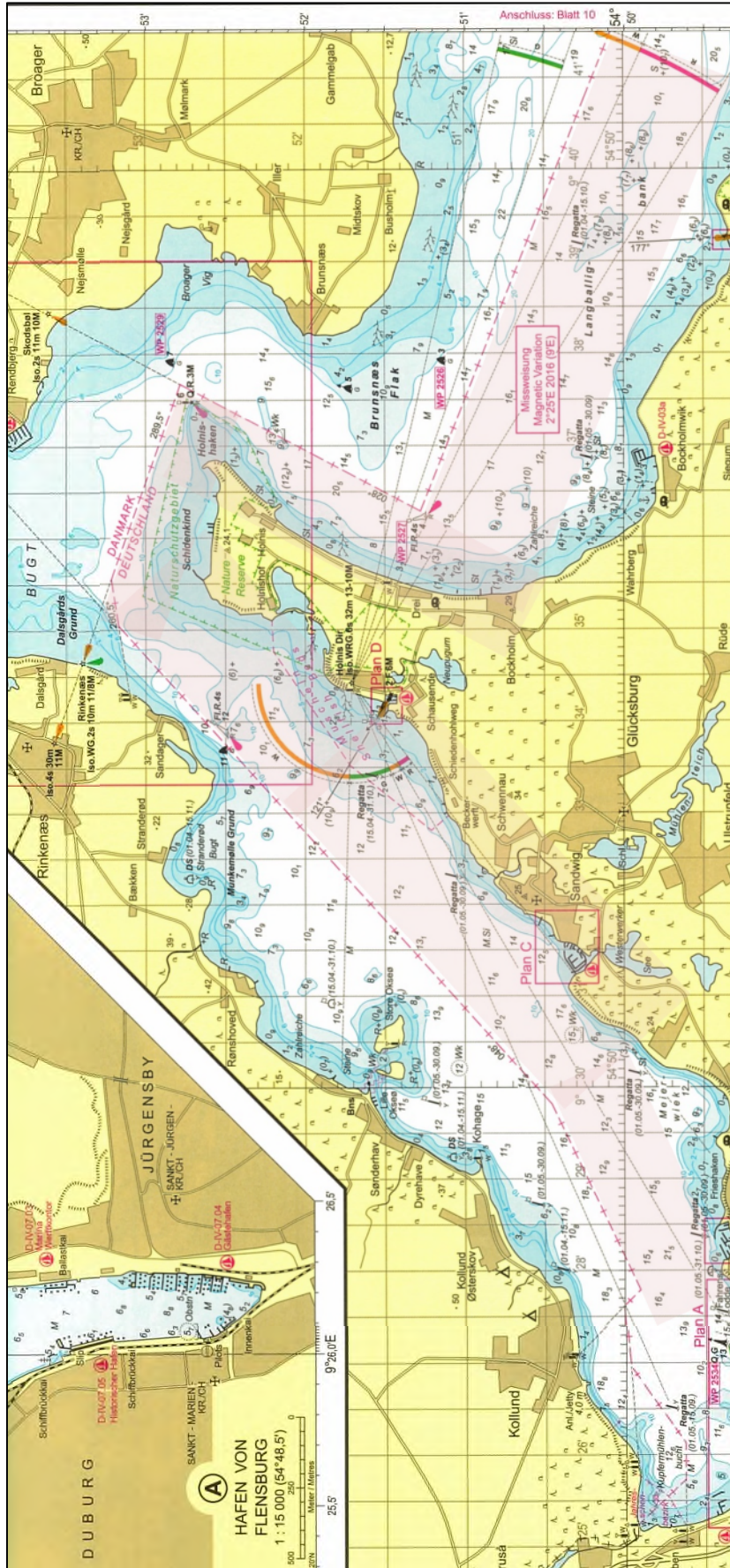


Figure 10: Course of Zone 2 (red area) in the Flensburg Firth



## 4 ANALYSIS

### 4.1 Time and location of the collision

An analysis of Graph 1 reveals two possible times for the collision. One is the time at which there was a rapid loss of speed at 142327. However, this is opposed by the location and sequence of the following positions, as the NOBILE continuously moves further in a north-north-westerly direction (see Figure 9). The collision with the WERKER would have had to interrupt this movement because the two ships were locked together, and in all likelihood the NOBILE came to a standstill on the WERKER. Hence, the loss in speed is probably due to the ship luffing up at about 308° COG, which continued until 142459, meaning this point in time can be ruled out. The other is the time at which the NOBILE's position points start to converge and the COG veers abruptly to starboard (see Figures 6 and 9). This time is set at 142527. This abrupt veer could have two causes. One is the hard-starboard course alteration described by the crew of the NOBILE, which ended in the collision shortly afterwards. Two is the continuing full astern manoeuvre initiated by the WERKER, which drags the NOBILE (still locked together with the WERKER after colliding with her) aft, i.e. to starboard.

The first cause is regarded as less likely, as it is assumed that this vessel would not be able to execute such an abrupt course alteration.

Another indication is the fact that the NOBILE's skipper stated to the BSU that the collision happened at 1426. At that point in time, the NOBILE was already north of the directional line formed by the leading marks of Sandlager and thus in Danish waters according to the AIS track.

On that basis, the scene of the collision is defined as a location north of the directional line formed by the leading marks of Sandlager and border marking<sup>14</sup> (see Figures 11 and 12). Given the short intervals, the location at 142527 is determined as the scene of the collision. This equates to the following position: 54° 53.2'N 009°35.26'E, which is located in Danish waters.

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<sup>14</sup> Chart 1 of the BSH, mark N 41.



Figure 11: Track of the NOBILE with the scene of the accident

#### 4.2 Approach of the two vessels

The analysis of the approach is complicated for lack of data on the course steered by the WERKER. This is demonstrated with an example (see Figure 12). At a speed of 5 kts, the WERKER was located in the vicinity of buoy 8 four minutes before the collision (142127). At a speed of 6 kts, she was 1.3 cbl away from the buoy.

