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

Investigation Report 58/14

Less Serious Marine Casualty

Collision between the JADE and MV WILSON FEDJE on 5 March 2014 in the port of Hamburg

8 September 2016

www.bsu-bund.de

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, amended most recently by Article 22 of 24 May 2016, BGBl. (Federal Law Gazette) I p. 1217.

According to said Law, the sole objective of this investigation is to prevent future accidents and malfunctions. This investigation does not serve to ascertain fault, liability or claims (Article 9(2) SUG).

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

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

Issued by:
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1 Summary

At about **0802**[1] on 5 March 2014, the Barbados-registered cargo ship WILSON FEDJE collided with the German-flagged inland motor vessel JADE in extremely dense fog with visibility of significantly less than 100 metres in places on the northern edge of the northern Elbe main fairway in the port of Hamburg level with the Seemannshöft pilot station.

The WILSON FEDJE had sailed in ballast from Rotterdam and was proceeding to her berth in the port of Hamburg under pilotage and shore-based radar guidance at the time of the accident. The large container ship XIN LOS ANGELES was sailing about 1 nm ahead of the WILSON FEDJE, also heading for Hamburg.

For her part, the fully laden JADE, carrying approximately 1,000 tonnes of soybean meal, left the port of Hamburg (Rethe-Hafen port) for Beidenfleth[2] at 0700. After sailing out of the Köhlbrand secondary fairway, she proceeded downstream on the northern side of the northern Elbe main fairway in accordance with requirements. This vessel did not make use of any pilotage whatsoever.[3]

There was radio contact between the WILSON FEDJE's port pilot and skipper of the inland motor vessel ALMERODE about nine minutes before the collision. The ALMERODE was approaching from the east and intended to turn from the northern Elbe main fairway into the Köhlfleet secondary fairway, which branched off to the south of her current position, after the passage of the XIN LOS ANGELES and preferably before the passage of the WILSON FEDJE. The WILSON FEDJE's pilot agreed to this request. A green-green encounter[4] was agreed upon and corresponding information sent to the radar pilot, who had no objection given the general traffic situation but advised the two vessels about a vessel following the ALMERODE, i.e. also sailing downstream on the River Elbe. It later transpired that this was the JADE.

To implement the green-green encounter agreed with the ALMERODE, the WILSON FEDJE's pilot started to steer the ship into the northern part of the fairway at about 0755. At 0756, he notified shipping of this course alteration and the intention to return to the southern side of the fairway after passing the ALMERODE on VHF channel 74.

[1] All times shown in this report are local (CET (or UTC + 1 hour)).
[2] Beidenfleth: Small inland waterway vessel port on the River Stör (a tributary on the right of the River Elbe in Schleswig-Holstein).
[3] Note: A corresponding requirement did not exist for the inland waterway vessel.
[4] Note: Based on the green navigational lights to starboard, green-green is a nautical euphemism for vessels passing to their respective starboard side. Depending on the situation, this is permissible under certain circumstances and thus derogates from the rule laid down in the COLREGs and national regulations that vessels on head-on courses are required to pass each other on the port side (i.e. red-red).

In the ensuing period, the WILSON FEDJE's pilot notified shipping of the position and destination of his ship several more times on channel 74. There was no communication with the vessel following the ALMERODE (the JADE), the name of which was still unknown to both the WILSON FEDJE's pilot and the radar pilot.

The WILSON FEDJE's pilot decided not to continue with his plan to return to the southern part of the fairway immediately after the green-green passage with the ALMERODE. On the one hand, he wanted to avoid crossing the heading line of the still anonymous oncoming JADE, which was approaching on the starboard side of the WILSON FEDJE. On the other hand, given the prevailing situation he assumed that the JADE would maintain her course even without a clear arrangement and that a green-green encounter of the two vessels would thus unfold without any complications.

The skipper of the JADE had apparently not followed the preceding communication concerning the intentions of the WILSON FEDJE on channel 74, however. Consequently, he believed that the approach with the oncoming WILSON FEDJE, which in his opinion was quite clearly on the 'wrong' side of the fairway, was not a readily manageable green-green encounter without complications, but reportedly feared that the WILSON FEDJE was on a collision course. To avoid a collision, the skipper of the JADE initiated a rigorous course alteration to starboard. By this time, the two vessels were already so close to each other that it was too late for a corresponding course alteration to starboard by the WILSON FEDJE. Despite the stop and subsequent full astern manoeuvre initiated on the bridge of the WILSON FEDJE immediately after the JADE's course alteration to starboard was recognised, the two vessels collided at 0802.

The WILSON FEDJE's bulbous bow ploughed into the port side of the JADE at an angle of about 90 degrees. The WILSON FEDJE parted from the JADE by moving astern shortly afterwards. The skipper of the JADE managed to manoeuvre the inland waterway vessel to the northern embankment of the northern Elbe under her own steam, where he deliberately grounded her. It was thus possible to prevent the JADE, which had sustained heavy water ingress as a result of the collision, from foundering. After reporting the accident to the vessel traffic centre (Hamburg Port Traffic), several unsuccessful attempts at contacting the JADE, and looking out for but not finding any crew members of the JADE overboard, the WILSON FEDJE, which only suffered very minor damage due to the collision, continued her journey toward her berth.

The JADE was lightened and her buoyancy temporarily restored in the days that followed. The inland waterway vessel was then towed to the Jöhnk-Werft shipyard in Hamburg-Harburg, where she was scrapped because a repair would not have been economically viable.

The accident did not result in any injuries, nor did it harm the environment.

2 FACTUAL INFORMATION

2.1 Photo of the MV WILSON FEDJE

Figure 1: Photo of the WILSON FEDJE

2.2 Ship particulars: MV WILSON FEDJE

Name of ship:	WILSON FEDJE
Type of ship:	General cargo/multi-purpose carrier
Nationality/Flag:	Barbados
Port of registry:	Bridgetown
IMO number:	9491757
Call sign:	8PAH4
Owner:	WILSON SHIPOWNING AS, Norway
Year built:	2012
Shipyard:	Shandong Baibuting Shipbuilding Co. Ltd, Rongcheng, China
Classification society:	DNV GL
Length overall:	89.93 m
Breadth overall:	15.0 m
Gross tonnage:	3,561
Deadweight:	4,501 t
Draught (max.):	5.80 m
Engine rating:	2,040 kW
Main engine:	WÄRTSILÄ 6L26 four-stroke diesel engine
(Service) speed (max.):	12.8 kts
Hull material:	Steel
Minimum safe manning:	7

2.3 Voyage particulars: MV WILSON FEDJE

Port of departure:	Rotterdam, the Netherlands
Port of call:	Hamburg, Germany
Type of voyage:	Merchant shipping, international

Cargo information:	In ballast
Draught at time of accident:	4.1 m
Manning:	8
Pilot on board:	Yes
Number of passengers:	None

2.4 Photo of the JADE

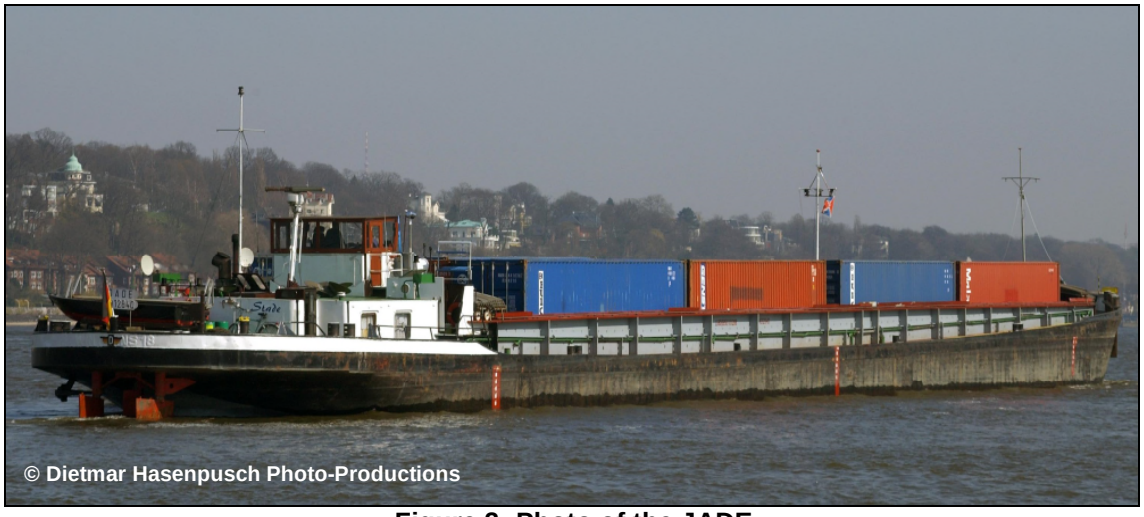

Figure 2: Photo of the JADE

2.5 Ship particulars: JADE

Name of ship:	JADE
Type of ship:	Inland motor vessel/motor cargo vessel
Nationality/Flag:	Germany
Port of registry:	Stade
IMO number:	None
Call sign:	DA 3611
Owner:	BKS Binnenschifffahrtskontor Sommerfeld GmbH, Buxtehude
Year built:	1958
Shipyard/Yard number:	Deutsche Industriewerke, Berlin-Spandau
Navigability licence:	Zentralstelle Schiffsuntersuchungskommission (inspection body for inland waterway vessels), navigability licence number EM-825; inspection body Emden
Length overall:	79.94 m
Breadth overall:	9.50 m
Deadweight:	1,408 t
Draught (max.):	2.80 m
Engine rating:	736 kW
Hull material:	Steel
Manning:	2

