



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

Investigation Report 116/07

Serious Marine Casualty

**Grounding of the MV VOLGO-BALT 209
on 22 March 2007 on the Lower Elbe River
south of Buoys “3” and “5”**

15 February 2008

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.

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

Head: Jörg Kaufmann
Fon: +49 40 31908300
posteingang-bsu@bsh.de

Fax: +49 40 31908340
<http://www.bsu-bund.de>

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1 Summary of the marine casualty

On 22 March 2007 at 20:25 h¹, while on the voyage from the Kiel Canal to Bremen, the vessel MS VOLGO-BALT 209, sailing under Russian flag and carrying 2966 t coal ran aground south of the fairway Buoys “3” and “5” in gale force 7 to 8 Bft northerly winds and an ebb current. The vessel was sailing under pilot advice. Because of the rough seas the Weser pilot had already come on board before Cuxhaven, while the Elbe pilot was let off at 19:55 h at Buoy “10”. Then the Weser pilot took over advice of the vessel’s manoeuvres. Based on the traffic situation his intention was to cross the fairway already before the Elbe Approach Buoy in the area of Buoys “1” and “3”, keeping close to the buoy line until the “Scharhörnriff N” Buoy and then to approach the “Alte Weser” navigational light. However, after passing Buoy “6” and crossing the fairway it became impossible to effect a distinct course change westward, so that the VOLGO-BALT 209 ran aground. The Master, the Third Mate, the Helmsman and the Pilot were on the bridge at the time.

¹ All times in the report are CET = UTC +1h.

3 Vessel particulars

3.1 Photo



Figure 2: Photograph of the vessel

3.2 Particulars

Name of the vessel:	VOLGO-BALT 209
Type of vessel:	General cargo vessel
Nationality/Flag:	Russia
Port of registry:	Kaliningrad
IMO No.:	8844957
Call sign:	UGGD
Owner:	Transonega Shipping Joint Stock Co
Year built:	1978
Shipyard/Yard No.:	Zavody Tazkeho Strojarsstva - Komarno
Classification society:	RMRS, Russian Maritime Register of Shipping
Length overall:	114 m
Breadth overall:	13.2 m
Gross tonnage:	2473
Deadweight :	2893
Draught at time of accident:	Fore: 3.20 m, Aft: 3.90 m
Engine rating:	1030 kW
Main engine:	Skoda Prague
Speed:	10 kn
Number of crew:	13

4 Course of the accident

On 22 March 2007 the VOLGO-BALT 209, laden with coal, was on a voyage from Kaliningrad to the Arcelor Bremen steel works in Bremen. The vessel had announced its transit of the Kiel Canal via the United Canal Agency GmbH and booked pilots for the entire passage to Bremen. At 08:05 h the ship took on the River Pilot at the Kiel Lighthouse and tied up in the lock at 09:20 h, leaving at 09:55 h for Brunsbüttel. The estimated time of arrival in Bremen was announced at 08:00 h the following morning. The cargo was reported as being 2966 t and bunker stocks were stated as being 48 t diesel fuel with drafts of Fore = 3.20 m and Aft = 3.90 m. Once passage of the Kiel Canal was completed, the Elbe Pilot took over advice of the ship's command.

Because of the strong northerly winds of 7 to 8 Bft gusting 9 Bft and the rough seas, the Elbe pilot interchange service was shifted to a position further inshore between Buoys "9" and "11" and not, as at first intended, at the Elbe Approach Buoy. For this reason, the Weser / Distance Pilot had already come on board before Cuxhaven at around 18:30 h. At 19:55 h the Elbe Pilot left the ship between Buoys "8" and "10" and the Weser / Distance Pilot took over advice. Other persons on the bridge were the Master, the Third Mate and the Helmsman.

Visibility was good, and the radar image was clear. Channels 5 (Neuwerk Radar) and 71 (Cuxhaven Elbe Traffic), the Shore Based Radar Advisory Service Channel 18 (Scharhörner Radar) and Channel 8 for the Pilot Boat were switched on on the VHF radios. The helm was operated by a seaman. The helm commands issued by the Pilot in English, were translated into Russian by the Master and relayed to the Helmsman. There was no lighted rudder indicator on the ceiling above the helm. It was necessary to go to the conning to read the rudder position indicator. With the ebb tide and current, at times the ship proceeded at 14 kn over the ground. North-westerly swells of 2 to 2.5 m and north to north-easterly as well as north to north-westerly winds of 8 Bft were observed. At the time of arrival at the mouth of the Elbe the ship heavily working in the sea.

The Pilot on board spoke in German to the Radar Pilot and then translated the recommendations and directions into English for the Russian Watch Officer. The Pilot was at first not fully able to identify the Master as compared to the Watch Officer. After passing Buoy "10" the radar advisor informed the ship that a vessel proceeding in the same direction wished to overtake, and that thereafter the VOLGO-BALT 209 would meet with no further traffic between Buoys "6" and "Elbe", either travelling in the same or in the oncoming direction. However, after passing the "Elbe" Buoy large amounts of incoming traffic should be expected. It was therefore a matter for consideration whether to cross the fairway immediately after passing Buoy "6", following the line between Buoys "3" and "1" (leaving both buoys to port) to the "Scharhörner N" Shoal Buoy in order then, once south of this buoy, to head for the "Alte Weser" lighthouse. The Pilot explained the course to be followed on the charts. Using these charts and the GPS receiver handing above the chart table the Third Mate reviewed the position on an ongoing basis and made annotations on the chart (cf. Fig. 3).

Up to the overtaking by the vessel proceeding in the same direction, the VOLGO-BALT 209 ran distinctly on the right hand of the fairway with a gyrocompass course of 285°. After passing Buoy “6” the pilot recommended a course change to 220° so as to take Buoy “3” dead ahead in order to cross the fairway. This recommendation was relayed in English to the Master, who translated it and then issued orders to the helmsman in Russian.

After the course had been changed and steering stabilised, the Pilot realised that Buoy “3” was quickly passing to starboard. He checked the compass course and saw that it was 200° instead of 220°. He then recommended a course of 250°. This course recommendation was not implemented. Shortly before passing the southern radar line Buoy “3” could still be seen clearly to starboard, and the Pilot recommended 270° and “Hard to Starboard”. Thereupon the Helmsman put the helm 20° to starboard. The ship turned but could not get beyond a course of 262°. Both engines were running “full ahead”, so that it was not possible to increase engine revolutions to enhance the rudder effect.

At approximately the same time the Third Mate determined that the VOLGO-BALT 209 was in shallow waters and informed the Master. Thereafter the VOLGO-BALT 209 drifted outside of the buoy line and ran aground at approx. 20:25 h west of the Beacon "BCN A".



Figure 3: Section of Chart, VOLGO-BALT 209

Subsequently several rudder and engine manoeuvres were undertaken in order to get the ship clear. In the process the vessel touched bottom several times, sometimes violently. Spray came over the deck and hatches, and ballast tanks 1 and 3 filled up with water. During the manoeuvres the Helmsman carried out orders from

the Master and the First Mate, who had come onto the bridge after the grounding. Later, both main engines failed. Following orders from the Master, the Third Mate carried out ballast work.