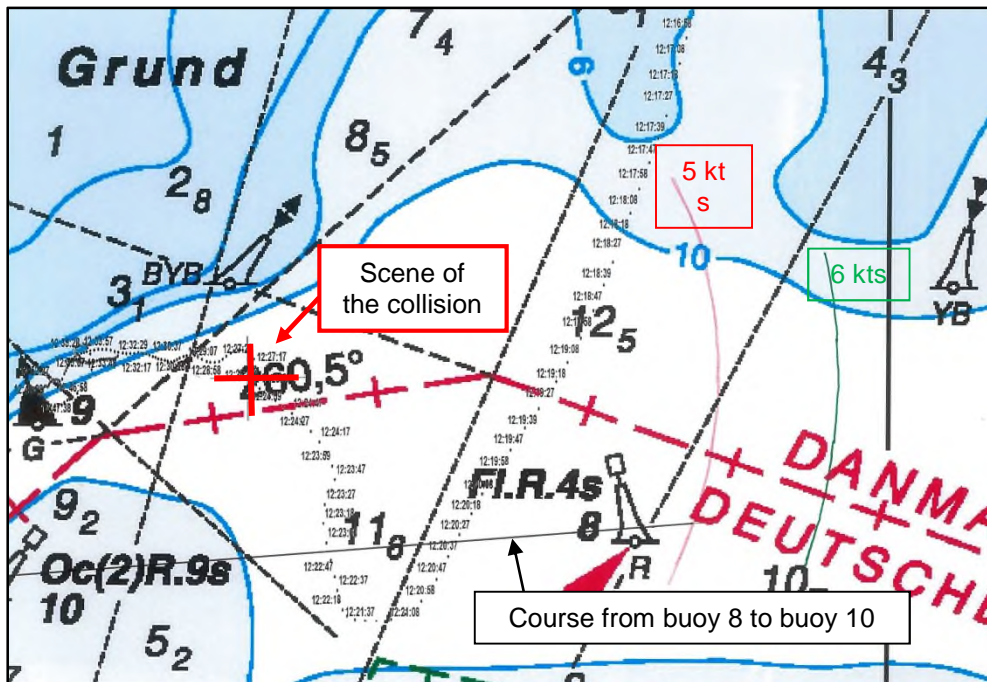


Figure 12: Possible positions of the WERKER four minutes before the accident

It is apparent that the speed of 5 kts could coincide with the testimony of the NOBILE's skipper. The unclear course of the WERKER, i.e. passage close to buoy 8, or not, increases the number of variables and thus the uncertainty when analysing the development of the collision.

For the following rough analysis of the approach of the two vessels, it is assumed by the investigators that the speed of the WERKER was about 5.5 kts, i.e. she made good a distance of 0.9 cbl per minute, keeping to the leading lights in the process. The below image emerges from this (see Figure 13):

- Position I: The NOBILE crossed the heading line of the WERKER at about 1419. The two vessels were about 3.5 cbl (650 m) apart at this point;
- Position II: The distance between the two ships was about 3 cbl (560 m) when the NOBILE tacked off the Holnis Peninsula (at 142127);
- Position III: At 142227, the distance between the two vessels was about 2.2 cbl (410 m). Buoy 8 was abeam of the WERKER;
- Position IV: Two minutes before the collision, at about 142327, the distance between the two vessels was about 1.4 cbl (260 m);
- Position V: Based on the assumptions made, the distance still amounted to about 130 m at 142427.

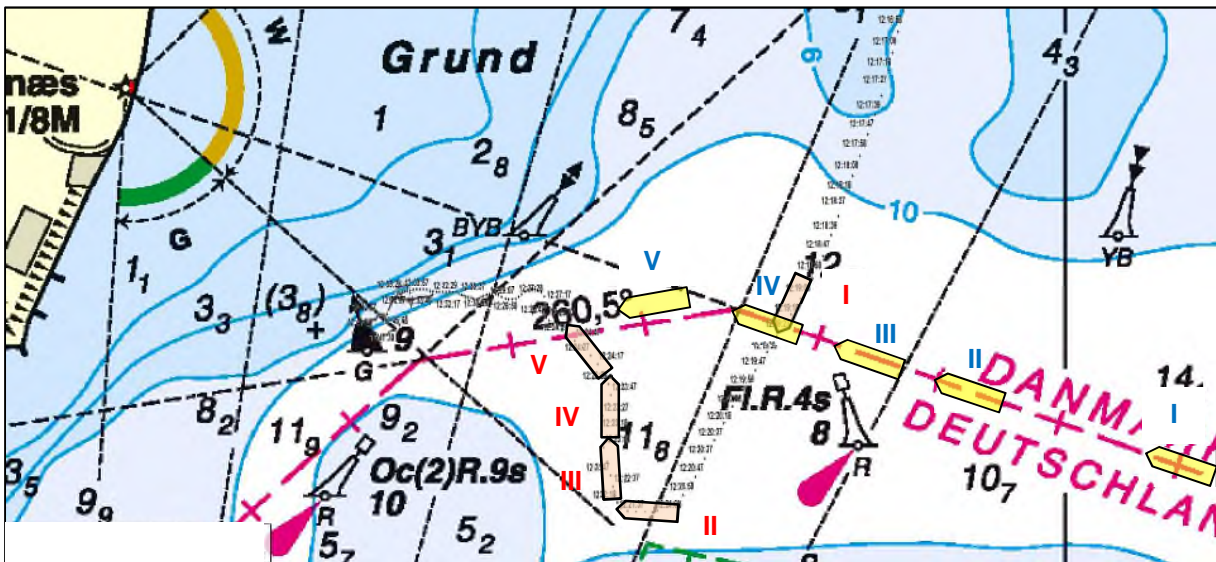


Figure 13: Assumed positions of the NOBILE and the WERKER<sup>15</sup>

The analysis of the development of the collision is complicated further by the fact that the COGs of the NOBILE were extremely uneven and that the possible direction of the approach of the WERKER is subject to a relatively large margin. For the scene of the collision determined, true headings of between 289° and 260.5° come into question for the WERKER. At the same time, it is difficult to determine the nature of the approach, i.e. crossing courses or overtaking. Since neither the course of the WERKER at the time of the collision nor the route to the scene of the collision is known, it is only possible to approximate the actual course of the voyage by a process of elimination.

<sup>15</sup> Vessels not shown to scale (times in UTC).

To this end, the two possible extremes are considered first:

- a. The WERKER passed buoy 8 in close proximity and then maintained her course up until the collision: In this case, the two vessels would have converged at an angle of some 53°-60° and the WERKER would have been seen to be overtaking the NOBILE. Accordingly, the NOBILE would have been situated forward of the WERKER's bow in the final stages of the close quarter situation, which probably would have prompted a response from the WERKER to avoid sailing into the NOBILE. Furthermore, this course is not consistent with the collision angle of about 90°. This variation is regarded as less likely.
- b. The WERKER passed buoy 8 at an extremely large distance well to the north: For buoy 9 to be passed on her starboard side, she would have needed to alter her course to about 260° some four minutes before the collision (142127). The investigators believe this too is less probable. The following aspects oppose it:
  - a considerable and noticeable increase in speed was not possible for the WERKER given the technical circumstances;
  - consequently, the investigators assume that the increase in speed and veer to port of the WERKER observed by the NOBILE's skipper at about 1423 were products of the course alteration to 260°, i.e. toward the NOBILE, which she made at this point.