2.6 Voyage particulars: JADE

Port of departure:	Hamburg, Germany
Port of call:	Beidenfleth, Germany
Type of voyage:	Merchant shipping (inland water transport), national
Cargo information:	Soybean meal
Draught at time of accident:	No details
Manning:	2
Pilot on board:	-
Number of passengers:	None

2.7 Marine casualty information

Type of accident:	Less serious marine casualty[5], collision
Date, time:	05/03/2014, 0802
Location:	Elbe, Hamburg
Latitude/Longitude:	φ 53°32.6'N λ 009°52.8'E
Ship operation and voyage segment:	Harbour mode
Consequences:	Minor material damage to the WILSON FEDJE; heavy damage to the JADE; no physical injuries or damage to the environment

Extract from Nautical Chart No 48 (INT 1455; River Elbe from Schulau to Hamburg), BSH[6]

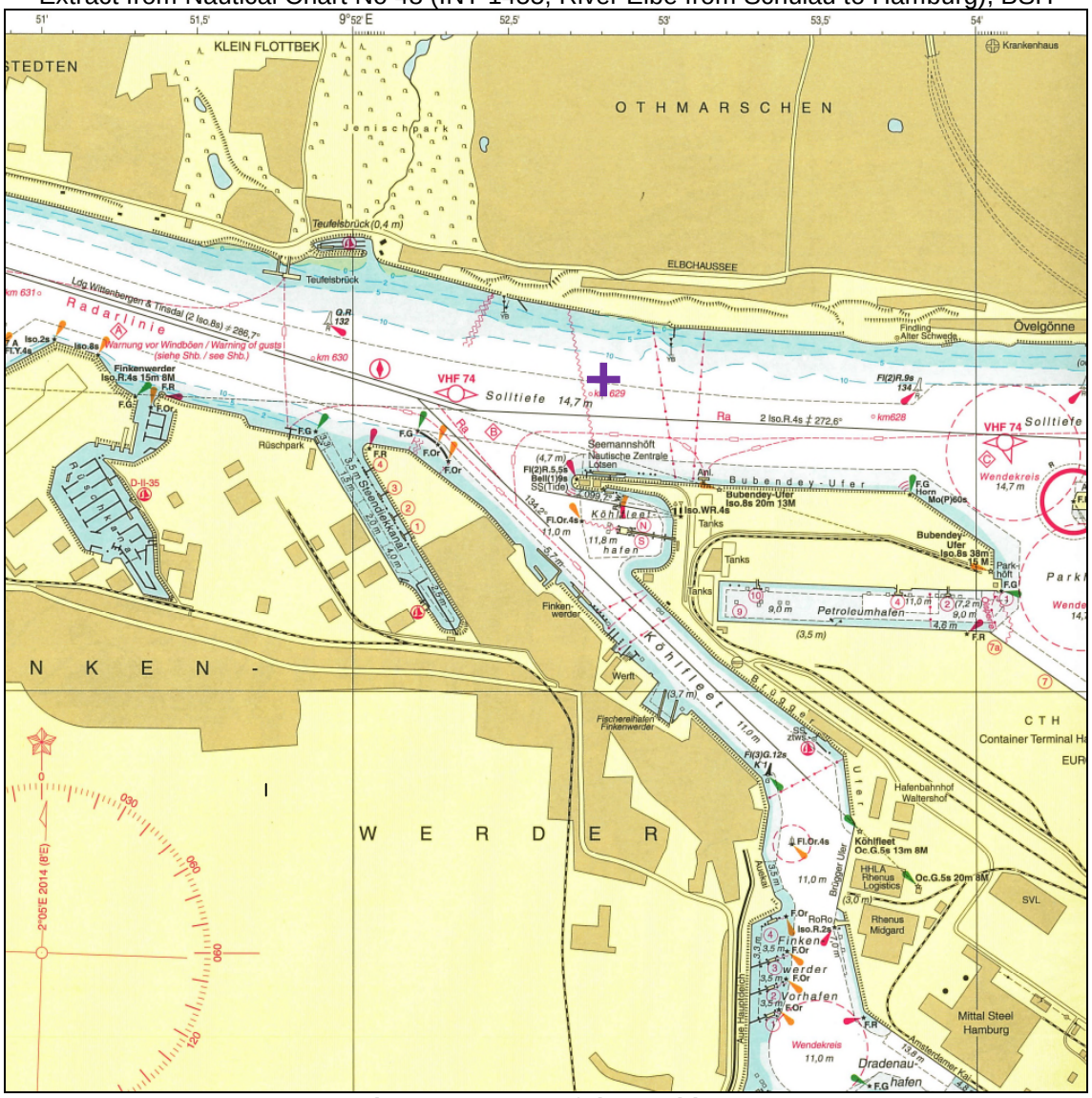

Figure 3: Scene of the accident

[5] Note: Classification as a less serious marine casualty is due to the fact that the damage to the seagoing ship involved and insofar relevant was only very minor.
[6] BSH: Federal Maritime and Hydrographic Agency.

2.8 Shore authority involvement and emergency response

Agencies involved:	Hamburg Port Traffic, Waterway Police (WSP) Hamburg, Hamburg fire service
Resources used:	Patrol boats ELBE 35 and ELBE 2, tug BUGSIER 14, pilot boat LOTSE 3, fireboat OBERBRANDMEISTER REPSOLD, service launch HAFENKAPITÄN, pusher and dive boat ALINA TF1
Actions taken:	JADE deliberately grounded on the northern bank of the River Elbe by her skipper; scene of the accident secured by the above vessels; inspection of the JADE's engine room for water ingress and pollutant discharge
Results achieved:	The WILSON FEDJE remains fully seaworthy after the collision; the heavily damaged JADE is lightened on the bank of the River Elbe, made temporarily buoyant, towed to the Jöhnk-Werft shipyard (Hamburg-Harburg) on 9 March 2014, and scrapped there

3 COURSE OF THE ACCIDENT AND INVESTIGATION

3.1 Course of the accident

3.1.1 Events prior to the collision

3.1.1.1 Course of the WILSON FEDJE's voyage

The WILSON FEDJE was sailing on the River Elbe in ballast from Rotterdam toward Hamburg on the day of the accident. While in harbour mode, visibility gradually deteriorated to values of considerably less than 100 metres due to fog.

The WILSON FEDJE reached Tinsdal on the western boundary of the port of Hamburg at about **0726**. The Elbe pilot registered the ship and her intended berth (Kalikai) with Hamburg Port Traffic in due form on VHF channel 14[7]. He then informed shipping on the current position of the ship and her (interim) destination, Köhlbrand, on the VHF channel (74[8]) stipulated in the port of Hamburg for mandatory position reports and direct communication with other vessels.[9]

The port pilot boarded at about **0745** and took charge of piloting the ship from about **0750** onwards after a brief exchange of information with the Elbe pilot and a briefing from the master of the ship. The reduction in the WILSON FEDJE's speed from 11 to about 6.5 kts due to the pilot transfer was subsequently increased to an average of 8.5 kts.

After the Elbe pilot disembarked, the master of the ship and – after a corresponding request by the pilot – a rating on watch were subsequently on the bridge in addition to the port pilot (referred to below in abbreviated form as 'pilot'). The ship, equipped with a left-hand controllable pitch propeller, a conventional rudder, and a bow thruster, continued her voyage on autopilot after the pilot transfer.

[7] VHF channel 14 is the predominantly authoritative radio channel in the port of Hamburg for communication between vessels on one hand and Hamburg Port Traffic, on the other. In particular, it is used for the registration of ships reaching the port boundary and leaving berth. Channel 14 operates in simplex, i.e. the same frequency is used for transmitting and receiving.

[8] Note: Pursuant to Article 8 of the Regulation on traffic in the port of Hamburg and on other waters (Hafenverkehrsordnung - HVO), ships designated by the Hamburg Port Authority as seagoing and inland waterway vessels equipped with VHF are required to send position reports in German upon entry and departure, as well as when shifting within the port. These reports, containing information on the name and heading, must be made on VHF channel 74 and encompass casting off in the port of Hamburg, leaving a dock or fairway, crossing a fairway, and passing fixed points marked in the nautical chart within the port of Hamburg. Channel 74 operates in simplex, i.e. the same frequency is used for transmitting and receiving, and is intended for ship-ship and ship-shore communication.

[9] Note: This and all other radio communication between the parties involved was carried out in German. Source: Audio recordings of the WILSON FEDJE's VDR and Hamburg Port Traffic.

Both radar units were in operation on the bridge. According to information given by the ship's command, the port radar unit (S-band) operated at a range of 0.5 nm. The pilot used the starboard radar unit (X-band). The WILSON FEDJE's VDR[10] recorded images (which constituted an important source of information during the reconstruction of the accident) from this device. An analysis of the images revealed that the X-band radar was switched from a range of 1.5 to 0.75 nm at **0747** (see **Figs. 4 f**). Similar to the display mode on the nautical chart, the display mode was set to north up, relative motion throughout the period under consideration.

On **Fig. 4**, which shows the traffic situation from the radar perspective of the WILSON FEDJE at **0747**, i.e. just before the pilot transfer, the radar echo of the large container ship XIN LOS ANGELES is visible ahead at a distance of about 0.8 nm.[11] This vessel was also sailing upstream on the River Elbe to her berth in the port of Hamburg with tug assistance at a speed of about 6 kts. The echo of the XIN LOS ANGELES inevitably disappeared from the radar image initially after the radar unit's range was switched to 0.75 nm (see **Fig. 5**).