At 22:05 h the Rescue Cruiser HERMANN HELMS arrived on the scene and carried out the first rescue attempt. It was joined at around 22:30 h by the Multipurpose Vessel NEUWERK and the Police Boat BÜRGERMEISTER BRAUER, and shortly thereafter, the tugs TAUCHER OTTO WULF 3 from Cuxhaven and PARAT from Brunsbüttel. Because of the low water level, further attempts at moving the ship could only be made at 01:32 h. At 01:45 h the VOLGO-BALT 209 ran aground again and hit bottom at the stern. There followed further impacts until the ship was afloat again at 02:40 h and was towed by the two tugs to Cuxhaven, where tug and tow arrived at 06:55 h on 23 March 2007.

5 Investigation

The first investigation took place directly on 23 March 2007, including the deployment of divers with cameras. Owing to the damage, the ship had at first been prohibited from leaving port by the Marine Insurance and Safety Association. On 25 and 26 April 2007 the vessel was surveyed by the Russian Maritime Register of Shipping (RMRS) and the BSU after the coal cargo had been unloaded and the cargo holds had been cleaned.

In the RMRS inspection report it was determined that the hull was dented and cracked in the area of ballast tanks 1 and 3 on the port side. Both the rudder and propeller were damaged (cf. Fig. 4). The bulwark and the deck planking were deformed in the area of frames 64 to 84, probably due to green water slamming. There was no visible damage inside the cargo spaces in the areas of planking, frames or bulkheads. The superstructure, hatches and entry holds were in satisfactory condition, and the cargo spaces were dry.

Under specific conditions, the RMRS investigation report authorised an exceptional voyage under tow to Kaliningrad.



Figure 4: Damage to aft section

The navigation equipment consisted of two Decca Bridgemaster radar's, a Sperry gyrocompass, a standard magnetic compass, two GPS (Philips and Sperry), a Sperry ES 5000 echo sounder, an Anthea log, a AP 1500 Sperry autopilot and a C. Plath course and rudder position recorder. One of the radar's was damaged. There were up-to-date Russian charts and Sailing Directories as well as a 2006 deviation table

for the magnetic compass as well as maintenance records on board. The chart that was used, No. 25212 (INT 1452) had been kept up to date and included correction No. 5306 of 30 November 2006 as the last change. The next inspection would take place at the wharf.



Figure 5: Bridge of the VOLGO-BALT 209

5.1 Charts

The BSU reviewed the planned and actual courses of the VOLGO-BALT 209 by means of the Russian paper charts corresponding to German Charts 44 (INT 1452) “Elbe Estuary” and 2 (INT 1456) “Jade and Weser Estuaries” at a scale of 1:50.000, in the presence of the Master and of the Third Mate. Chart 87 (INT 1413) “Borkum to Neuwerk and Helgoland” at a scale of 1:150.000 was also on board. However, Chart 49 (INT 1463) for the “Jade, Weser and Elbe Estuaries” at a scale of 1:100.000 was missing. This would have shown the approaches between the Elbe and the Jade/Weser on one page, although at a smaller (less easily readable) scale. The map of the Cuxhaven harbour is printed in the bottom left corner of Chart 44, so that the way to the “Alte Weser” lighthouse to attain the “Alte Weser” fairway is not shown in one stretch. Therefore, charts could have been changed only on the meridian of the Elbe Approach Buoy or immediately beforehand. On the current German Chart 2 only the southern portion of the fairway around the Elbe Approach Buoy is shown. If the chart section had been increased by one minute further northwards (cf. historical Chart 2 before the last conversion to the IALA Buoyage system²), the chart image would have been significantly better, enabling a better transition to Chart 44. This is particularly striking if intending to leave the Elbe on the northern fairway. The current map sheet division can be irritating when transferring a position (cf. Fig. 1 and 6).

² International Association of Lighthouse Authorities (IALA)

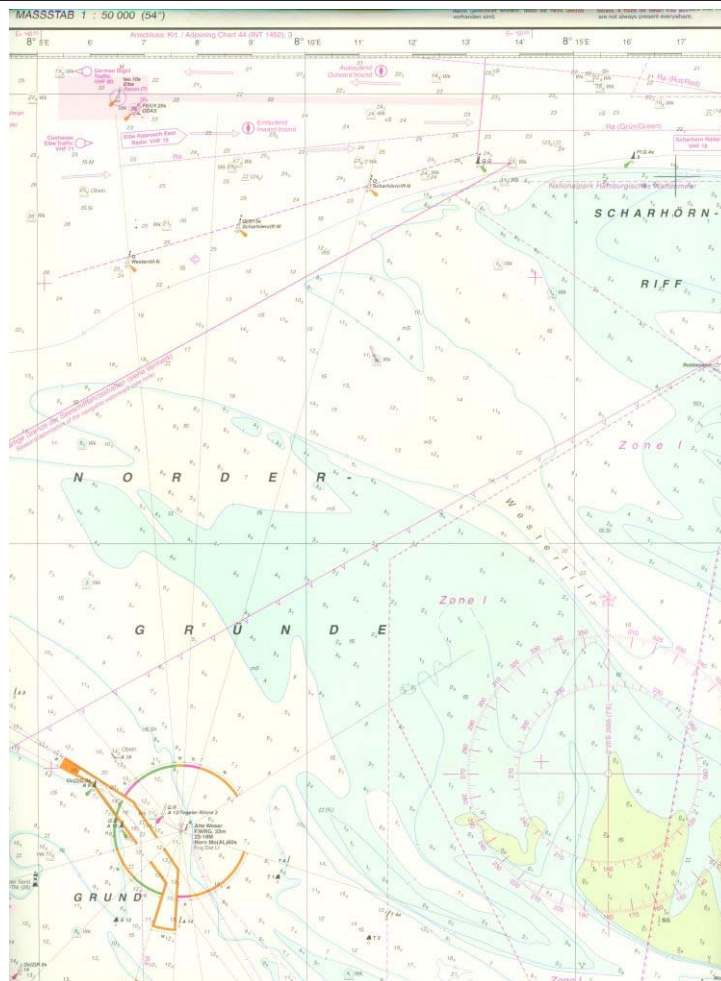


Figure 6: Section of Chart 2 (INT 1456) BSH

On the way from the Elbe to the Weser Chart 44 has a printed harbour map and, as opposed to Sheet 13 of the BSH Pleasure Craft Chart Set 3014, covers up the Scharhörn and Nordergründe shoals.

In this context the BSH states that German Chart 44 (INT 1452) has been published in this form for approximately 100 years. As is indicated by its title, "Elbe Estuary", it is intended as an aid to incoming and outbound navigation of the estuary of the river Elbe. This traffic travels in the area around the Elbe Approach Buoy, passing Cuxhaven or on the approach to Cuxhaven itself. For the latter purpose, the map of Cuxhaven has been inserted on the left hand side of the chart. Chart 44 is not appropriate for navigation from the Elbe Estuary into the Weser or vice versa. It is actually necessary to use Chart 2 "Jade and Weser Estuaries", which in turn is not appropriate for the approach to the Elbe Estuary. In order to avoid shallow areas, when coming from the east, deeper draught merchant shipping is obliged to approach the "Alte Weser" fairway in a wide westward ranging curve. A good overview of the overall situation is provided by Chart 49, which the BSH has been publishing for three years now for this very reason. Although the scale is smaller, it provides sufficient indications and details.

A change-over between Charts 44 and 2 would already have been possible between Buoys "5" and "3" of the Elbe Fairway.