This leads the investigators to believe that the increase in speed observed can only have been the change in the relative speed. On the assumption that the WERKER was following the course of the fairway and made a course alteration directly to buoy 9 at about 1423, she would have been well north of the Rinkenæs leading light at the time.

This deliberation gives rise to the assumption that the two vessels started to converge on crossing courses at about 1423. This is also supported by the following:

- the two skippers indicated they were on crossing courses in their submissions;
- the collision angle, and
- the fairway turned from 289.5° to 260.5° in the course steered by the WERKER. Since the WERKER was following the fairway, this ultimately meant the two vessels would be on crossing courses as they were converging.

This contrasts with the testimony of the NOBILE's skipper, claiming to have seen the WERKER heading directly to buoy 10 after passing buoy 8 at close proximity. The investigators strongly believe this to be incorrect. Although passing buoy 8 at close proximity cannot be ruled out, it would not have been possible for the two vessels to collide north of the Rinkenæs leading light if this was the case. Moreover, the collision would not have happened because after her turn north of Holnis, the NOBILE would have crossed the course of the WERKER once more about 1 cbl ahead of the WERKER (see Figure 13). In turn, the WERKER would have passed the stern of the NOBILE later at a distance of about 0.5 cbl.

### **4.3 Regulations for preventing collisions**

Article 1 VO-KVR<sup>16</sup> states that the Regulations for Preventing Collisions at Sea (COLREGs) apply in Germany. Article 2 VO-KVR states that the Ordinance applies "on navigable maritime waterways [...] and in the remaining territorial sea." "For ships entitled to fly the flag of Germany, [it shall also apply] beyond the seaward delimitation of the territorial sea of the Federal Republic of Germany, unless different regulations apply in territorial waters of other States."

Under Article 3(1) VO-KVR, both skippers were required to behave "such as to ensure the safety and easy flow of shipping traffic and to avoid any other person to be exposed to any damage or detriment, to be put at risk, or to be impeded or molested any more than is inevitable in the circumstances prevailing." They were required "in particular, [to] take any precaution as may be required by the practice of good seamanship or by the special circumstances of the case."

#### **4.3.1 Narrow channel (or fairway)**

##### **4.3.1.1 Introduction**

The border between Denmark and Germany, which runs through the middle of the fairway, would mean that the rules governing right of way in the fairway are provided for by two different legal frameworks, as the SeeSchStrO generally applies on the German side and the COLREGs on the Danish. To preclude potential conflicts from the outset, the Shipping Administration laid down and promulgated in May 2007<sup>17</sup> that on the Flensburg Firth the channel indicated by lateral<sup>18</sup> marks (from buoys 1 to 2 and from buoys 13 to 14) is not a fairway within the meaning of the SeeSchStrO. This means that in the area referred to any evading action of converging vessels is based solely on the COLREGs.

The WERKER was only able to move with the help of her engine. This means that she is a power-driven vessel according to Rule 3(b) COLREGs. The NOBILE only used her sails for propulsion. This means that for the purposes of this marine casualty investigation she is a sailing vessel as defined in Rule 3(c) COLREGs.

During the case in hand, neither vessel was basically impeded by her draught or restricted in the choice of heading or speed any more than would be normal for her form of propulsion.

For the collision being considered, Section I<sup>19</sup> COLREGs, which provides for conduct of vessels in any condition of visibility, and Section II<sup>20</sup> COLREGs (Conduct of vessels in sight of one another) are relevant.

The BSU's investigators assume that the area of relevance here between beacon 6/buoy 7 and buoys 9/10 is a narrow channel within the meaning of the COLREGs. Based on the ruling of the Higher Federal Maritime Board of Inquiry

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<sup>16</sup> Ordinance to Implement the International Regulations for Preventing Collisions at Sea, 1972.

<sup>17</sup> Notice of the Directorate-General for Waterways and Shipping, Outstation North, concerning the SeeSchStrO (section A 1.1.1).

<sup>18</sup> Lateral system – buoyage system marking the sides of the fairway.

<sup>19</sup> Rules 4 to 10 COLREGs.

<sup>20</sup> Rules 11 to 18 COLREGs.

(Bundesoberseeamt)<sup>21</sup>, it is established that the narrowness of the fairway is seen in the fact that a ship sailing into the passage between beacon 6/buoy 7 and buoys 9/10 is deprived of the opportunity to make a starboard or port manoeuvre without complications due to objectively confined manoeuvring space.

In its ruling, the Higher Federal Maritime Board of Inquiry commented with regard to this subject that there are two basic opinions: *"The 'subjective' opinion delivers no solid evidence as to when a fairway should be regarded as narrow. It makes the assessment contingent upon the estimation of the skipper or size of the ship in the situation in hand." [...] If qualifying a fairway as narrow is left only to the subjective estimation of each individual skipper, then the question arises as to what happens if the skipper of only one ship believes it is, but not the skipper of the ship crossing the course. The risk of a misunderstanding – ultimately leading to a collision – due to errors is especially great in such cases. [...] If the characteristics of 'narrowness' are now derived based mainly on the circumstances of the geographical situation, then it must be conceded that the skipper [...] yet again ultimately decides when this is the case. This amounts to a decision on a case-by case basis and as a consequence is also criticised.*

*On the other hand, the 'objective' opinion identifies a narrow fairway as such based on set criteria. [...] The Higher Federal Maritime Board of Inquiry follows an objective interpretation of a narrow fairway. Accordingly, the circumstances restricting a fairway are generally natural obstacles and shoals [...] or buoys, for example. A teleological interpretation leads to this result [...]."*<sup>22</sup>

In the opinion of the BSU, the following objective criteria should be considered:

- lateral navigation marks are provided that define the course of the fairway;
- the water depths outside the fairway mean that areas outside the fairway must be sailed with caution or not at all. In several places – in the vicinity of the scene of the collision, in particular – this applies to the WERKER, too, which only has a shallow draught;
- in the vicinity of Holnis Peninsula the body of water available is less than 1 nm wide on average. The distance between the 2 m lines is about 0.5 nm level with buoy pair 9/10, and
- furthermore, the investigators also considered the fact that a starboard turning circle<sup>23</sup> in the area the BSU assumes to be the scene of the collision would have taken the WERKER to within the immediate vicinity of the east cardinal buoy or beyond.