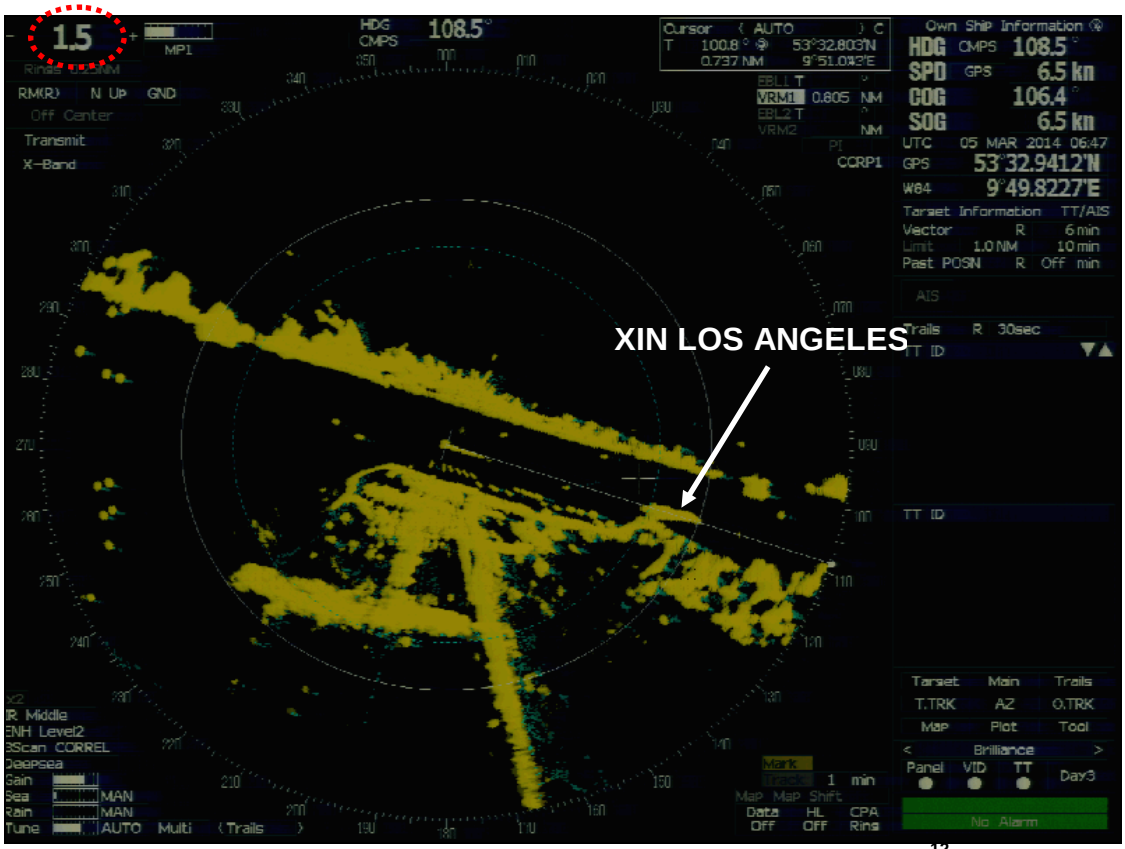

Figure 4: WILSON FEDJE's radar image (X-band) at 0747 (1)[12]

[10] VDR: Voyage data recorder.

[11] Note: It was possible to identify the XIN LOS ANGELES by name as the source of the echo unequivocally by making a comparison with the AIS recordings referred to during the investigation of Hamburg Port Traffic.

[12] Source here and below: WILSON FEDJE's VDR; in accordance with its functionality, the VDR stores radar images at 15-second intervals (labels and markings by the author of this report).

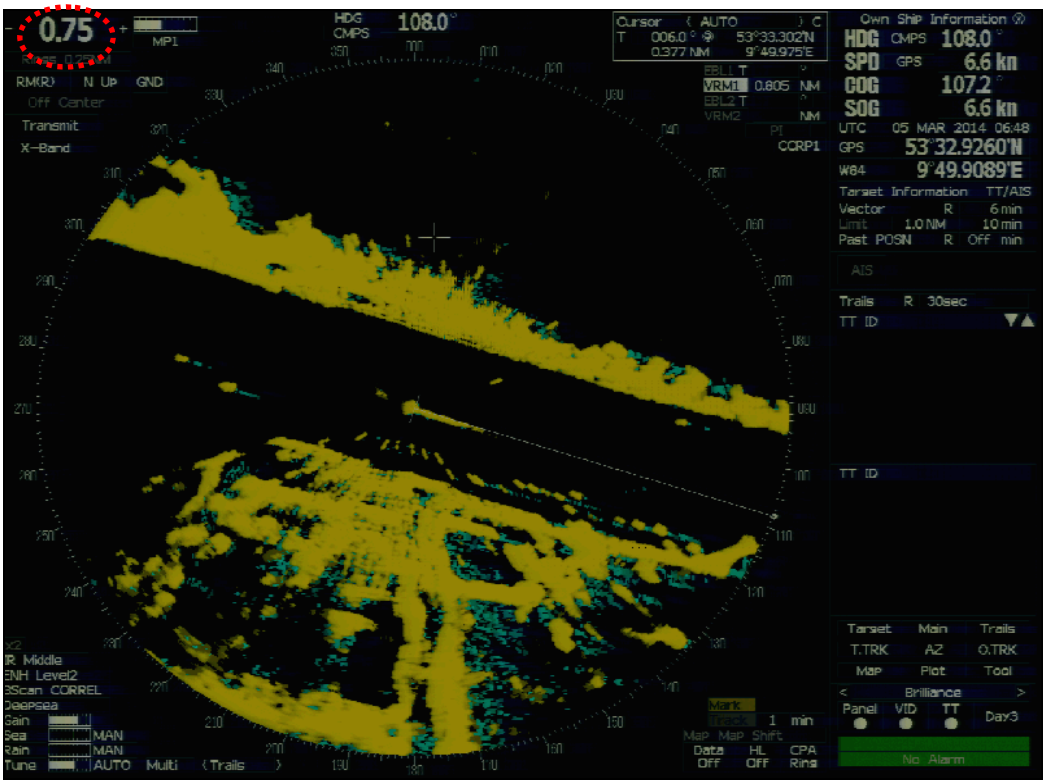

Figure 5: WILSON FEDJE's radar image (X-band) at 0747 (2)
(after the range was altered)

The two VHF units on the bridge of the WILSON FEDJE were primarily set to the channel stipulated for the port of Hamburg, 74 (general reporting channel), and – after the WILSON FEDJE had registered for shore-based radar guidance[13] – to the channel of relevance within the section in question, 19[14].

At about **0753**, the WILSON FEDJE's pilot notified shipping and Hamburg Port Traffic of the current position of the ship (Finkenwerder Pfähle East) and further course of the voyage on channel 74: *"Continuing to Köhlbrand."*

Immediately afterwards, the WILSON FEDJE received a call on the same VHF channel from the ALMERODE, which had also registered for shore-based radar guidance. This German inland tanker of some 95 metres in length was drifting in a waiting position in the middle of the northern half of the northern Elbe main fairway east of where the main fairway branches toward Köhlfleet at this point.

[13] Shore-based radar guidance (service of the Pilots' Association): At Hamburg Port Traffic, several pilots (referred to in each case in abbreviated form as 'radar pilot' in this report) work at special radar workstations and are tasked with monitoring certain defined sections and transmitting specific advice in the interest of safe navigation to fellow pilots on board registered for guidance or to registered exempt vessels (vessels exempt from the obligation to engage a pilot) on a VHF channel assigned to the particular section during poor visibility.

[14] Note: Ship-shore channel; operates in duplex, i.e. two different frequencies are used for transmitting and receiving. The transmission frequency of the ship station(s) corresponds with the reception frequency of the coastal radio station, and vice versa. Consequently, direct ship-ship communication is technically impossible on this channel.

The ALMERODE basically asked the WILSON FEDJE if it would be possible to turn into the Köhlfleet after the passage of the XIN LOS ANGELES (also registered for shore-based radar guidance on channel 19) but before the WILSON FEDJE. The WILSON FEDJE's pilot readily agreed to the ALMERODE's request and stated that the WILSON FEDJE would therefore move further to the north. Consequently, it was planned that the two vessels would encounter on their respective starboard sides (i.e. a green-green passage).[15]

Fig. 6 below was extracted from Hamburg Port Traffic's radar/AIS[16] recording and shows the positions of the ALMERODE, heading for Köhlfleet, and the XIN LOS ANGELES, sailing toward Köhlbrand, shortly before the WILSON FEDJE and ALMERODE liaised with each other, as already discussed above. The JADE's radar echo can now be seen on the right edge of the recorded image. The WILSON FEDJE was still outside and to the left of the section shown about 1.4 nm west of the ALMERODE and about 0.8 nm west of XIN LOS ANGELES at the time in question.