The different structure of the Pleasure Craft charts results from the variety of the sheet sections in themselves, which because of their size require a different subdivision than those intended for merchant shipping. In addition, the sea areas covered up in Chart 44 with the map of Cuxhaven are easily navigable for shallower draft pleasure craft, while professional shipping should avoid these areas as a matter of principle.

Enlarging Chart 2 northward would clearly result in improved chart image. In this scale, one minute of latitude corresponds to approx. 4 cm. And yet it is exactly these 4 cm that cannot technically be accomplished. The format of charts is mandated among other things also by the image setter and printing formats.

Because of these technical requirements it was necessary to reduce the format to the current size in 1986. This coincided with an expansion of the INT chart corpus with Chart 44. Before a chart can become an INT Chart it is submitted to the regional agency of the IHO complete with its scale and dimensions. The countries concerned can then lodge their objections if applicable. This was true in particular in the early years of INT charting, in which all sheet sections were defined. INT Charts use internationally standardised symbols, and the chart itself is bilingual. However, national sea charts, which are not affected by this, can also be used in international shipping.

German Sailing Directories, as the original source for publications in foreign Sailing Directories, do not provide detailed recommendations concerning the navigation of the waters between the Elbe and the Weser. For people not familiar with the area, navigation of the inlets and tideland fairways between the North, East and West Frisian islands is recommended only under guidance from persons with local knowledge or under pilot advice.

5.2 Tidal currents, water levels and wind effects

The Pilot's original plan to leave the Elbe Fairway already after having passed the Scharhörnriff N Buoy and to head for the "Alte Weser" Lighthouse over the Northern Grounds, i.e. within the red sector of the light, requires exact knowledge of the sea area and of vessel characteristics in the Wadden Sea in all weather conditions.

Before navigating this sea area it is necessary to obtain information concerning possible changes in depths and navigation channels. West to north-west winds drive the water into the inlets and cause higher water, while easterly winds result in lower water. Strong shifts of outer grounds and bars usually occur after violent westerly and north-westerly disturbances. In Germany, the depths of inlets and tidal waters are published by the Waterways and Shipping Offices by means of announcements to Mariners. The intertidal areas are to a great extent nature reserves with varying rules for navigation.

In the inlets, at high water the tidal currents will often set across the direction of a navigational course within the navigation channel and over the sand flats. With gale force westerly and north-westerly winds and rising water, there are usually no significant seas on the outer bar and in the outer fairway of the inlet. With an ebb current on the other hand there will be high and dangerous seas. Waves become steeply rising breakers especially in those areas of the inlet where the ebbing current attains higher speeds as a result of a narrowing of the deeper channel or gully.

In some inlets, groundswell can occur with strong gales in both ebb and flood currents. The tidal waters fairways are inland waterways that are of interest only for flat bottomed, shallow draught craft. Tidal waters fairways change on a daily and hourly basis due to the effect of the tides. The accuracy of fairway denomination and representation on sea charts is uncertain. Within the Wadden Sea, tidal currents will set from and to the inlets. Flood currents will spread out in all directions behind the islands, first into the gullies and then across the sand flats.

Navigating in and on the edge of the Wadden Sea requires special attention to currents and winds. For this purpose the BSH publishes Current Atlases. The following illustrations explain the resulting currents at the time of the incident.

Excerpt from BSH-No. 2347: German Bight Currents, cf. Figs. 7-9³

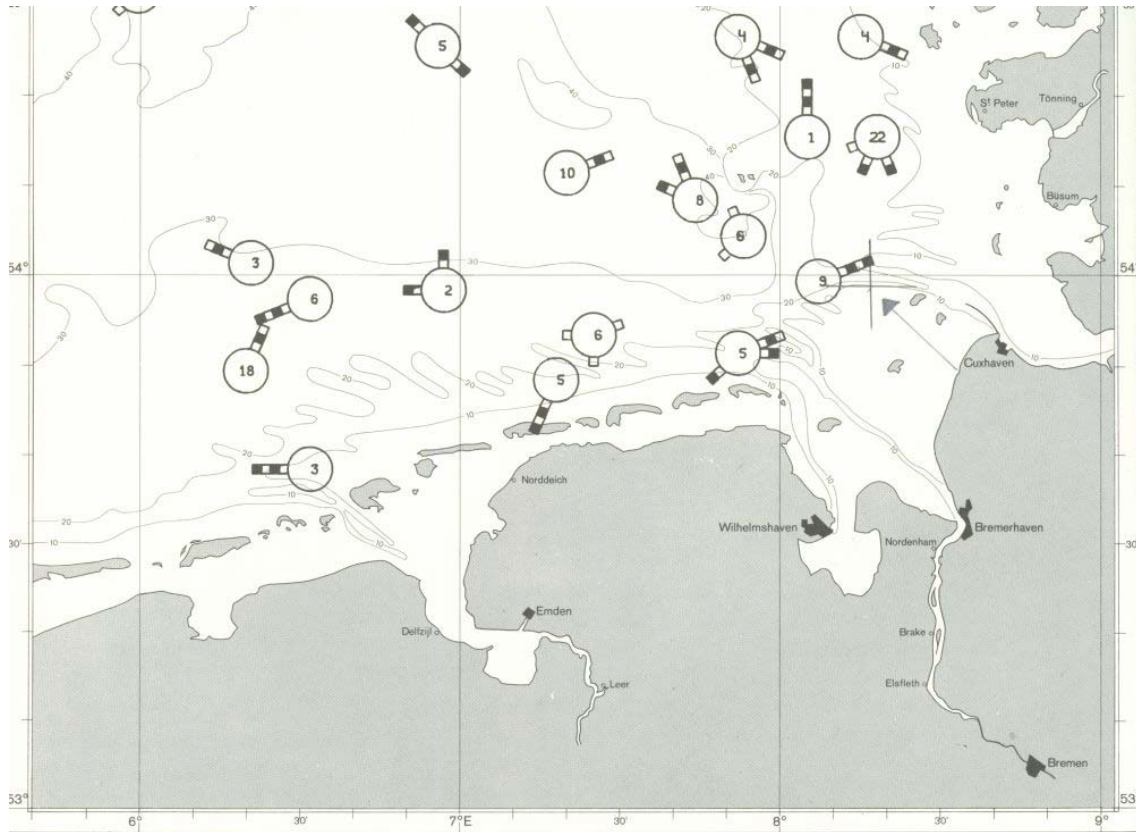


Figure 7: Excerpt from BSH No. 2347, Residual current under northerly winds with directional bars
 Residual current under northerly winds close to the water surface, number of daily averages and percentage current direction indicator bars.

³ The three-hourly wind records at the Elbe Approach Buoy were used for representation of the current portion generated by the local wind (residual current). In this calculation, the vectorial daily average current values reported by all stations are correlated to the vectorial daily average wind values at the Elbe Approach Buoy on the corresponding calendar days. All other data interpretation is independent of specific dates/times.

Remarks concerning the residual current distribution charts:

Speed and prevailing direction near the surface of the residual current are shown for each of the eight wind sectors. The first and second illustration identically show the positions of the Station Groups (circles) and the directional emphasis of the residual current. The first illustration also provides information on the number of all daily average values (figures inside circles) of the residual currents subject to the respective wind directions. The directional emphasis of the residual current is shown by means of black and white bars pointing in the direction of the current's setting action. The 45° directional sectors for wind and current are equated to the principal directions 0°, 45°, 90°, ... in the illustrations. With residual currents, combining two sectors can also result in intermediate directions. Every black or white segment of the directional bars describes a relative frequency of 20% based on the relevant total number of daily average values. Relative frequencies below 20% have not been taken into account. The breakdown into 20% segments favours emphasis on prevailing directions and as a result can cause the impression that relative frequencies at the Station Groups may in appearance exceed 100%.