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<sup>21</sup> Higher Federal Maritime Board of Inquiry Decision W 9/90 of 12 December 1990 concerning the collision between the ACHAT and OSLO VI.

<sup>22</sup> Ibid.

<sup>23</sup> Submission on the draft of Dipl.-Ing. Henftling: Conclusion from the WERKER's sea trial that the diameter of a full turning circle is about 150 m.

The BSU's assessment of a narrow fairway in this area is consistent with the approaches upheld in the relevant literature<sup>24</sup>. Hence, Rule 9 COLREGs is applicable.

In this context, it remains to be noted that the Shipping Administration did not specify whether parts of or the entire marked channel in the area excluded by the SeeSchStrO is a narrow channel within the meaning of the COLREGs. Consequently, it is questionable whether the finding in certain sources<sup>25</sup> that a 'narrow channel' is located only in the area north of the Holnis Peninsula (Holnis Narrows) could actually withstand scrutiny.

By contrast, Article 2 para. 1 No. 1 SeeSchStrO lays down that 'fairway denotes those parts of navigable waters that are marked or delimited by any one or more of the visual signs described under Items B.11 through B.13 of Annex I [...]. This fairway is a 'narrow channel' within the meaning of the COLREGs. However, this rule does not apply to the sea area in question due to the aforementioned Notice.

#### **4.3.1.2 Sailing and evading in narrow channels**

The following is defined in **Rule 9(a) COLREGs**: "A vessel proceeding along the course of a narrow channel or fairway shall keep as near to the outer limit of the channel or fairway which lies on her starboard side as is safe and practicable."

The investigators do not doubt the testimonies, which claimed that the WERKER was proceeding along the course of the narrow fairway while en route to the Flensburg Firth. Given the WERKER's shallow draught, there was nothing to prevent her from keeping close to the edge of the fairway. However, the actual position of the outer edge is difficult to determine in the sea area in question because there is no 'counterpart' to buoy 8 on the starboard side of the fairway. Heading directly for buoy 9 is not an option because the line linking buoys 7 and 9 is located south of buoy 8 (see Figure 3). The two cardinal buoys located in this area (south cardinal mark and east cardinal mark) can be used for guidance only, since by definition they do not mark the fairway. This is especially true of the east cardinal mark, which cannot be classed as a fairway buoy in any case because of its location within the 6-m depth contour. On the other hand, together with the small lighthouse at Rinkenæs, which also constitutes the lower light of the line of leading lights with the same name, it forms a good landmark because it is also located on this line of lights.

Based on the considerations made in section 4.2, the investigators assume that the WERKER's skipper kept to the right-hand side of the fairway. Given the absence of a visible fairway boundary in the northerly direction amongst other things, it is possible that she did not proceed near to or on the outer edge.

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<sup>24</sup> Hilgert, Helmut/Schilling, Rolf: Kollisionsverhütung auf See. Teil 1: Ein Kommentar der internationalen Kollisionsverhütungsregeln (KVR) (*Preventing collisions at sea. Part 1: A commentary to the International Regulations for Preventing Collisions at Sea (COLREGs)*). Rostock 1992, p. 76. Cockcroft, A. N./Lameijer, J. N. F.: A Guide to the Collision Avoidance Rules, 7th Edition. Oxford 2012, p. 45 ff. Deseck, P.: International Regulations for Preventing Collisions at Sea, 2nd Revised Edition. 2002, p. 113 ff. Allen, Craig H.: Farwell's Rules of the Nautical Road. 8th Edition. Annapolis 2005, p. 280 ff.

<sup>25</sup> Fact sheet of the WSP (Flensburg District) and others that reference it (see section 7).

With regard to course alterations along the fairway, *Hilgert and Schilling*<sup>26</sup> state: "*Course alterations that are necessary due to the curvature of the fairway are not regarded as a course alteration within the meaning of the Rules of the COLREGs. In narrow channels [or fairways], it is necessary for both inbound and outbound vessels to follow the curvature of the fairway if they wish to remain on their side of the fairway. Accordingly, power-driven vessels do not need to sound the course alteration signals under Rule 34(a): – If a course alteration has become necessary to follow the curvature of the fairway [...].*" This means that the WERKER was not necessarily required to sound a signal for the course alteration to buoy 9.

**Rule 9(b) COLREGs** lays down: "A vessel of less than 20 metres in length or a sailing vessel shall not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway."

This rule takes precedence over the provisions of Rules 8 and 18(a) COLREGs. This means that when approaching the other vessel, the sailing vessel must manoeuvre so as not to impede her passage. Should a risk of collision nonetheless develop, then all vessels must initiate appropriate manoeuvres to avoid a collision (see also Rule 8(f)((i)-(iii)) COLREGs below).

The heading of the 'small' vessel or sailing vessel is of no relevance when assessing the situation according to Rule 9(b) COLREGs. The obligation of establishing whether another vessel is impeded, or not, rests with the vessel of less than 20 m in length (or with the sailing vessel). The vessel that can safely navigate only within a narrow channel or fairway as defined in this rule is not necessarily a vessel constrained by her draught within the meaning of Rule 3(h) COLREGs. Accordingly, a vessel subject to the foregoing cannot be identified by the lights or shapes exhibited.

The absolute size of a vessel is not always an indication as to whether she can navigate safely within a narrow channel. Rather, the draught is a decisive factor. In the interest of safety, the NOBILE's crew had to assume that the NOBILE was not allowed to impede the passage of the WERKER because it was not aware of the WERKER's draught. This is all the more applicable given that the water depths drop rapidly in the area north of buoy 9 and of the east cardinal mark. The WERKER could have made an evasive action manoeuvre in this area, however. On the other hand, the NOBILE made no attempt to clarify the status of the WERKER.

The NOBILE's greater draught in relation to the WERKER is of no relevance in the application of Rule 9(b) COLREGs, as the only material fact is propulsion under sail.

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<sup>26</sup> Hilgert, Helmut/Schilling, Rolf: Kollisionsverhütung auf See. Teil 1: Ein Kommentar der internationalen Kollisionsverhütungsregeln (KVR) (*Preventing collisions at sea. Part 1: A commentary to the International Regulations for Preventing Collisions at Sea (COLREGs)*). Rostock 1992, p. 77.



This means that even though the NOBILE could only sail in the fairway due to her draught, she had an obligation not to impede the WERKER.

*Deseck*<sup>27</sup> considers that Rule 9(b) COLREGS applies for to all sailing vessels, since they may be restricted in their manoeuvrability because of a sudden change in the direction and/or speed of the wind. As they can never rely with certainty on their manoeuvres, safety requires that in a narrow channel or fairway they keep well out of the way of other vessels.