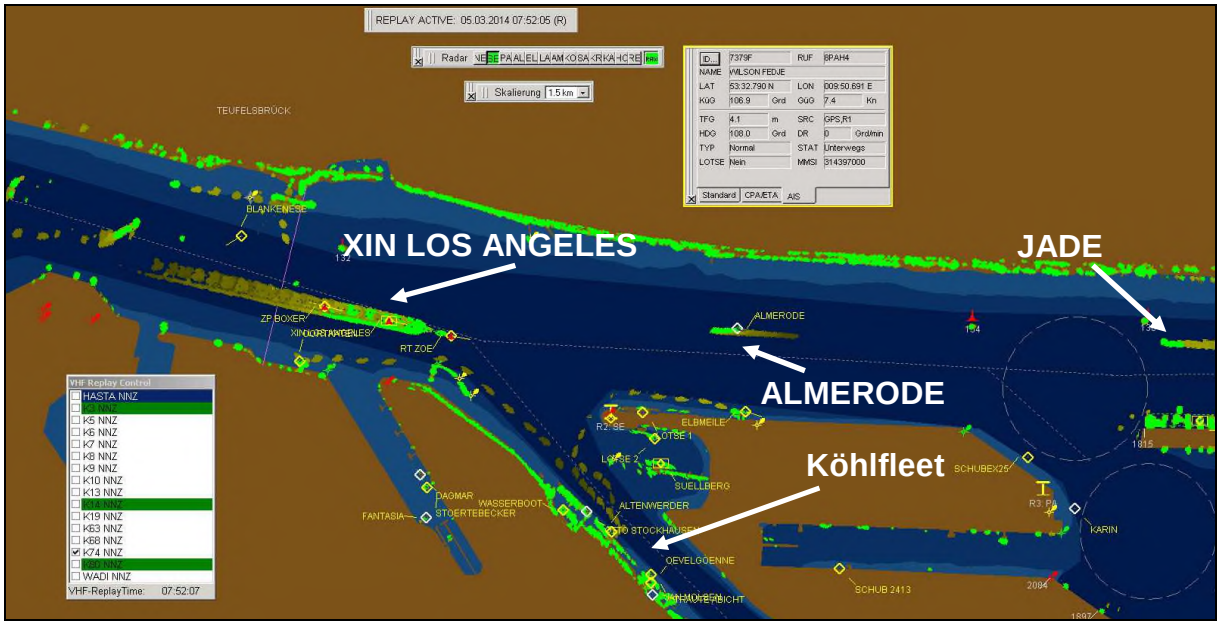

Figure 6: Radar/AIS recording from Hamburg Port Traffic (0752)

At **0754**, the WILSON FEDJE's pilot shifted the position of his ship about 0.4 nm to the left on the screen of the starboard radar unit, which he was operating, i.e. to the west. Due to the now off-centred display of his ship's position,

[15] Note: The ALMERODE had already made contact with the Elbe pilot on the WILSON FEDJE once at 0747 (in accordance with an earlier recommendation from the radar pilot) on channel 74 to liaise on the turn into the Köhlfleet with him. The Elbe pilot suggested in this regard that they wait until the imminent pilot transfer was finished on the bridge of the WILSON FEDJE. The ALMERODE was in agreement with this.

[16] AIS: Automatic identification system. All ships equipped with this system transmit GPS-based data, including position, course, speed, as well as possibly other information, at a standardised interval on VHF. These data can be displayed by the receiver on a monitor or superimposed on an electronic chart system or possibly a radar image, for example. Moreover, an increasing number of sea marks and coastal radio stations are being equipped with AIS transponders and/or receivers.

the pilot was able to see about 1.2 nm ahead without changing the 0.75-nm range setting on the radar. Consequently, the echo of the large container ship XIN LOS ANGELES, sailing ahead, was now completely visible on the radar screen and that of the ALMERODE, in a waiting position, had appeared on it for the first time (see **Figs. 7 f.**).

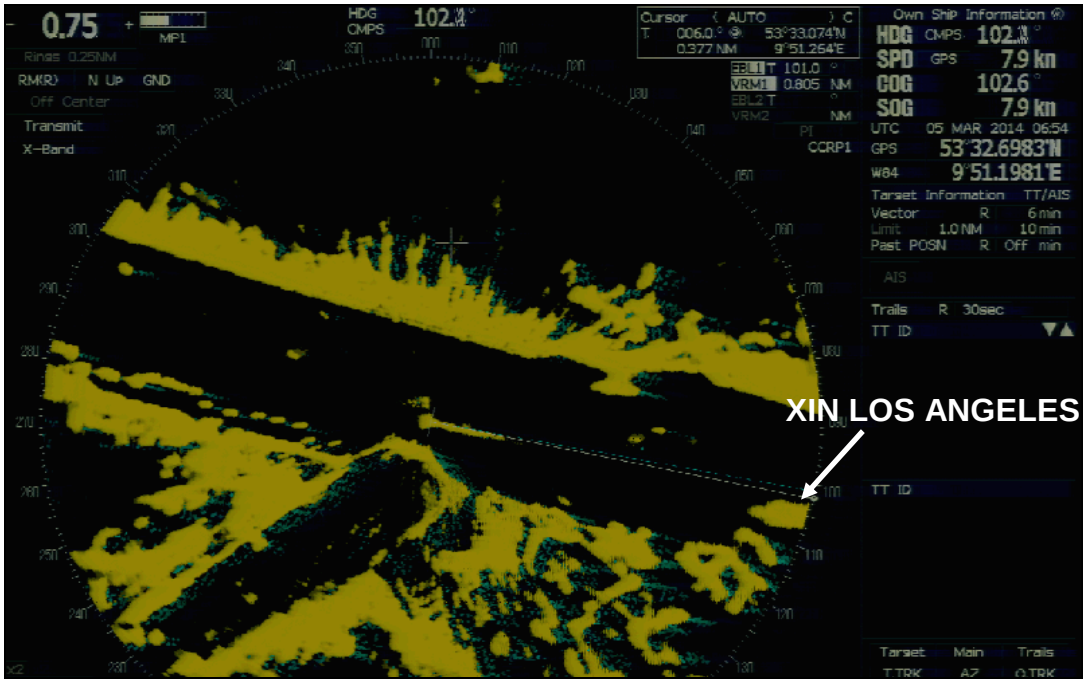

Figure 7: Extract from the WILSON FEDJE's radar image (X-band) at 0754 (1)

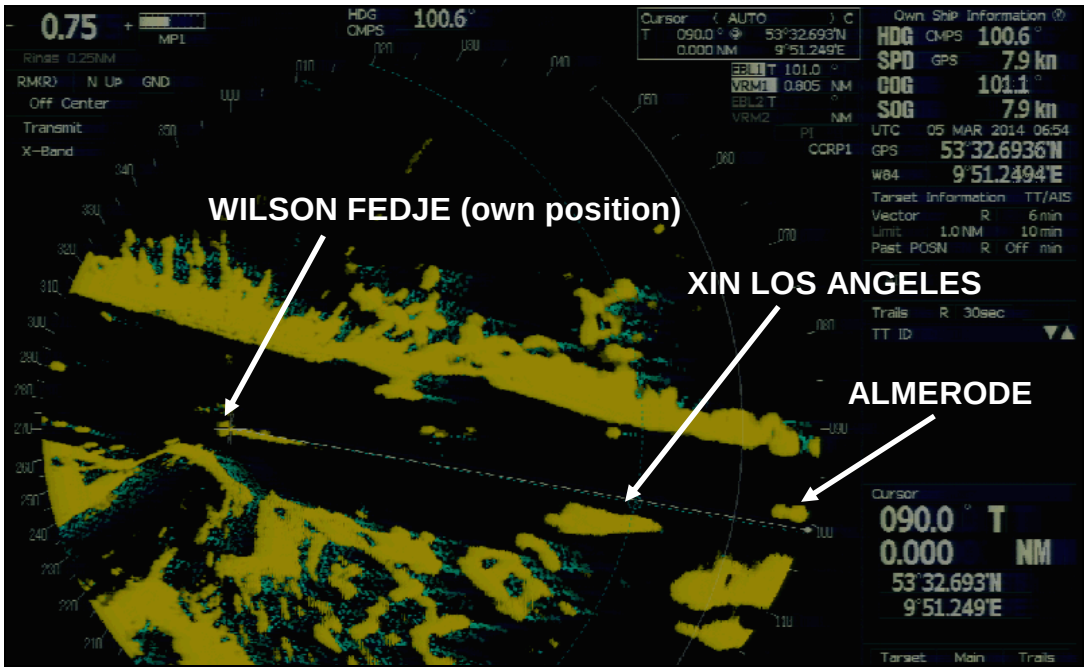

Figure 8: Extract from the WILSON FEDJE's radar image (X-band) at 0754 (2) (after her position was shifted to the left)

Owing to the distance between the two vessels being too great, the echo of the JADE is still not visible on the radar screen even after the position of the WILSON FEDJE was shifted. When the individual reference points are plotted in a nautical chart, the following representation of the traffic situation, also at **0754**, which was taken from the radar/AIS recording of Hamburg Port Traffic, shows that at the time referred to the distance between the WILSON FEDJE and the JADE, which is only displayed as a radar echo for lack of AIS ID (not a carriage requirement), stood at about 1.8 nm (see **Fig. 9**).