The second illustration show the directional emphasis points and the speed of the residual current at a given wind direction. The figures in the circles are average speed values in cm/s^{-1} and refer to the relevant prevailing direction of the current. With several directional points of emphasis the speeds shown underneath one another (maximum of three values) are assigned to the individual directions, starting from the north and proceeding clockwise.

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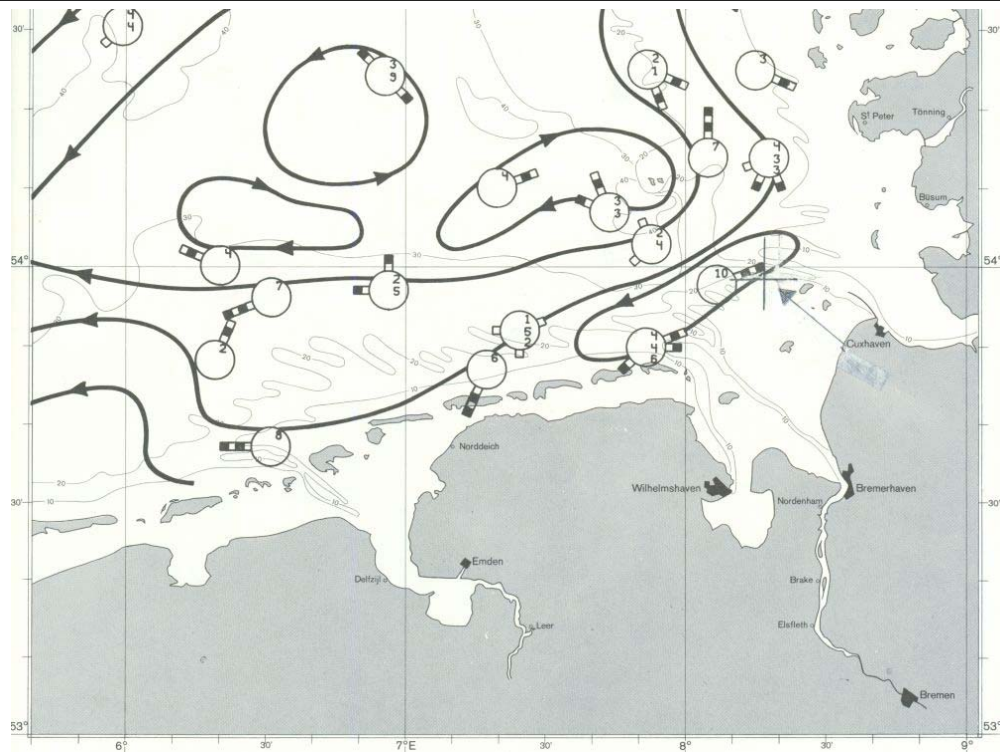


Figure 8: Excerpt from BSH No. 2347, Residual current under northerly winds with average direction
Residual current under northerly winds close to the water surface, speed in cm/s and direction of average residual current

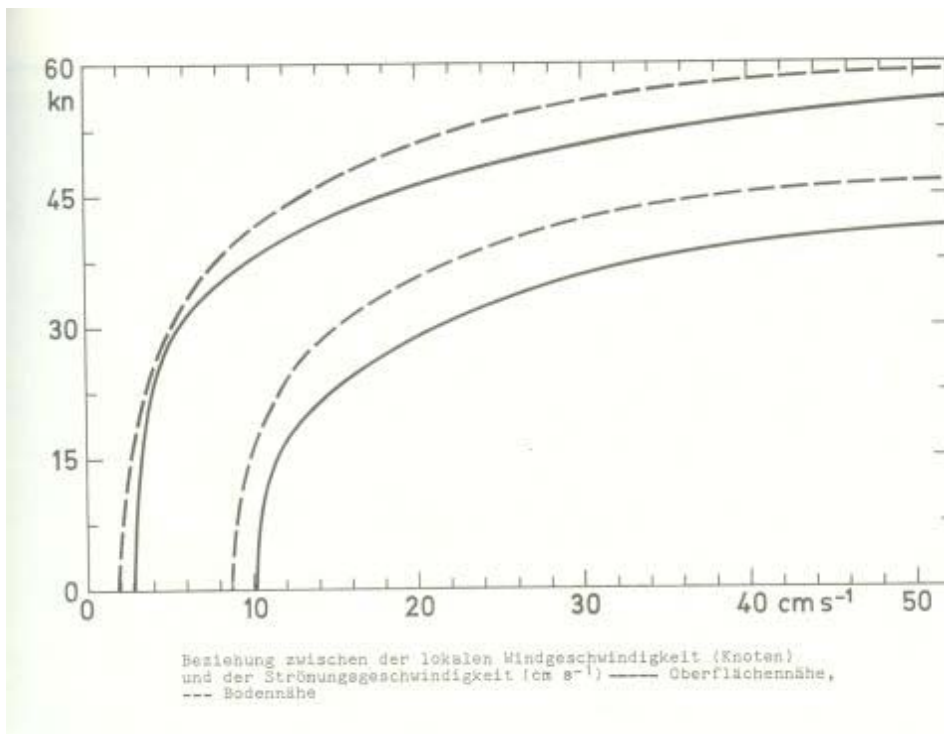
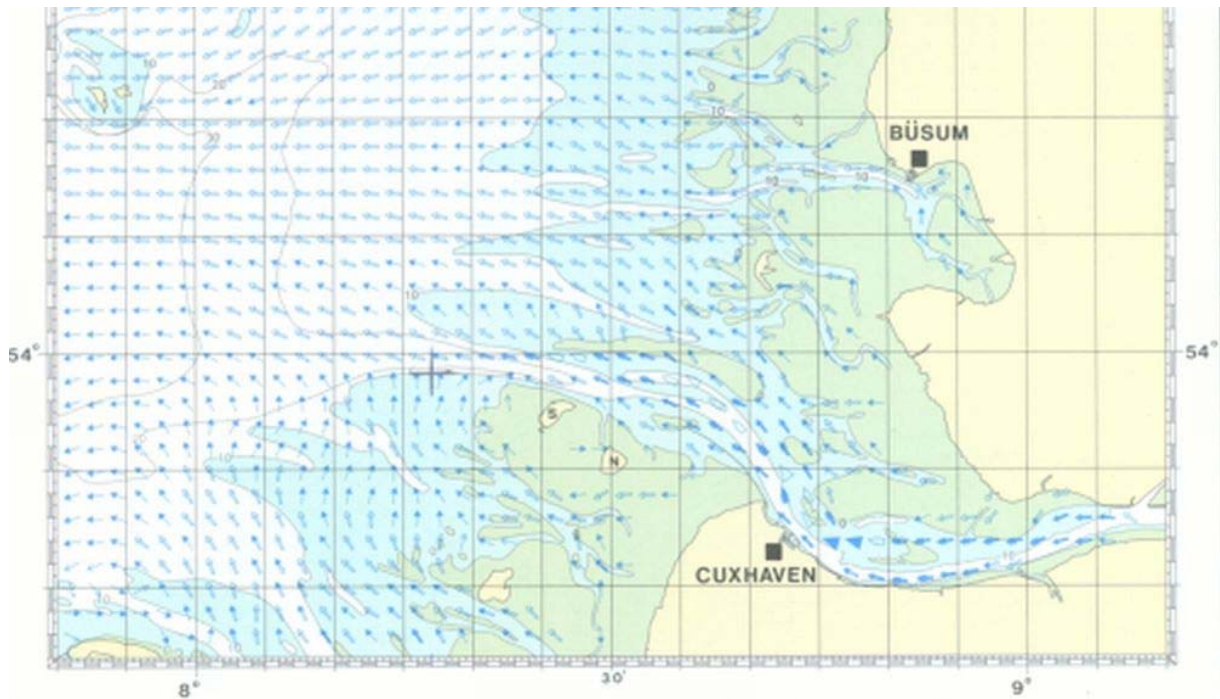