An analysis of Graph 1 shows that the NOBILE's course was far more consistent on the previous two tacks. The considerable unevenness after the last tack before the collision could have two causes. On the one hand, the ship could have been exposed to winds veering heavily at this point, e.g. because she was close to the shore, which made it difficult to steer a steady course. This should have prompted the NOBILE's skipper to keep clear of the WERKER in good time.

On the other hand, they may have manoeuvred because it was not clear how they should behave toward the WERKER. The skipper's submission did not address possible manoeuvring or veering winds.

The retrospective assessment of the course steered by the NOBILE is affected by the shifting geomorphology in this area. When the NOBILE crossed the fairway for the first time, she came from an area that permitted relatively unrestricted manoeuvring due to the depths of water there. Therefore, the NOBILE had the option of keeping north of the fairway, so as to then turn into it and follow its course after two further tacks. This would have enabled her to avoid crossing the course of the WERKER. However, the skipper of the NOBILE crossed the fairway. After leaving the fairway on the southern side, the sea-room available was extremely limited (1.4 cbl to the 5-m line) outside the fairway. It was not possible to proceed under sail or with lowered centreboard in this area, hence the tack.

The investigators assume that retracting the centreboard during the intended course of the voyage (tacking into the wind) would have increased the drift to such an extent that windward headway would have been extremely limited. Consequently, retracting the centreboard under sail, which due to the reduced draught would have delivered more scope as regards course selection, was not an option.

**Rule 9(d) COLREGs** expands upon the rules of conduct for vessels wishing to cross narrow channels or fairways. "A vessel shall not cross a narrow channel or fairway if such crossing impedes the passage of a vessel which can safely navigate only within such channel or fairway. The latter vessel may use the sound signal prescribed in Rule 34(d) if in doubt as to the intention of the crossing vessel."

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<sup>27</sup> Deseck, P.: International Regulations for Preventing Collisions at Sea, 2nd Revised Edition. 2002, p. 115 ff.

*Hilgert and Schilling*<sup>28</sup> explain the purpose of this rule: "Crossing narrow channels should be prevented as far as possible." The same is expressed by *Cockcroft and Lameijer*<sup>29</sup>: "The main purpose of Rule 9(d) is to reduce the number of dangerous crossings in narrow channels or fairways, often caused by relatively small vessels which could usually avoid the danger by waiting until the passage is clear or by a better anticipation of the prevailing traffic situation."

*Allen*<sup>30</sup> comments that the rule can only be applied if the crossing vessel is able to sail outside of the narrow channel. In the prevailing situation, this was no longer possible for the NOBILE because there was no or an ever-decreasing amount of room available outside the marked channel due to the continuously declining water depths toward the west (see also section 3.2.2.1). A look at the chart reveals that the NOBILE would have to make the next tack within the fairway. With that in mind, the investigators believe Rule 9(d) COLREGs is not applicable.

The finding with regard to the next turn gives rise to an analysis of what course the NOBILE's voyage might take subsequently. The calculation of the probable course of the ensuing voyage was based on the assumption of no collision and constant winds from about 270°. The COGs (205° and 330°) made good beforehand was considered in the process. As a result, the investigators assume that the NOBILE would have needed three more tacks within the fairway if conditions were favourable. If the boundary conditions were less favourable, five or more tacks would have been necessary to pass the 'narrows' in the vicinity of buoys 9/10 (distance = 240 m). Since the NOBILE was in a regatta, the investigators assume that the NOBILE's skipper did not intend to complete this leg under engine power.

#### 4.3.2 Other rules

**Rule 8(f)(i) COLREGs** is closely related to Rule 9(b): "A vessel which, by any of these Rules, is required not to impede the passage or safe passage of another vessel shall, when required by the circumstances of the case, take early action to allow sufficient sea-room for the safe passage of the other vessel."

The NOBILE's skipper observed the WERKER after the NOBILE tacked north of the Holnis Peninsula. The skipper, who was standing on the aft deck, signalled to the WERKER by hand to indicate that she should pass aft of the NOBILE. The distance between the two vessels at this point was about 350-400 m. Firstly, the investigators believe it is rather unlikely that the WERKER would have recognised hand signals from this distance. Secondly, the use of hand signals to manage traffic situations – collision situations, in particular – is by no means helpful or consistent with regulations. At any event, this approach did not conform to the spirit of Rule 8(f)(i) COLREGs, which calls for active, unambiguous and timely action, i.e. alteration of the course and/or speed of the vessel that should not impede the passage.

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<sup>28</sup> Ibid. p. 78.

<sup>29</sup> Cockcroft, A. N./Lameijer, J. N. F.: A Guide to the Collision Avoidance Rules, 7th Edition. Oxford 2012, p. 48.

<sup>30</sup> Allen, Craig H.: Farwell's Rules of the Nautical Road. 8th Edition. Annapolis 2005, p. 292.

Based on the distance between the two vessels after the tack, the time at which the NOBILE should have satisfied her obligation of taking early action was after the tack.

The NOBILE's skipper protested that the WERKER was on the wrong side of the fairway. Regardless of the assessment of this questionable factor, it remains to be noted that neither the aforementioned Rule 8 nor Rule 9 COLREGs is contingent upon whether the vessel that should not be impeded is situated on the correct or incorrect side of the fairway. Consequently, a violation of Rule 9(a) COLREGs does not automatically entail the non-applicability of the other Rules.

Moreover, the reciprocal obligations of the two vessels are defined by **Rule 8(f)(ii) COLREGs** ("A vessel required not to impede the passage or safe passage of another vessel is not relieved of this obligation if approaching the other vessel so as to involve risk of collision and shall, when taking action, have full regard to the action which may be required by the Rules of this Part.") and **Rule 8(f)(iii) COLREGs** ("A vessel the passage of which is not to be impeded remains fully obliged to comply with the Rules of this Part when the two vessels are approaching one another so as to involve risk of collision.").

*Hilgert and Schilling*<sup>31</sup> comment on this: "[...] any vessel that should not impede another is required by Rule 8(f)(i) to take early action, however. Such action is thus required from the moment it is recognised that a risk of collision is developing [...] or an obstruction might occur. [...] the obligation not to impede [remains] applicable even if the vessels have converged to the extent that a risk of collision already exists."

The applicable reciprocal obligations of the two vessels to keep clear or evade during their approach were determined by the aforementioned Rules. In the case in hand, **Rules 8((a)-(e)) and 18(a)(iv) COLREGs** (Responsibilities between vessels) were also applicable:

"Except where Rules 9, 10 and 13 otherwise require:

- (a) A power-driven vessel underway shall keep out of the way of [...]
- (iv) a sailing vessel."