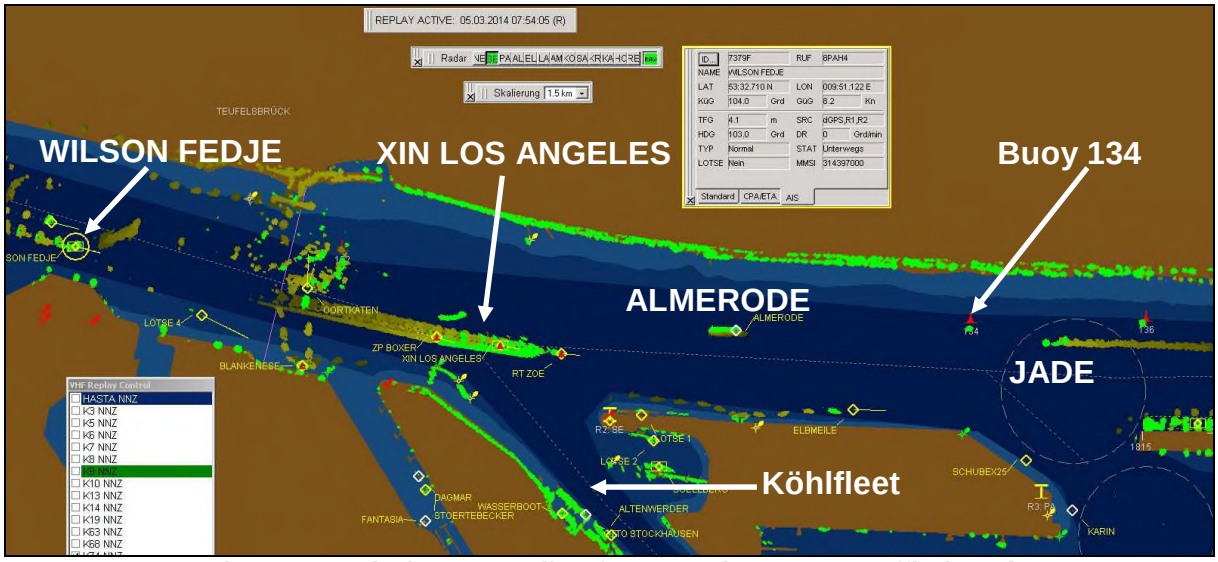

Figure 9: Radar/AIS recording from Hamburg Port Traffic (0754)

At the same time (between **0753 and 0754**), the ALMERODE notified the radar pilot on channel 19 that the turn into the Köhlfleet was imminent and corresponding arrangements had reportedly already been made with the WILSON FEDJE. The radar pilot advised the ALMERODE to give the XIN LOS ANGELES a little more room. The radar pilot also advised the ALMERODE **on a vessel approaching her from behind without identification** and recommended that the ALMERODE liaise with her to prevent her from catching up completely.

Immediately after this radio contact (at about **0754**), the WILSON FEDJE's port pilot reported in to the radar pilot on channel 19 and notified him of the position and destination of his ship (Kalikai). Moreover, he also basically said that the ALMERODE was being allowed to pass behind the XIN LOS ANGELES. The radar pilot briefly acknowledged the imminent passage of the XIN LOS ANGELES. He also briefly referred the WILSON FEDJE's pilot to ***"an outbound vessel at buoy 134."*** A few seconds later, the radar pilot asked the WILSON FEDJE's pilot if they were planning a green-green with the ALMERODE.

The pilot of the WILSON FEDJE confirmed this. The radar pilot replied: ***"Okay, as I said, I still have a vessel without identification – currently outbound at 134. I do not know where she is headed or what her name is."***

This concluded the contact between the radar pilot and pilot of the WILSON FEDJE for the time being.

The pilot of the WILSON FEDJE then started (from about **0755**) to slowly alter the course of the ship toward the northern half of the fairway. At about **0756**, the pilot sent his next position report on channel 74 and notified shipping that the WILSON FEDJE is now moving into the northern part of the fairway, will be making a green-green with the ALMERODE, and then return to the south.
A few seconds later, the pilot of the XIN LOS ANGELES called the WILSON FEDJE's pilot on channel 74 and stated: ***"Another vessel moving quickly downstream is at 134. I do not know who she is."*** The WILSON FEDJE's pilot briefly confirmed receipt of this information (initially without making any further enquiries).

The two following **Figs. 10 f.** show the traffic situation at **0757** from the shore-based perspective of Hamburg Port Traffic and correspondingly from the perspective of the WILSON FEDJE's X-band radar. It is clear that the JADE, still anonymous to all stations, moves into the range of the radar unit used by the WILSON FEDJE's pilot at precisely this moment.

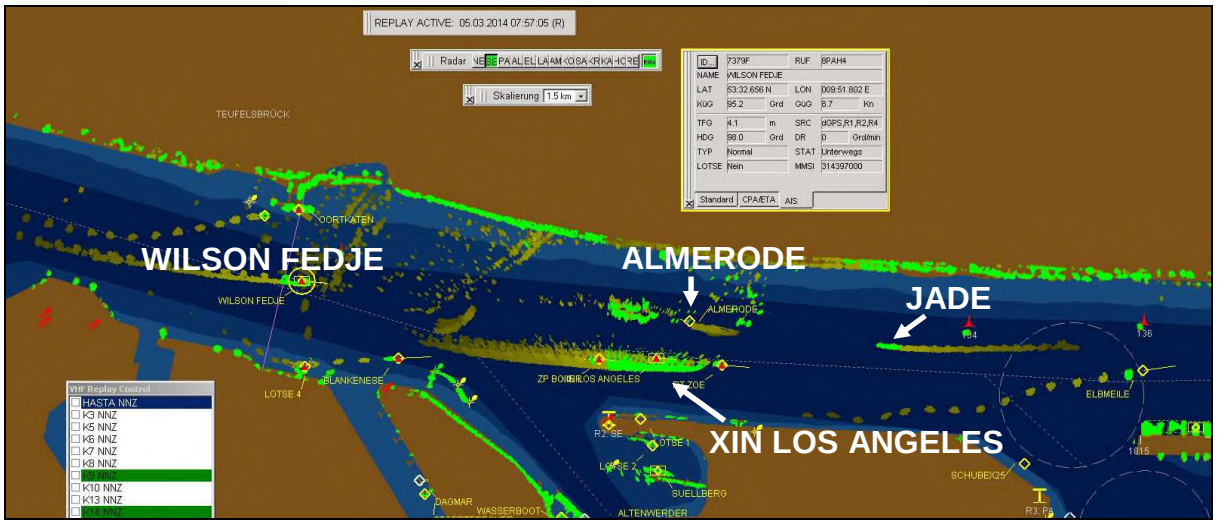

Figure 10: Radar/AIS recording from Hamburg Port Traffic (0757)

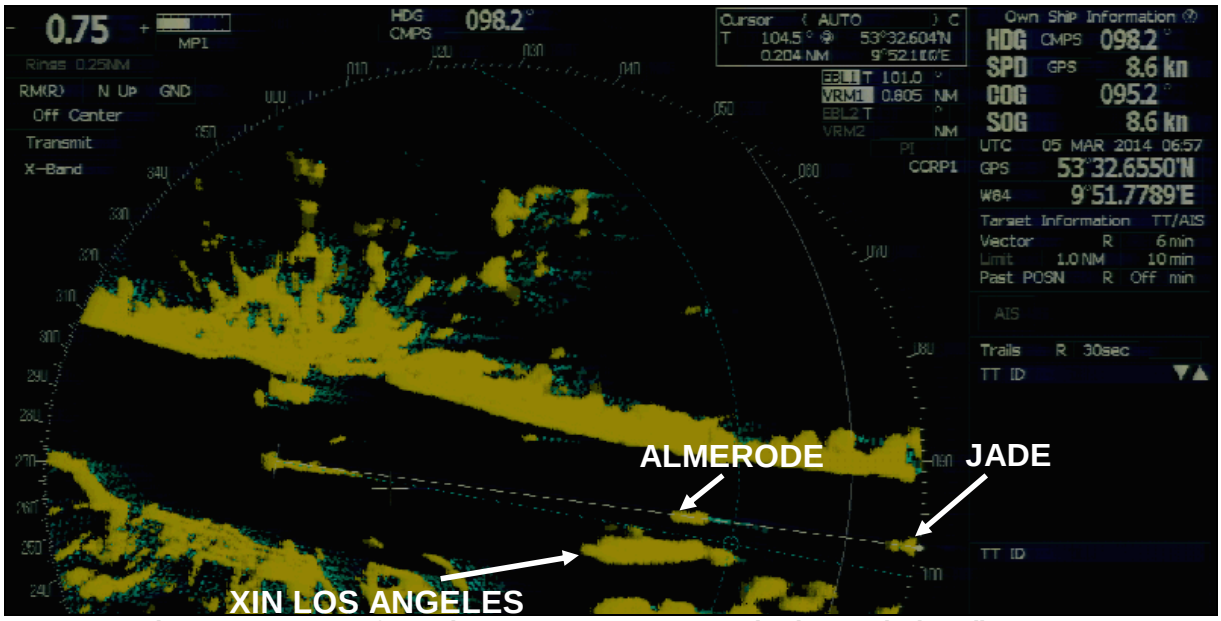

Figure 11: Extract from the WILSON FEDJE's radar image (X-band) at 0757

About 1.5 minutes after receiving information regarding the unidentified vessel at buoy 134 from the pilot of the XIN LOS ANGELES, the WILSON FEDJE's pilot asked his colleague on channel 74 for notification as soon as he had identified the vessel in question.