Figure 9: Relationship between wind speed and current



6 h before high water at Helgoland on 23 March 2007 at 02:29

In den folgenden Karten sind die Stromgeschwindigkeiten in cm/s angegeben. Die Umrechnung der in den Karten dargestellten Geschwindigkeitsskalen in sm/h ergibt folgende gerundete Zahlenwerte:

↗	< 0.05	↖	1.4 - 1.8	↗	0.1 - 2.5	↖	70 - 90
↘	0.05 - 0.1	↗	1.8 - 2.2	↘	2.5 - 5.0	↗	90 - 110
↙	0.1 - 0.2	↘	2.2 - 2.6	↙	5 - 10	↘	110 - 130
↖	0.2 - 0.6	↙	2.6 - 3.0	↖	10 - 30	↙	130 - 150
↗	0.6 - 1.0	↖	3.0 - 3.4	↗	30 - 50	↖	150 - 170
↘	1.0 - 1.4	↙	> 3.4	↘	50 - 70	↙	> 170

Knoten (gerundet) cm/s

In charts below, current speeds are given in cm/s. The conversion of the speed scales represented on the charts to nm/h provides the following (rounded) figures: Knots (rounded):

Figure 10: Excerpt from BSH No. 2348: Coastal Tidal Currents in German Bight

By vector addition of the astronomical influence of the tidal current and the portion of the current generated by the local wind (residual current) the current prevailing at the time of the incident in the Elbe Fairway was determined to set westwards (272°) at 2.3 kn. In this calculation it was assumed that according to the BSH's Tide Tables the main tidal current would set to 280° at 1.4 kn and the wind effect generated a current of 1 kn in direction 250°. In the area of the mudflat shore south of the line between Buoys 3 and 5 the tidal current set northwards at 0.5 kn, so that at that location, when taking into account the wind, there was a 1 kn current setting 280°.

5.3 Weather Expertise

In the morning of 22 March 2007 there was a low pressure system with its centre over Poland. During the day, it intensified slightly while moving westwards. In the night to 23 March 2007 the centre of the system was over Eastern Germany. A high pressure ridge extended from the Azores High over the British Islands to Central Scandinavia. This pressure distribution led to lively northerly winds over German Bight.

The weather was cloudy to heavily overcast, with rain coming in from the east. Horizontal visibility was approximately 20 km, air temperature approx. 6°C and the water temperature 7°C.

Sunset was at 17:44 h UTC. The moon did not provide a significant light source at that point: the waxing sickle was at approximately 30° above the horizon.

The wind was northerly and blew at average strengths of 7 to 8 Bft, with gusts measured at up to 9 Bft.

The Beaufort (Bft) wind force values refer to a 10-minute average of the wind speed measured at a height of 10 m.

There are no observations of wave heights from other shipping in the area under investigation. Nonetheless the relationships between wind force, load duration and fetch make it possible to estimate the significant wave height of the prevailing sea conditions. A directionally stable average wind of force 7 to 8 Bft blowing over a period of 6 hours can, with undisturbed deep water conditions, generate wind seas with significant wave heights of around 3 m at 6 s intervals. In this case however it is not possible to assume undisturbed sea conditions. North of the accident position is the Großer Vogelsand ["Big Bird Sand Shoal"], which has a smoothing effect on the development of wind seas due to its depths of less than 10 m. The sea plots of the abovementioned meteorological models and buoys measurements evidence wind sea wave heights of around 2 m at 5 s intervals.

The indicated wave height values fundamentally refer to the significant wave height. They correspond to the arithmetic average of the upper third of the wave heights in a given observation period. This means that a number of individual waves are always higher than the significant wave height. In rare cases, individual waves can exceed the significant wave height by 70% to 100%.

5.4 Radio records

For the investigation, BSU has evaluated audio tape recordings on VHF channels 5 (Neuwerk Radar), 10 (Tug Request), 18 (Scharhörn Radar) and 71 (VTS Cuxhaven Elbe Traffic) each from 20:00 h to 20:45 h.

According to these recordings, the Pilot of the VOLGO-BALT 209 had announced the crossing of the Elbe Fairway between the Elbe and the Weser at 20:10:40 h after the overtaking vessel CARMEN had passed the VOLGO-BALT 209 southward. At this point, according to Radar Pilot information, the next incoming vessel had been 3 sm west of the radar control, so that the intended manoeuvre should have succeeded. At 20:18:50 h the Radar Pilot informed the Pilot on the VOLGO-BALT 209 that it was situated at 100 m north of the radar line (green) and that all was clear without further incoming traffic. At 20:22:20 h the Radar Pilot recommended changing the course westward when the VOLGO-BALT 209 was at the starboard fairway edge of the buoy line. Immediately thereafter, at 20:22:50 h it was urgently recommended to steer westward because the vessel's position was now 200 m south of the buoy line. At 20:24:40 h and according to the Radar Pilot, the vessel's location was already 300 m south of the buoy line. Thereafter the VOLGO-BALT 209 was called several times by the Radar Pilot and asked to switch to VHF channel 5. At 20:34:20 h the VOLGO-BALT 209 was called by the Cuxhaven Elbe Traffic VTS. According to VTS records, with its draught of 3.90 m the VOLGO-BALT 209 would run aground. This was confirmed by the Pilot on board with the information an attempt would be made to get the ship clear by a "full astern manoeuvre". At 20:35:40 h the VOLGO-BALT 209 reported that no personal injuries or leakages had been found. According to VTS records, the position of the VOLGO-BALT 209 was said to have been 250 m south of the buoy line. At 20:39:00 h the VTS informed the remaining shipping over VHF channel 71 of the fact that the VOLGO-BALT 209 had run aground and was situated south of Buoys "3" and "5" approx. 250 m outside the fairway. At 20:44:50 h the VOLGO-BALT 209 requested tug assistance.

5.5 Track records

The following figure provided by the VTS of the Cuxhaven Waterways and Shipping Office shows records of all craft in the period of 20:00 h to 20:40 h with their times and the relevant positions and speeds. Using the process minutes together with the audio and radar recordings and the pilot waters and anchorage assignments on the Lower Elbe, the BSU was able to reconstruct the course of the accident.