This means that after determining an existing risk of collision, the WERKER would have been required to give way to the NOBILE. The evading action should have taken place with due regard to the possible actions of the NOBILE, however.

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<sup>31</sup> Hilgert, Helmut/Schilling, Rolf: Kollisionsverhütung auf See. Teil 1: Ein Kommentar der internationalen Kollisionsverhütungsregeln (KVR) (*Preventing collisions at sea. Part 1: A commentary to the International Regulations for Preventing Collisions at Sea (COLREGs)*). Rostock 1992, p. 74.

Since the specific risk of collision in this case was evidently only recognised<sup>32</sup> at a later stage, and the NOBILE had the option of taking evasive action to port or starboard<sup>33</sup>, an evasive action manoeuvre by the WERKER to starboard would probably have been the most promising way of avoiding a collision.

In addition to the rules discussed, an obligation to observe other 'basic rules' that apply in all conditions of visibility also existed. These included keeping a proper lookout (Rule 5 COLREGs), proceeding at a safe speed (Rule 6 COLREGs), and the obligation to determine the risk of collision (Rule 7 COLREGs).

Re Rule 5 COLREGs: The investigators assume that a proper lookout was kept on both vessels. In each case, the other vessel was identified early on, even though the close quarter situation was estimated differently on the two vessels.

Re Rule 6 COLREGs: The two vessels were underway at relatively low speeds, albeit above that sufficient to maintain the ability to steer. Had the risk of collision been detected earlier on, then the reduction in speed is likely to have been sufficient to avoid the collision. Here the reduction in speed would also have been possible for the NOBILE by easing the vessel up and heading into the wind or opening the sails.

Re Rule 7 COLREGs: The skipper on each vessel apparently failed to use all available means to determine the risk of collision early enough or at all. The investigators believe that the visual information in the area of observation was sufficient to assess the situation and to arrive at a decision on collision prevention.

In fact, both vessels responded to the close quarter situation and risk of collision extremely late: the WERKER at a distance of 50 m and the NOBILE at a distance that necessitated a avoid collision by manoeuvre action. The initiated manoeuvres combined failed to prevent the collision. Due to erroneous assumptions by each party, the manoeuvres initiated were ultimately counter-productive. The NOBILE assumed the WERKER would increase her speed and intended to pass aft of her. On the other hand, the WERKER set the engine to astern to prevent the collision.

#### **4.3.3 Maintenance of the logbook**

The skipper of each vessel was required to keep a logbook. The NOBILE satisfied this obligation in very broad terms with the entries made. The extent to which the course recorded in the plotter can be used for a detailed analysis of the course of the voyage subsequently is unclear, however.

A logbook was not kept on the WERKER.

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<sup>32</sup> Rule 17(a)(ii) COLREGs.

<sup>33</sup> Rule 17(b) COLREGs.

#### 4.3.4 Summary

Due to insufficient testimonies, each skipper's actual assessment and evaluation of the close quarter situation is not known. Several possible variations arise only for the NOBILE if the skipper's conceivable level of knowledge in respect of the legal situation were to be taken into account.

The investigators believe it likely that it was not possible to establish with certainty that a risk of collision existed for a prolonged period after the last tack. This is derived from the brief period of observation and changing courses of the NOBILE. It is possible that the risk of collision only became concrete when the WERKER executed the course alteration considered by the investigators toward buoy 9. The finding that the NOBILE's skipper should have satisfied his obligation not to impede the WERKER early on is not affected by the possibly later developing risk of collision, however.

The investigators do not interpret the fact that the skipper of the NOBILE spoke of an action to avoid collision by manoeuvre in his submission as an indication that the skipper actually assumed that his was the stand-on vessel as defined in Rule 18(a)(iv) COLREGs.

It is evident that the WERKER relied on the fact that the NOBILE would manoeuvre such as to avoid a collision for an extremely long period. It appears that a more active role, e.g. through the use of sound signals<sup>34</sup>, was not considered. This could have been (and must be) done as soon as doubts as to the NOBILE's intention to keep clear emerged, i.e. before a risk of collision was suspected or existed.

The new situation between the two vessels caused by the NOBILE's turn three minutes before the collision prevented them from taking an anticipatory approach in terms of actual collision prevention, as called for in the open sea<sup>35</sup>. Having said that, the investigators believe that nothing prevented the NOBILE from proceeding with caution, especially when her skipper apparently intended to cross the fairway several times more. This means that there was sufficient space for manoeuvring available north of the fairway. Consequently, it would have been possible to wait there for the WERKER to pass and then to pass buoy pair 9/10 aft of the WERKER.

All in all, it remains to be noted that timely communication on VHF would have made each ship aware of the intentions of the other and communication subsequently could have served to make appropriate manoeuvring arrangements. This was not made use of.

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<sup>34</sup> Rule 9(d) COLREGs, referencing sound signals under Rule 34(d): "When vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle. Such signal may be supplemented by a light signal of at least five short and rapid flashes."

<sup>35</sup> Rule 16 COLREGs (Action by give-way vessel) and Rule 17 COLREGs (Action by stand-on vessel).

#### **4.4 WERKER's area of operation**

The Directorate-General for Waterways and Shipping (Kiel) was requested to comment on the issue of defining Zone 2 and that of the opposing conclusion that inland waterway vessels sailing on the Flensburg Firth toward Flensburg with the appropriate approval will inevitably violate the provisions of traffic legislation. It stated in its response that the BinSchUO is limited to German territory and therefore it is not possible to navigate the area referred to in a westerly direction without formal violation of the provisions of the COLREGs or the BinSchUO. It went on to say that compliance with the provisions is ultimately incumbent upon skippers and that they should avoid the area if a safe passage is not possible. From the perspective of traffic legislation no alternative solutions exist. The ZSUK was referenced with regard to the BinSchUO.

The Shipping Administration expanded upon its reasoning in its statement on the draft, stating that if a violation of legislation will be unavoidable when carrying out a voyage, then the voyage should not be started. In addition to a failure to comply with the approval of the vessel, it also sees an infringement of the limits of the area of operation arising from the proficiency. The Shipping Administration ultimately believes that responsibility rests with the owner and the skipper, and goes on to state that the vessel would have to be classified differently and that a corresponding qualification is necessary. In principle, the BSU concurs with this reasoning.

The ZSUK was also consulted on this issue. In its reply it noted that it was not responsible for monitoring of the traffic regulations, but rather only technical approval. It also stated that its duties do not include verification of whether a vessel has 'full' traffic approval documents. As regards the possible acquiescence of such vessels by the Danish authorities, it referred to the local administration.