At about **0759**, the WILSON FEDJE's pilot notified shipping of his current position and the further course of the voyage on channel 74:***"WILSON FEDJE off Köhlfleet; inside the northern part of the fairway; upstream to Köhlbrand."***

Figure 12: Radar/AIS recording from Hamburg Port Traffic (0759)

Immediately after this position report, the radar pilot sent the following information to the ALMERODE and, in particular, to the WILSON FEDJE on channel 19:***"WILSON FEDJE 80 metres north of the radar reference line; ALMERODE clear and moving south; and the second vessel, without identification, is currently ahead on your starboard shoulder – according to my radar screen."***

About one minute after the previous position report, i.e. between**0800** and **0801**, the WILSON FEDJE's pilot repeated the information on the current status of the ship on channel 74 using the following wording: ***"WILSON FEDJE inside the northern part of the fairway at the pilot station approaching Köhlbrand."***

A few seconds after that, the radar pilot called the WILSON FEDJE on channel 19: ***"WILSON FEDJE, the vessel ahead of you is turning to starboard. Caution!***[17] ***She is turning to starboard. She is turning north!"***
After a short interval (about five seconds), the radar pilot repeated his warning to the WILSON FEDJE: ***"Still a ship length to this vessel; she is almost at right angles. X***[18]***, she is right in front of your stem!"***

The turn to starboard of the still anonymous JADE coupled with the almost consistent course of the WILSON FEDJE is clearly visible on the following screenshot of Hamburg Port Traffic's recording of the traffic situation (see**Fig. 13**).

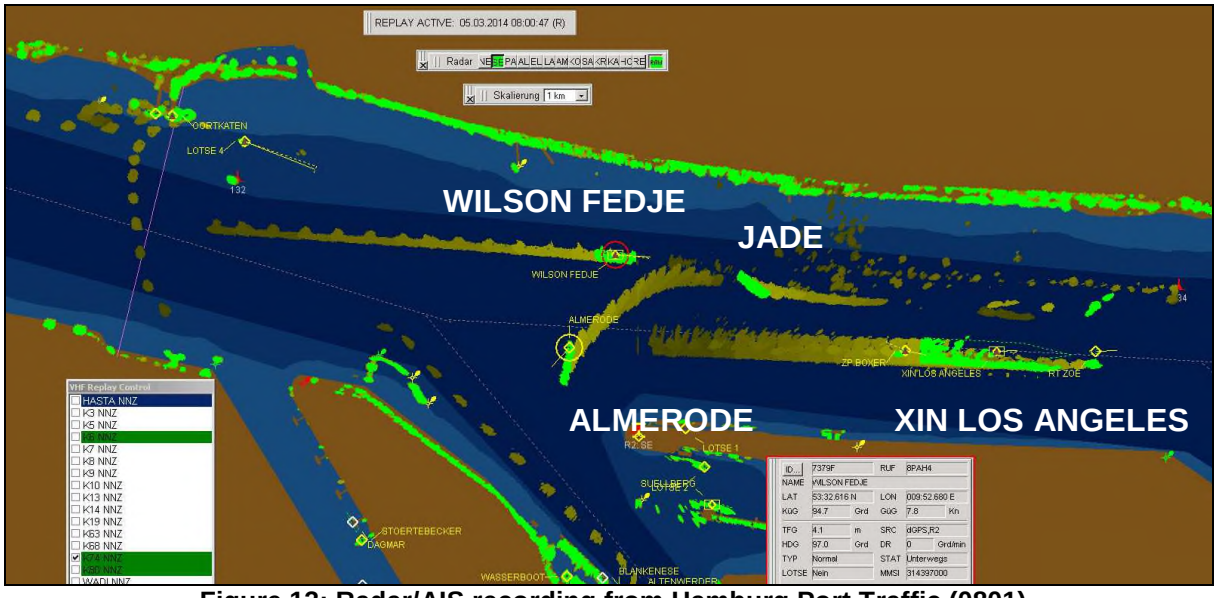

Figure 13: Radar/AIS recording from Hamburg Port Traffic (0801)

Seen from the rather unclear radar perspective of the WILSON FEDJE's pilot, the turn of the oncoming vessel, still anonymous at this point, is clearly visible only about half a minute later (about **0801** – see **Fig. 14** below), however.

[17] -

[18] The radar pilot uses the first name of the WILSON FEDJE's pilot here.

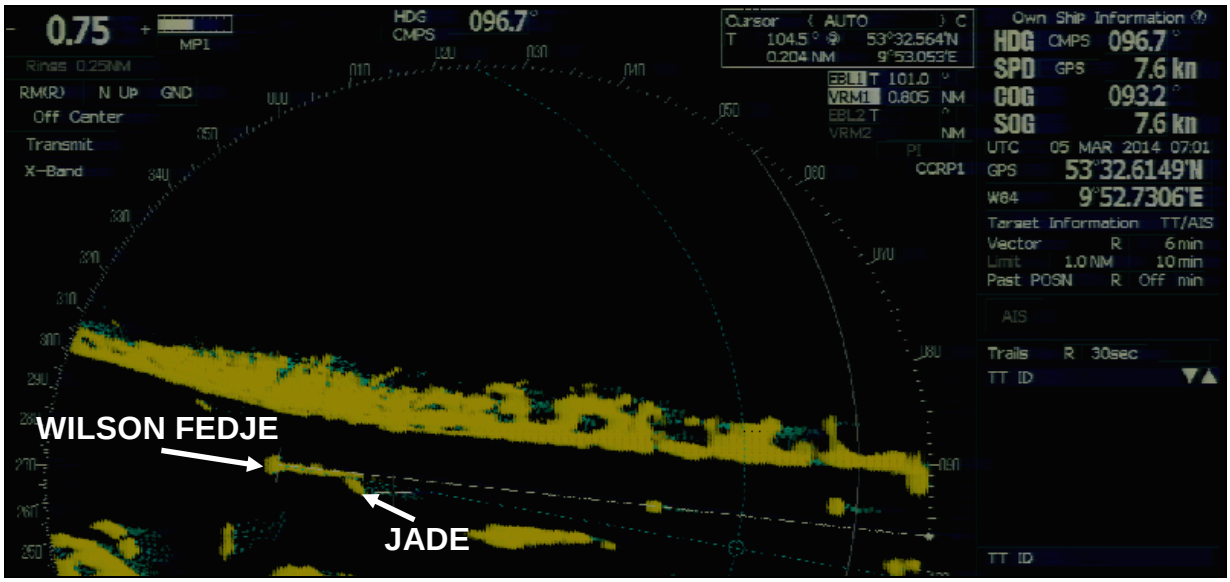

Figure 14: Extract from the WILSON FEDJE's radar image (X-band) at 0801

The still anonymous JADE should have come into view on the bridge of the WILSON FEDJE at a distance of about 30 to 40 metres at about the same time as it was recognised that there was a risk of an immediate collision on the radar.
About 15 seconds later (between **0801** and **0802**), without any further intermediate radio communication sent from the WILSON FEDJE or concerning her or the JADE on channel 19 or 74, collision noises can be heard in the VDR's audio recording of the microphones on the bridge. Accordingly, the radar echoes of the WILSON FEDJE and the JADE merge at this point (see **Fig. 15**). It is at this precise moment that the two vessels collide at an angle of nearly 90 degrees, despite having already initiated collision avoidance action (stop followed by a full astern manoeuvre; no alteration of course).

Figure 15: Radar/AIS recording from Hamburg Port Traffic (080129) (time of the collision)

3.1.1.2 Course of the JADE's voyage

The JADE left her berth in the port of Hamburg (Rethe-Hafen port) at about **0700**. Besides the skipper, another crew member was on board and acting as lookout on the forecastle due to the poor visibility. At **0718**, the skipper notified Hamburg Port Traffic on VHF channel 14 in broken but well understandable German of the fact that the JADE is located in the area of the exit at Rethe-Hafen port and was reportedly heading for Beidenfleth. In response to the aforementioned report, the nautical supervisor at Hamburg Port Traffic asked what type of cargo vessel the JADE was. The skipper replied that the is a dry-cargo carrier laden with soybean meal. The nautical supervisor at Hamburg Port Traffic once more asked for confirmation of the JADE's current position ("*in Rethe*") and port of destination (Beidenfleth). Finally, he gave the skipper the following information: ***"Skipper, radar is manned, channel eight zero."***[19] The skipper of the JADE replied with a brief "Thank you!". There was no further communication between the JADE on the one hand and Hamburg Port Traffic or other vessels, on the other, after that.

Immediately after the report to Hamburg Port Traffic, the JADE's skipper sent the following information to shipping at **0718** on channel 74: ***"The JADE will soon be leaving Rethe-Hafen port; Köhlbrand downstream."***

At **0732,** there was a brief exchange of information between the vessels BESIKTAS ICELAND and RONJA on channel 74:

"BESIKTAS ICELAND approaching; berth at Waltershof; will soon enter the Rethe."

"The RONJA now leaving the Rethe; Köhlbrand downstream."

"All clear ahead of me; the inland waterway vessel JADE is sailing here, however. The inland waterway vessel JADE is now here; Köhlbrand downstream, just passed Neuhof berth; she is not very fast."

At **0738**, the JADE's skipper sent the following message on channel 74: ***"JADE will soon be out of Köhlbrand, downstream, departure."***

At **0741**, the JADE's skipper then reported one final time on channel 74, stating: ***"JADE left the Köhlbrand, downstream."***

Fig. 16 below illustrates in a simplified form the route taken by the JADE from Rethe to the scene of the accident.

[19] Note: Radar guidance is given on VHF channel 80 in Köhlbrand.