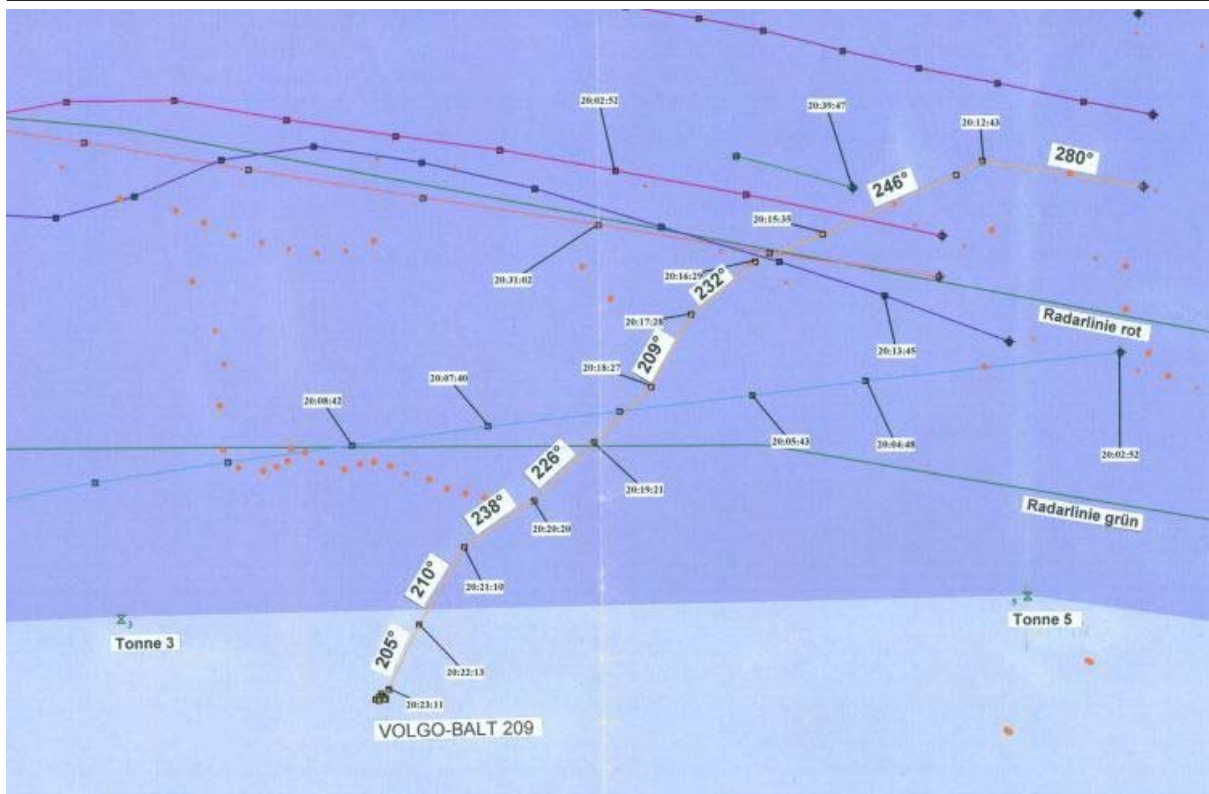


Figure 11: Track of the VOLGO-BALT 209

5.6 Piloting

The Pilot Act [*Gesetz über das Seelotswesen (SLG)*] and the Ordinance concerning Pilot Waters and their Limits (General Pilot Ordinance) (*Allgemeine Lotsverordnung*) constitute the foundation of the piloting profession in Germany. For each pilot area there are Pilot Brotherhoods whose Aldermen are represented in the Federal Pilot Chamber [*Bundeslotsenkammer*] and which are public service entities, corporations under public law. Sea Pilots assigned to a pilot area exercise their activity as self-employed non-commercial professionals. Sea pilots work under their own responsibility. In addition they are subject to compliance supervision of the Waterways and Shipping Directorates North and Northwest in accordance with the SLG. Accordingly the Federal Pilot Chamber is the sole official and mandatory contact point.

After an approximately one-year pilot training and in addition to his qualification to command ships of any size, every sea pilot has specialised local knowledge of his own area and his mission is to advise Masters in the manoeuvring of their vessels. This advisory service can also be performed from another ship or from a shore-based location. The Master remains responsible for the command of his ship even when he allows independent instructions from the sea pilot in regard to the operation of the vessel to be followed. In the event of damage caused to a vessel in the course of piloting activities, sea pilots are liable to the owner of the piloted vessel only if they are found to have acted intentionally or with gross negligence.

The Federal Association of Sea and Harbour Pilots (Bundesverband der See- und Hafenslotsen (BSHL)) and the Federal Pilots Chamber (Bundeslotsenkammer) participate in the organisation of the piloting business by the supervisory authorities of the Waterways and Shipping Directorates North and North-West as well as the Federal Ministry for Transport, Building and Urban Affairs. Essential components of this work are the initial and further training as well as the continuing education of sea pilots to ensure adequate coverage of rapid technological developments in maritime shipping and the navigability of pilot waters. The provisions of IMO Resolution A.960(23)⁴ provide a comprehensive framework to meet these needs.

Currently a framework further training plan is being developed for each Pilot Brotherhood to implement Convention A.960(23). For this purpose, courses on traffic safety services, accident management, statutory regulations, co-operation between pilots and bridge crews, navigation equipment, ship handling simulators, area specific changes, self-protection and first aid measures will be definitively defined within five years. On realisation of the training plan documents of several Pilot Brotherhoods describing their work method by quality management systems or in other handbooks are still missing. Furthermore financing has not yet been clarified.

5.6.1 Quality Management System (QMS)

The Pilot Brotherhoods Weser II / Jade and Elbe have a Quality Management System currently under development. The QMS refers exclusively to the area of applicability of sea piloting in the Federal Republic of Germany according to the SLG. This area of applicability also includes all harbour pilot areas not depending on the SLG but that are served by a Harbour Pilot Brotherhood (e.g. Hamburg and Bremerhaven).

The Quality Assurance Manual describes that the service is available 24 hours per day, 365 days per year. The service consists of the provision of qualified navigational advice to the ship's command combined with the contribution of area specific local knowledge and experience in the handling of ships of all types, dimensions and draughts by means of sea pilots.

The advisory service comprises segment piloting and manoeuvres in pilot waters, distance piloting between offshore stations of the German North Sea harbours as well as harbour piloting with and without tug assistance in all visibility and weather conditions. The service is offered in German and in English, and comprises all necessary piloting and other communication.

The procedures describe measures for specific scenarios, such as grounding, fatigue, risk analysis and safety evaluation. The pilots' training requirements are currently being determined together with the Aldermen, and a training plan is being developed that will incorporate internal and external training programs. Training is documented and defined in the procedures.

⁴ Recommendations on Training and Certification and on Operational Procedures for Maritime Pilots other than Deep-Sea Pilots

The “Grounding” procedure of the Elbe Pilot Brotherhood, for example, includes the following measures:

- Reduce speed
- Warn persons concerned (general alarm)
- Warn other traffic in the area of danger via VHF radio
- Report to the Vessel Traffic Service (VTS)
- Set/emit visual / sound signals according to SeeSchStrO [*Seeschiffahrtsstraßen-Ordnung*, Maritime Waterways Regulations] and KVR [*Kollisionsverhütungsregeln*, Collision Prevention Regulations].
- Report damage assessment to VTS
- Request radar advice
- Switch to radar channel / standby on traffic channel
- Determine how to get clear
- Report to the Emergency Station of the Elbe Pilot Brotherhood
- Clear transverse thruster for operation, if available
- If applicable, request tugs in consultation with Master
- Co-ordinate tug operation
- Continue voyage following consultation with VTS

Documented Quality Management and procedure descriptions such as risk analysis and safety evaluation provide the Pilot Brotherhoods with tools that help evaluate and potentially reduce the risks of casualty and dangerous events. At the Elbe Pilot Brotherhood the Alderman defines the problems to be examined and, whenever possible, determines the relevant limitations, such as implementation and costs, in advance. Thereafter, the Quality and Safety Standards Committee is entrusted with carrying out the “Formal Safety Assessment”. The method is structured into the identification of perils, risk evaluation, risk management options, cost/benefit evaluation and decision-making recommendations. Expert assessments, modelling and simulations are additional tools used.