All in all, the German Shipping Administration's response to the issues raised in relation to sailing in Zone 2 in compliance with the regulations was rather unsatisfactory, albeit its reasoning on the various points is understandable. Although the BSU is not aware of the number of inland waterway vessels it actually concerns in this area, it believes that a system, which would permit navigating the Flensburg Firth in its entirety at first glance, should ensure that.

The reference to the Danish shipping administration given by the ZSUK was taken up by the BSU. A request sent to the Danish shipping administration (Søfartsstyrelsen – Danish Maritime Authority) was answered as follows<sup>36</sup>:

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<sup>36</sup> Idiomatic translation by the BSU.

1. Foreign ships may sail in Danish waters if it is ensured that they exhibit a level of safety as would apply to comparable Danish vessels.
2. In the first instance, foreign ships transiting Danish waters must be approved for such voyages by their flag State Administration. The Administration of the flag State must have established that the ship in question has a level of safety as would comply with that of Danish requirements.
3. The European safety regulations for inland waterway vessels do not apply in Danish waters. For this reason, approval and certification under these regulations do not automatically correspond with the level of safety necessary for voyages in Danish waters.

The BSU assesses the submission of the Danish shipping administration as follows.

Re 1.: The BSU assumes that the WERKER's level of safety (design, equipment, qualifications of the crew) is equivalent to that of a Danish ship in comparable waters.

Re 2.: The WERKER was transiting Danish waters but not approved by the German Administration for such voyages at this point in time.

Re 3.: Without having carried out a detailed inspection, the BSU assumes that the WERKER's level of safety generally corresponded with that necessary for voyages in such Danish waters.

## **5 CONCLUSIONS**

### **5.1 Collision prevention**

Both vessels were operated by a suitably qualified crew at the time of the accident.

It should also be noted that the NOBILE failed to comply with the obligation not to impede the WERKER, which the BSU believes it had according to Rule 9(b) COLREGs. She should have taken evading action at an early stage, i.e. before the risk of collision emerged. After the NOBILE had crossed the course of the WERKER, the earliest possible time was after the tack at 1422.

This coincided with the fact that each vessel apparently failed to proceed with the necessary foresight, while making incorrect assumptions as to the behaviour of the other vessel. This is true of every conceivable case as regards the understanding of the legal situation during the encounter of both ships of the two skippers involved. The existing means (sound signals or coordination on VHF) were not made use of. As a result, the two vessels continued to converge until prevention of the collision was no longer possible with the measures initiated.

The course steered by the NOBILE indicates that the skipper intended to make further turns in the fairway or nearby. The investigators were unable to establish exactly what importance the NOBILE's skipper attributed to her participation in the regatta in his decision making. Although the level of traffic is not known, the BSU believes that the use of engine power would have been appropriate at least during the passage through the narrow section between buoys 9/10, as this would have ensured a quick passage, it would have reduced the number of potentially dangerous encounters, and thus would have produced a clear situation for all other traffic.

### **5.2 Maintenance of the logbook**

The obligation to keep the logbook was satisfied only in broad terms on the NOBILE. A logbook was not kept on the WERKER. This vessel did not transmit AIS data, which could have been recorded by the Shipping Administration. Consequently, no other underlying data were available to substantiate the testimony of the skipper.

### **5.3 WERKER's area of operation**

The WERKER was in possession of basic approval documents for operating in the Flensburg Firth inside German territory. The recognised Danish-German border is in the middle of the fairway. An obligation to keep to the right-hand side of the fairway arises from the COLREGs, which apply in this area. Accordingly, an inland waterway vessel with approval documents for the zone necessary here (Zone 2) would have been compelled to proceed in Danish waters on her way into the Flensburg Firth. She would have thus sailed a distance of more than 9 nm in an area for which she had no approval documents.



Although the body of water on the German side can also be used outside the marked fairway, this is no longer possible from buoy 4 at the latest due to its narrowness, as it would then be necessary to proceed against the direction of traffic. This means that a stretch of about 3.5 nm remains on which such a vessel would be compelled to violate her conditions if she wished to navigate safely.

The BSU's investigators were able to understand the reasoning of the German authorities consulted on this matter. However, it does seem that solving the problem is being consigned to the skippers of inland waterway vessels, even though a more global approach is necessary.

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## **6 SAFETY RECOMMENDATIONS**

The following safety recommendations do not constitute a presumption of blame or liability in respect of type, number or sequence.

### **6.1 Skipper of the NOBILE**

The Federal Bureau of Maritime Casualty Investigation recommends that the skipper of the NOBILE carry out future voyages with more attentiveness and consideration, and comply with the requirements of the COLREGs to the fullest extent.

### **6.2 Operator of the NOBILE**

The Federal Bureau of Maritime Casualty Investigation recommends that the operator of the NOBILE define specifically what facts should be entered in the logbook.

### **6.3 Skipper of the WERKER**

The Federal Bureau of Maritime Casualty Investigation recommends that the skipper of the WERKER carry out future voyages with more attentiveness and comply with the requirements of the COLREGs to the fullest extent.

### **6.4 Operator of the WERKER**

The Federal Bureau of Maritime Casualty Investigation recommends that the operator of the WERKER keep a logbook. Inter alia, it facilitates recording the course of the voyage when kept properly.

### **6.5 Skipper and operator of the WERKER**

The Federal Bureau of Maritime Casualty Investigation recommends that the skipper and the operator of the WERKER observe the maximum area of operation arising from the skipper's certificate of proficiency and the vessel's approval documents.

## 7 SOURCES

- Investigations of WSP Flensburg
- Written explanations/submissions of the skippers of the NOBILE and WERKER
- Ship papers and other documents from the NOBILE and the WERKER
- Other documents submitted by the operator of each vessel
- Nautical charts of the BSH
- Fact sheets, technical papers and website that focus on the rules governing right of way in the area of the Flensburg Firth:
  - WSP (Flensburg District) 'Wassersport & Freizeit – Fahrwassertonnen ... und doch kein Fahrwasser' (*Water sports and recreation – fairway buoys ... yet no fairway*), in particular the comments in the nautical chart. 2007
  - <http://www.mein-ostseehafen.de/seegebiete/schleswig-holstein/flensburger-foerde.html>, retrieved on 18 November 2016
  - [http://www.ra-felsmann.de/aktuelles/sportbootrecht/Flensburg\\_KVR.html](http://www.ra-felsmann.de/aktuelles/sportbootrecht/Flensburg_KVR.html), retrieved on 21 November 2016
  - <http://www.venghaus.eu/nautisch/segeln.html>, 'Fahrwasser, enge Fahrwasser oder Fahrrinnen, eine Gegenüberstellung von Kollisionsverhütungsregeln und Seeschifffahrtsstraßenordnung' (*Channel, narrow channel or fairways, a comparison of the COLREGs and SeeSchStrO*), retrieved on 21 November 2016