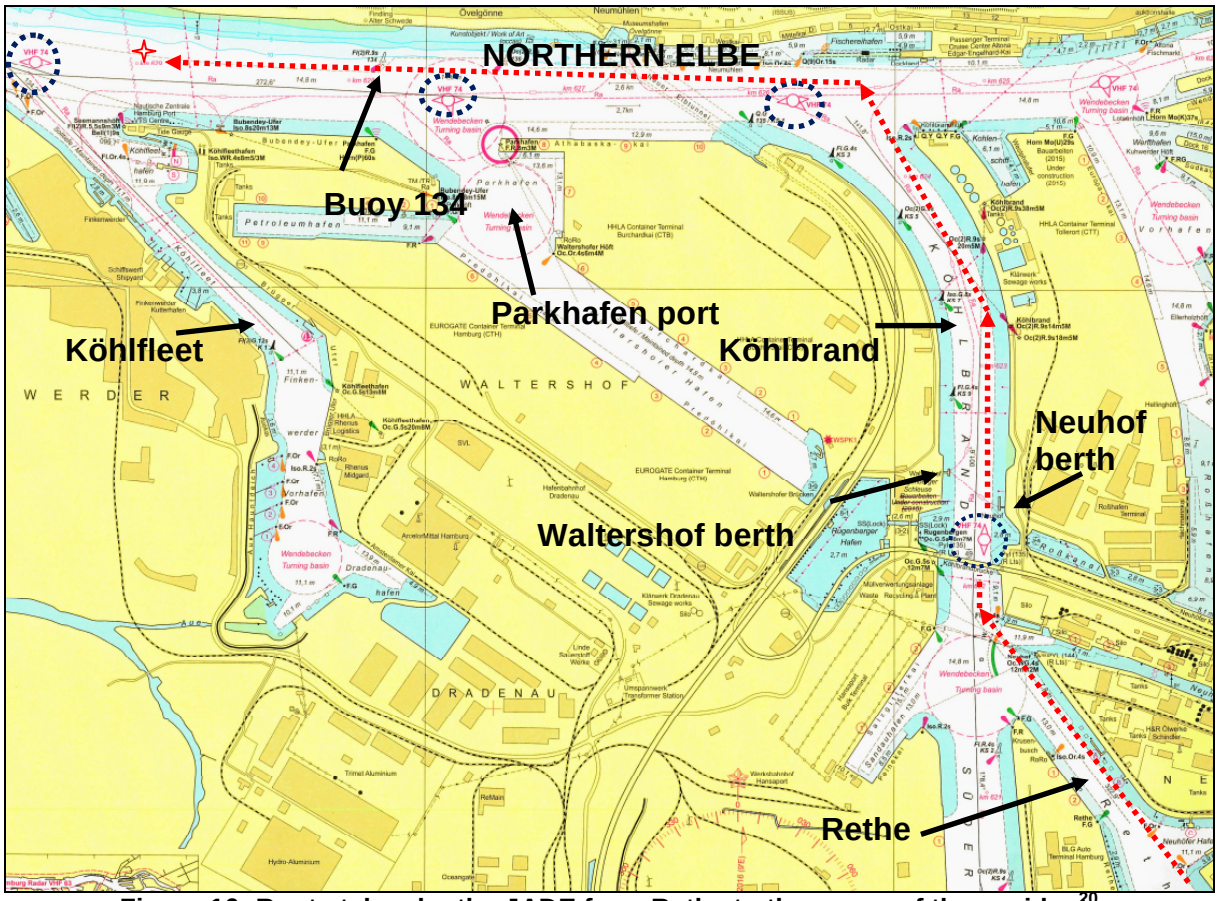

Figure 16: Route taken by the JADE from Rethe to the scene of the accident[20]

Since the JADE was not equipped with a VDR for lack of relevant carriage requirements for inland waterway vessels, it was only possible to rely on the testimony of the skipper and his deckhand for the investigation and below account of the sequence of events from the perspective of the JADE. This indicates that the skipper reportedly noticed that a container ship[21] escorted by two tugs was approaching him from the opposite direction when he passed buoy 134[22]. The skipper claimed that he identified the WILSON FEDJE behind the container ship and reportedly assumed she was in the process of overtaking the container ship (on her port side). He reportedly assumed that the WILSON FEDJE would change her heading back to starboard in good time and they would pass each other safely (port side to port side – or red-red).

[20] Extract from Official Nautical Chart No 48 (INT 1455; River Elbe from Schulau to Hamburg), BSH. Highlighted labels and blue marking of the mandatory VHF reporting points (VHF 74) by the author of this report.
[21] Note: This must have been the XIN LOS ANGELES.
[22] Note: The analysis of Hamburg Port Traffic's radar recordings reveals that the JADE was sailing at a speed of about 6 kts at this point.

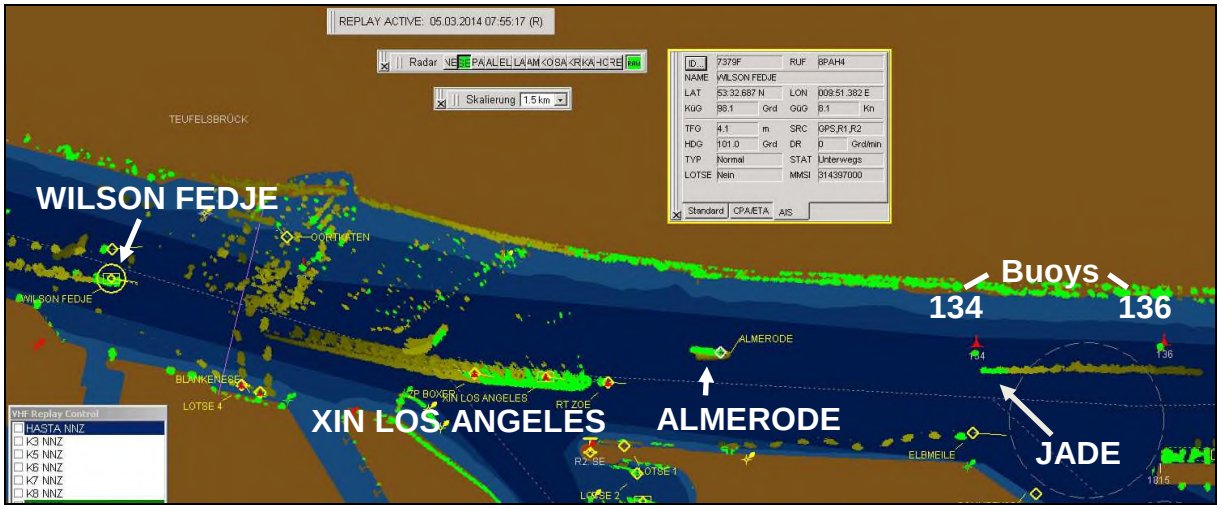

Figure 17: Radar/AIS recording from Hamburg Port Traffic (0755)
(the JADE is just passing buoy 134)

After some time, he reportedly realised that contrary to his assumption, the WILSON FEDJE was not altering her course to starboard. Therefore, the JADE's skipper reportedly altered the course of his ship to starboard to avoid the impending collision with the oncoming vessel. This collision avoidance manoeuvre was reportedly unsuccessful because of the high approach speed, however.

3.1.2 Events after the collision

After the collision, the WILSON FEDJE's pilot visually identified the other vessel involved in the collision by name as the JADE. The ship's command of the WILSON FEDJE immediately started to investigate the damage to its ship and – by making visual observations – the need for assistance on the JADE. At the same time, the WILSON FEDJE's pilot attempted to establish contact with the JADE on VHF channel 74 a total of five times within the next two minutes. The JADE did not respond to these calls, however. At **0804**, while attempting to establish contact with the JADE, the WILSON FEDJE's pilot also notified Hamburg Port Traffic on channel 14 of the collision, his unsuccessful calls to the JADE, and the observation that the JADE is currently drifting northward, so as to run aground there (presumably deliberately).

The investigation of the damage on board the WILSON FEDJE revealed that the voyage could be continued without any complications. The WILSON FEDJE was still unable to visually identify a need for assistance on the part of the JADE. Direct contact with the inland waterway vessel on VHF was not possible.

At about **0806**, the WILSON FEDJE's pilot called Hamburg Port Traffic on channel 14 once again and repeated the observation that the JADE was reportedly on a direct route to the northern bank of the northern Elbe. Referring to the (negative) findings of the damage investigation, the WILSON FEDJE's pilot also stated that they intended to continue their voyage. The nautical supervisor at Hamburg Port Traffic agreed with the WILSON FEDJE's proposal. Given the apparently only very minor damage to the WILSON FEDJE, they agreed that the precautionary measure of ordering a tug could be dispensed with.

In the ensuing period, Hamburg Port Traffic was unable to establish radio contact with the JADE, either. The nautical supervisor at Hamburg Port Traffic called the JADE unsuccessfully four times on channel 74 and three times on channel 14 between **0807** and **0809**.

Therefore, Hamburg Port Traffic once again asked the WILSON FEDJE's pilot on channel 14 whether he was able to identify anything else in respect of the JADE at **0810**. Apart from repeating that the JADE is moving toward the bank of the River Elbe, the pilot was unable to.

The tug BUGSIER 14, which was located in the vicinity of the scene of the accident, intervened in the above conversation, essentially offering to proceed to the JADE so as to assess the situation there. Hamburg Port Traffic agreed with this proposal.

At **0812**, Hamburg Port Traffic notified shipping on channel 74 of the position of the stricken JADE, basically ordering all vessels to navigate with great caution in the area in question.
In the meantime, Hamburg Port Traffic had informed Hamburg's fire service and WSP Hamburg of the accident. Both the fire service and the WSP proceeded to the JADE in boats.

The BUGSIER 14 reached the JADE at about **0819** but was unable to sail right up to the distressed vessel, grounded parallel to the direction of the current on the bank of the River Elbe, due to her draught (see **Fig. 18**).