The result of the procedure is a completion report containing a listing of the final recommendations, of the risks and dangers, information about data models and methods used, a description of the causes and the scope of prominent safety jeopardising factors of influence during the evaluation or in the recommendations as well as an overview of the structure of the team and the qualifications of those of its members who participated in the evaluation.

5.6.2 Pilot areas Kiel Canal, Elbe and Weser

For its voyage to Bremen, the VOLGO-BALT 209 would have had to pass five German sea pilot areas. For the stretch from the Elbe approach to the Weser approach the Master had requested distance piloting provided by the Weser II / Jade Pilot Brotherhood.

Because of the weather situation, the offshore Elbe Approach Buoy pilot transfer station was moved further inshore, and the Distance Pilot already came on board at Cuxhaven. The pilot exchange between the Brotherhoods took place between Buoys "8" and "10". According to § 16 of their respective regulations concerning the Administration and Organisation of the Sea Pilot Areas, the Sea Pilots of both Brotherhoods are entitled to pilot vessels outside of their own sea piloting area between the outer stations of the relevant position of the Pilot Boat.

Shallow-draught vessels leaving the Elbe, such as the VOLGO-BALT 209, when on the way from the Elbe to the Weser frequently already cross the Elbe Fairway in the area of Beacon "B" to Buoy "1" and travel south of the green buoy line. This is primarily intended to achieve an uncomplicated crossing of the incoming and outgoing Elbe traffic. The pilot communicates via a handheld VHF radio with all channels required in the pilot area and is equipped with actual soundings and situation reports as well as with the "Pilot Card" which provides the characteristics of the vessel to be piloted. Sea charts are not normally carried or used. From the perspective of the Weser II / Jade and Elbe Brotherhoods there is currently no need for action in regard to improving the piloting of traffic between Elbe and Weser and vice versa.

6 Analysis

The track records of the Cuxhaven Vessel Traffic Service (cf. Fig. 11) show that the VOLGO-BALT 209 started crossing the fairway after passing Buoy “6” at 20:12 h. Until 20:23 h, shortly before running aground, it travelled courses over the ground (COG) varying between 280° and 205°.⁵

After evaluation of the currents and wind effects, within the Elbe fairway northerly winds of force 8 Bft would generate a current setting westward (272°) at 2.3 kn. The average course through the water (CTW) would then be 212° at an average speed through the water (STW) of 8 kn.

The high standard deviation of 16° (cf. footnote) is due to the unstable course characteristics of the VOLGO-BALT 209. An aggravating factor were the crossing wind seas with 2 m wave heights at 5 s intervals. The exact reason for the unstable course could not be definitively determined. The Helmsman did not carry out the helm commands directly following the Pilot’s instructions, but only after the Master had translated them from English into Russian. This could potentially also have led to communication difficulties between the Pilot, the Master, the Watch Officer and the Helmsman. Out of the bridge personnel, only the Master was able to communicate with the Pilot. The Watch Officer verified the course made good by means of GPS position entries on the sea chart, and warned of the proximity of shallow waters. After crossing the southern buoy line it was however no longer possible to alter the average COG from 224° to 270°.

Upon review of the Russian sea charts used it became apparent that the relevant Chart, No. 49 (INT 1463 “Jade, Weser and Elbe Estuaries” at a scale of 1:100.000), which provides a better overview of the Elbe and Weser area, was missing. Although charts of the largest available scale (1:50.000) were used, it is however easy to lose the overall perspective when changing over from Chart 44 (INT 1452 “Elbe Estuary”) to Chart 2 (INT 1456 “Jade and Weser Estuaries”) because of the Cuxhaven Harbour map inset on Chart 44.

When looking at the BSH Chart catalogue, on the charts at the largest scale the Elbe Pilots’ transfer position is shown on the edges of Charts 2, 3 and 44 (cf. Fig. 12). Only on Chart 49 is the Elbe Pilot Transfer position shown centrally, providing a connected overview between Elbe and Weser and vice versa. Use of the largest chart scales available can therefore easily lead to irritation when planning the voyage and to errors when transferring the vessel’s position onto the new chart.

A carry-over of the position of chart 44 to chart 2 would also have been possible without chart 49 between the buoys “5” and “3” of the Elbe fairway. An extension of the map sheet division of chart 2 in a northward direction would result in an improved chart image for this area. This would for technical reasons lead to a reduction of the map sheet division in a southward direction. An alteration of only 1 minute would

⁵ The average COG was 224° and the average speed 9 kn speed over ground (SOG) with a standard deviation of 16° and 68% probability.

correspond to 4 cm at the present scale. The effect of such reduction must be evaluated in view of the requirements of safe navigation. On the occasion of the next edition the Federal Maritime and Hydrographic Agency (BSH) reviews the facts again. Basically it is to be noted, that the problem of different scales and overlapping map sheet divisions in the printed chart catalogue cannot be resolved completely satisfactory. Only an electronic chart system like ECDIS, which works without map sheet divisions and is scalable, can find a remedy.

Sailing between the Elbe and Weser River nearby the shore does not belong to the usual passages of merchant shipping, since the changability of the topography of the Wattenmeer can be counteracted appropriately, in accordance with good seamanship, by northerly routes in the main fairway. This explains why for this passage no detailed recommendations are given in the relevant sailing directory of the BSH. The BSH will check the inclusion of a pertinent notice concerning the topography.

According to information received from the Pilot, the VOLGO-BALT 209 was running "full ahead". At times, speeds of 14 kn were reached, so that it was not possible further to improve steerage by increasing speed. The voyage was doomed once the southern buoy line was crossed. According to the Pilot's statements, it was planned to pass on the port side of the buoys. Although this would have reduced the risk of encountering shallow waters, it would have transgressed traffic regulations because the wrong side of the fairway would have been used. In addition and in any event both the Vessel Traffic Service and the Radar Pilot should have been informed of this decision. According to the radio and track records at the VTS it had to be assumed that the course would run outside the buoy line on the starboard side of the fairway. It should also be remembered that between the line running from Buoy 3 to Buoy 5 and the 5 m depth line there are only one to two cable lengths [1 cable = 185.2 m] available to perform a relatively significant course change such as that from approx. 200° to 270°. Thus there was a high risk of grounding in the event of failure of the first attempt to change course.

The Elbe Pilot Brotherhood has a risk evaluation procedure in its Quality Management System. This would provide a tool to identify weaknesses in the crossing of the fairway from the Elbe to the Weser. In regard to this particular casualty however the Elbe and Weser II / Jade Pilot Brotherhoods saw no need for action. It is only pointed out that, draught permitting, the fairway in the direction of Bremerhaven is often crossed already before the Elbe Approach Buoy.