## 8 ANNEXES

### 8.1 Extract from the AIS data of the NOBILE

Time (in UTC)	Speed [kts]	COG [°]	Event
122008	6.1	212.4	
122018	6.1	208.8	
122027	6	208.8	
122037	6.1	207.8	
122047	6.3	205.5	
122058	6.4	207.6	Tack starts off Holnis
122108	5.6	222.5	
122118	4.6	239.1	
122127	3.8	253.6	
122137	3.1	266.1	
122147	2.6	275	
122159	2.1	287.3	
122208	1.9	309	
122218	2.1	333.4	
122227	2.6	345.4	
122237	3.1	348.6	
122247	3.6	349.3	Tack finishes
122259	4.3	347.2	
122300	3.1	351	
122308	4.6	346.8	
122318	5.1	359.1	
122320	3.7	10	
122327	5.6	9.9	
122337	3	39	
122340	3.8	357	1st possible time of collision
122347	3	356.9	
122359	3.4	344.1	
122400	3.5	337	
122408	3.5	331.6	
122417	3.5	324.1	
122420	3.5	321	
122427	3.5	318.6	
122437	3.2	312.3	
122440	3.4	311	
122447	2.8	308.7	
122459	2.4	309.6	
122500	3.2	310	
122508	2.1	307.3	
122517	1.9	306.3	
122520	2.7	306	
122527	1.6	306.4	2nd possible time of collision
122537	1.2	309	
122540	2.3	309	
122549	1	313.3	
122558	0.6	316.5	
122600	1.9	330	
122608	0.4	319.6	
122617	0.3	327.2	
122620	1.5	5	
122627	0.2	340	
122637	0.3	356.4	
122640	1.4	5	
122649	0.4	13.4	
122658	0.6	23.2	
122700	1.3	5	
122707	0.8	26.1	
122717	1.5	16.7	
122728	2	332.2	
122737	1.3	325.8	
122749	0.9	313.5	
122758	0.7	302.8	
122807	0.6	293.7	

Spreadsheet 1: Extract from the available data from the NOBILE

Ref.: 189/14

The speed and COG data transmitted by the NOBILE's AIS unit are shown in Spreadsheet 1 (times and values in black). The data recorded on the private tablet computer are inserted (times and values in red).

## 8.2 Current data

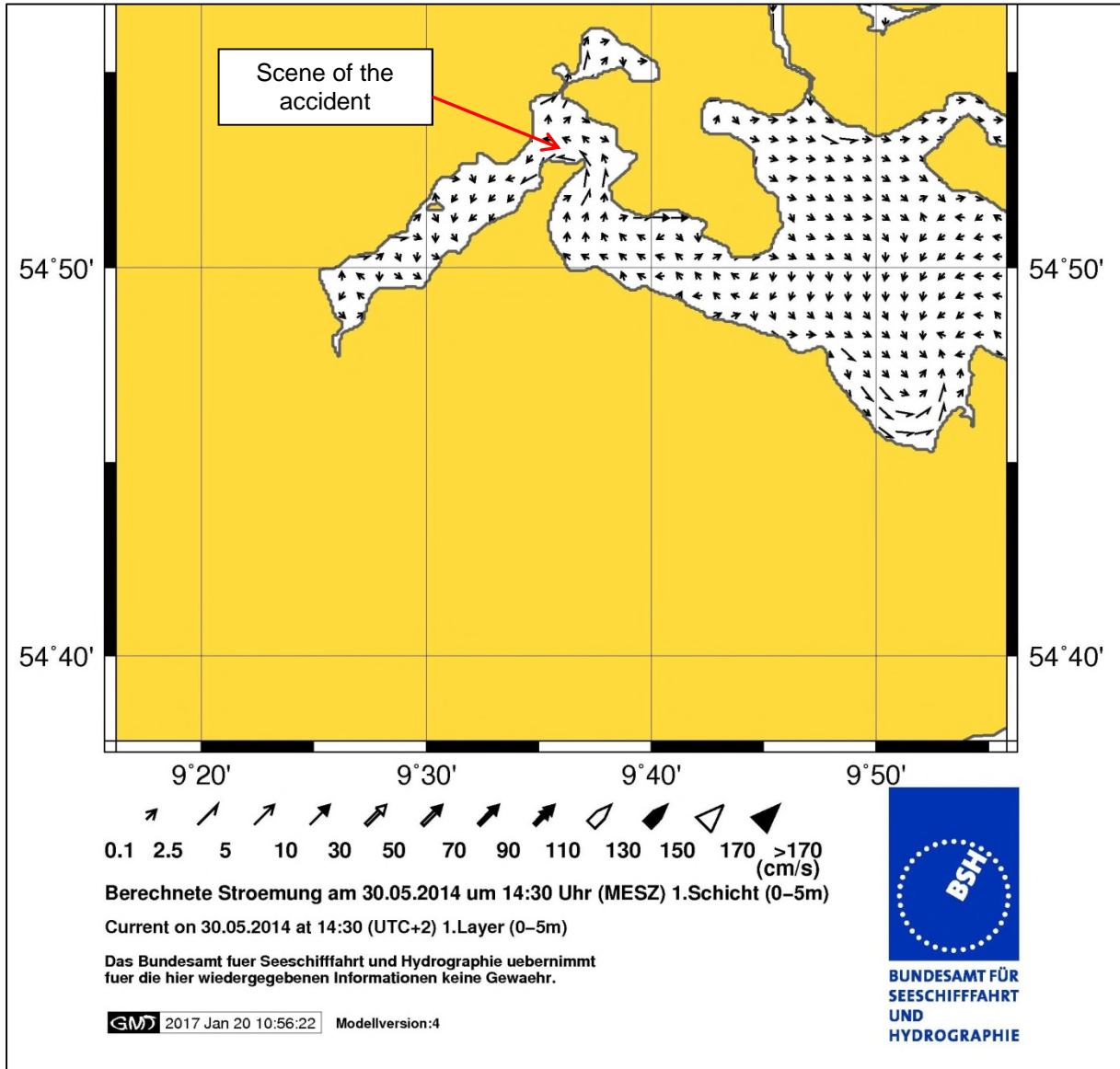


Figure 14: Current data for the Flensburg Firth, 1430