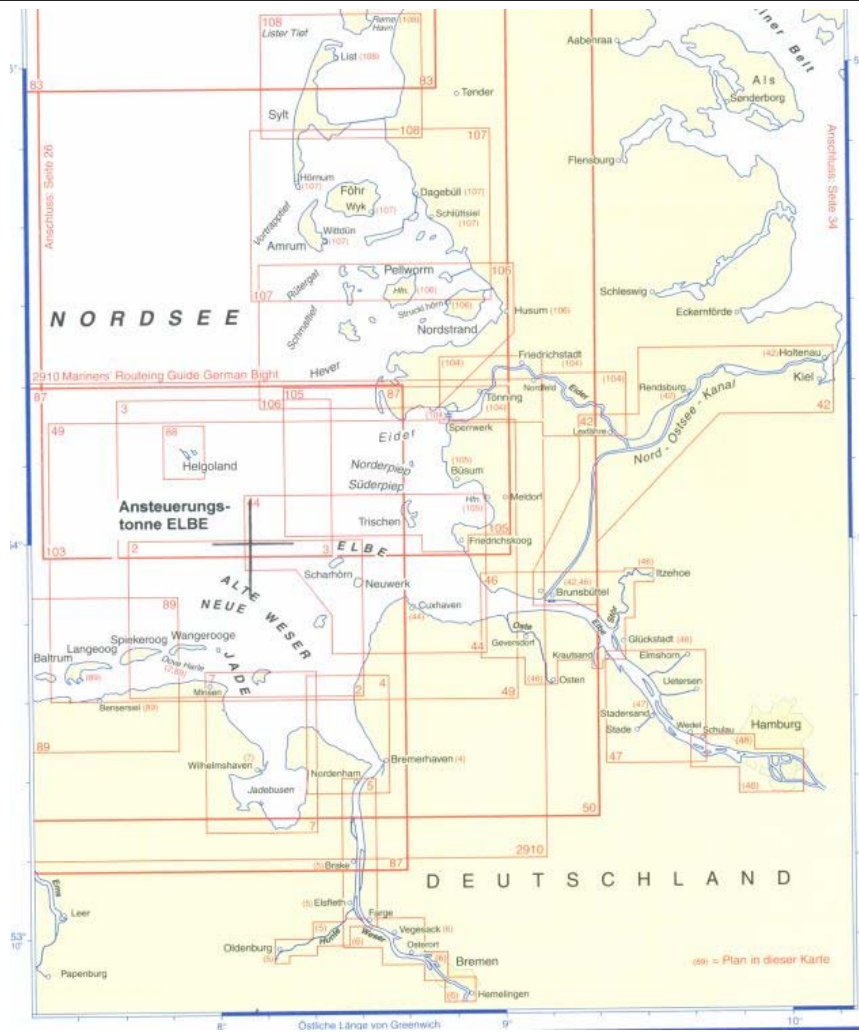


Figure 12: BSH Catalogue Charts and Books

7 Safety recommendations

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

Pursuant to the International Convention for the Safety of Life at Sea (SOLAS) Chapter V Rule 14, the Federal Bureau for Maritime Casualty Investigation recommends that owners, operators and ship commands ensure that English can be used as the working language for communication between pilots and the members of the bridge watch if there is no other common language available for the immediate and direct exchange of information. Prior translation can lead to crucial delays and misunderstandings with time critical commands. In this connection, reference is also made to standard IMO expressions such as e.g. helm orders. All helm orders given should be repeated by the helmsman, and the watch officer should ensure that they are properly and immediately carried out. The helmsman must immediately report if the vessel does not respond to the helm.

The BSU recommends that the Federal Maritime and Hydrographic Agency [*Bundesamt für Seeschifffahrt und Hydrographie (BSH)*] as the original publisher of the international charts for the German sea areas pursuant to SOLAS Chapter V Rule 9, revise the sheet divisions of the charts in the area of the Elbe Approach Buoy from the perspective of safe ship handling requirements. On the charts with the largest published scales the pilot transfer positions, which are the central approach point for ship commands, are usually shown on the edge of the charts. This can lead to irritation when carrying over the vessel's position from one chart to the next, as well as to confusion in voyage planning. According to the Watch Standards (STCW 95 Chapter VIII), the largest scale chart on board must be used. It must be appropriate for the area and contain the latest available information.

The Federal Bureau of Maritime Casualty Investigation recommends the Federal Ministry of Transport, Building and Urban Affairs and the Waterways and Shipping Directorate North and Northwest to jointly devise a financing conception with the Federal Pilots Chamber and the Federal Association of Sea and Harbour Pilots for the rapid implementation of the IMO-Resolution A.960(23). This shall ensure the availability of formal aids by quality management systems so that advanced training of the pilots is provided, advanced training facilities are fostered and risk analysis can be better executed. It is also pointed out that it is possible to apply for research grants from the Federal Ministry of the Economics and Technology [*Bundesministerium für Wirtschaft und Technologie (BMWi)*], in particular for the improvement of ship handling simulators.

The BSU recommends that the Waterways and Shipping Directorate North, in close cooperation with the Waterways and Shipping Office Cuxhaven, review and document traffic conditions in respect to the danger of collision and grounding of vessels crossing the fairway on the way from the Elbe to the Weser already between Elbe Buoys "9" and "1". This investigation should result, if necessary, in specific instructions to be provided to the Vessel Traffic Service to help ensure optimal maritime traffic safety.

8 Sources

- Findings of the Cuxhaven Waterway Police [*Wasserschutzpolizei* (WSP)]
- Statements/Opinions/Hearings
 - Master
 - Third Mate
 - Pilot
 - RMRS (Russian Maritime Register of Shipping) inspection report
 - BSU on-board inspection
- Technical / Statutory information
 - Excerpt for the Quality and Safety Management Handbook, Elbe Pilot Brotherhood
 - Excerpt from the Quality Assurance Handbook – Guidelines for Processes and Procedures, Weser II / Jade Pilot Brotherhood
 - Sea Pilot Regulations Outside Pilot Areas
 - Excerpt from the Pilot Act [*Gesetz über das Seelotswesen* (SLG)]
 - Excerpt from ship handling regulations, navigable maritime waterways and distances as well as pilot service information
- Charts and book published by the Federal Maritime and Hydrographic Agency [*Bundesamt für Seeschifffahrt und Hydrographie* (BSH)]
 - Detail of Chart 44 (INT 1452) Elbe Estuary
 - Detail of Chart 2 (INT 1456) Jade and Weser Estuaries
 - Detail of 2347, German Bight Currents
 - Detail of 2348, Coastal Tidal Currents in German Bight
 - Detail of 2452, Catalogue of Charts and Books
- Official expert opinion from Germany's National Meteorological Service [*Deutscher Wetterdienst* (DWD)], Maritime Shipping Division
- Maritime Safety Services / Vessel Traffic Service (VTS)
 - Video and sound recordings of the Cuxhaven WSA Vessel Traffic Service
 - Track and radar records
 - Transcript of radio communications on Channels 71, 18, 5, 10
 - Record of the course of events
- Supporting documentation
 - Excerpt from the ship's log
 - Pilot request from UCA, United Canal Agency GmbH, Kiel
- Photographs:
 - Vessel photograph – Transonega Shipping
 - Chart, VOLGO-BALT 209, BSU
 - Damage to aft underwater section, Russian Maritime Register of Shipping (RMRS)
 - Bridge of the VOLGO-BALT 209, BSU