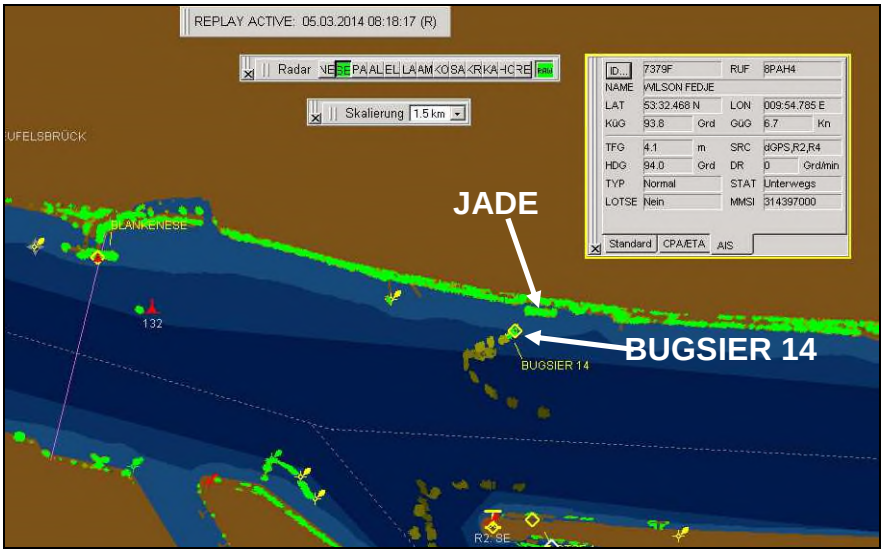

Figure 18: Radar/AIS recording from Hamburg Port Traffic (0818) (the tug BUGSIER 14 en route to the JADE)

Insofar as possible, BUGSIER 14 notified Hamburg Port Traffic of its observations pertaining to the condition of the JADE several times in the ensuing minutes on channel 14. Hamburg Port Traffic asked BUGSIER 14 to remain at the scene and wait for the arrival of the police as a precautionary measure.

The first WSP boat and a pilot boat that had also hurried to the distressed vessel arrived at the JADE at about **0830**.

At **0833**, a port pilot on board the JADE reported in on channel 14. He had transferred from the pilot boat to the distressed vessel in the meantime and then notified Hamburg Port Traffic that reportedly nobody on board the JADE was injured but she was taking on water. The pilot also confirmed that the JADE was grounded firmly on the bank in a stable position.

The JADE was lightened on the embankment and her buoyancy temporarily restored in the days that followed. The inland waterway vessel was then towed to the Jöhnk-Werft shipyard in Hamburg-Harburg, where she was scrapped because a repair would not have been economically viable.

Figure 19: The JADE on the embankment

Figure 20: Leakage repairs on the JADE

3.2 Consequences of the accident

3.2.1 Damage to the WILSON FEDJE

The WILSON FEDJE sustained only very minor damage in the area of the bulbous bow (**Fig. 21**) during the collision with the JADE.

Figure 21: Paint abrasions on the WILSON FEDJE's bulbous bow

3.2.2 Damage to the JADE

The JADE was torn open amidships on the port side due to the heavy impact with the WILSON FEDJE's bulbous bow, which caused a huge gash of several metres wide in her hull.

Figure 22: JADE – photo of the damage (top view)

Figure 23: JADE – photo of the damage (close-up 1)

Figure 24: JADE – photo of the damage (close-up 2)

3.2.3 Physical injury and damage to the environment

The marine casualty did not result in any injuries. Moreover, there was no significant impact on the environment, as no fuel or lubricant tanks were damaged during the collision. Since the fodder carried by the JADE does not possess any lasting environmentally hazardous properties, the collision-induced contamination of the sea water with components of the cargo did not pose a risk to the environment, either.

3.3 Investigation

3.3.1 Course, sources, and material particulars

The BSU received notice of the accident from WSP Hamburg immediately after the collision and began the investigation. Hamburg Port Traffic's radar and AIS recordings, as well as its recording of the VHF radio traffic were requested and analysed. It was also possible to secure and analyse the WILSON FEDJE's VDR recordings.[23] Since the JADE was neither equipped with an AIS transmitting device nor a VDR (for lack of relevant carriage requirements as an inland waterway vessel), corresponding technical recordings of the course of the JADE's voyage or of the radar image situation on her bridge, for example, were not available.

For the purpose of a comprehensive review of all the available sources of information, the BSU also referred to the extensive findings of WSP Hamburg's accident investigation in the course of its own investigation.

With regard to answering the question as to how the collision could have happened, in addition to the radar images recorded by the VDR and Hamburg Port Traffic, the VHF radio traffic recordings originating from the same sources were also of fundamental importance.

Due to their technical quality and objective nature, the above sources provided an excellent means of reconstructing the course of the voyage of each vessel involved in the collision. The radio communication and associated radar image recordings analysed also made it easy to understand the intentions of the WILSON FEDJE's pilot and JADE's skipper behind the course of each voyage. In the final analysis, it became unequivocally clear that the marine casualty was caused by deficiencies in the closely interrelated problem areas information and communication that were based on human factors.

By contrast, no evidence of (additional) technical issues on board the vessels involved being a factor in the accident came to light from the outset, meaning no corresponding investigative steps were necessary.

[23] Note: A VDR made by Totem Plus was on board the WILSON FEDJE.

3.3.2 Weather conditions and visibility

3.3.2.1 Report by Germany's National Meteorological Service (DWD)[24]

A summary of the weather conditions in the vicinity of the port of Hamburg level with fairway buoys 132/134 at about 0800 described in the DWD's official report follows:

"Wind: Due to the minor difference in atmospheric pressure, the wind blew only faintly from the north-west. It reached a mean average of 2-4 kts (2 Bft). At the same time, there were no significant gusts in the stable stratified atmosphere. The initial low wind warning was no longer valid at the time of the accident.

Weather and visibility: Cloud cover was generally variable to heavy. Surrounding stations, such as Fuhlsbüttel, reported fog. Visibility only stood at one to four kilometres. Rain was only registered in the Baltic Sea and Lauenburg areas.

Temperature: Air temperature stood at two degrees. The water in the Lower Elbe was about six degrees Celsius."

3.3.2.2 Actual visibility according to the findings of the BSU

As opposed to the DWD's generalised account of the visibility spectrum ("one to four kilometres"), the BSU believes that the actual visibility with which the vessels involved in the collision were confronted on the day of the accident was considerably lower, probably less than 50 metres in places. This finding arises firstly from the fact that witnesses from various vessels stated they were unable to identify the JADE by name despite an immediate close-quarters situation. Moreover, the analysis of the radio traffic on channel 74 revealed that in the relevant period under consideration (from about 30 minutes before up until about 30 minutes after the accident), other traffic that had nothing to do with the course of events leading up to and during the accident had exchanged information on the visibility in various parts of the port area. Distances of well under 100 metres were regularly stated.

3.3.3 Radio communication

3.3.3.1 Preliminary notes

Pursuant to Article 8(1) HVO, ships designated by the Hamburg Port Authority as seagoing and inland waterway vessels equipped with VHF are required to send position reports with an indication of the name, size, and route in German upon entry and departure, as well as when shifting within the port.

[24] Source: The DWD's official report of 27 March 2014 on the weather conditions in the vicinity of the port of Hamburg level with fairway buoys 132/134 at 0800 CET on 5 March 2014.

Such vessels are required to report in to Hamburg Port Traffic when they pass the state border (both inbound and outbound) at Tinsdal and Oortkaten, as well as when they moor or cast off in the port of Hamburg. The reports, containing information on the name and heading, must be made on VHF channel 74 and are mandatory in the port of Hamburg when passing fixed points, which are also plotted in the official nautical chart. In addition, reports to Hamburg Port Traffic are mandatory on VHF channel 14 when passing the Hamburg state border inbound or outbound, as well as when mooring or casting off in the port of Hamburg.

Nautical supervisors at Hamburg Port Traffic monitor the two above VHF operating channels (14 and 74). Channel 74 is the primary operating channel for all vessels moving within the port area, and especially for the numerous smaller port craft and their communications with each other. By contrast, channel 14 is predominantly used by inbound and outbound seagoing ships and facilitates primarily the exchange of specific information (concerning berth management, in particular) between Hamburg Port Traffic on one hand and the respective ship, on the other. Consequently, channel 14 is given priority by nautical supervisors at Hamburg Port Traffic when exercising their duties.

3.3.3.2 VHF channel 14

The JADE notified Hamburg Port Traffic that she was leaving her berth, stating position and destination, in German at **0718** on channel 14. The skipper did not say anything about the size of the vessel, however. In response to Hamburg Port Traffic's query as to what type of cargo vessel the JADE was, he described his ship as a dry-cargo carrier reportedly laden with soybean meal, but did not indicate explicitly that the JADE is an inland waterway vessel. Hamburg Port Traffic also reminded the JADE's skipper that the radar guidance service was available to him on channel 80.

On the other hand, the WILSON FEDJE reported in to Hamburg Port Traffic on channel 14 at **0726**, notifying that she had passed the state border (inbound) and her destination is Kalikai. There was no indication of the size of the ship in this case, either, but also no corresponding query. Hamburg Port Traffic advised that the radar guidance service was available here, too.

There was no further communication concerning or sent by the vessels subsequently involved in the collision on channel 14 prior to the accident. This channel was used on various occasions after the collision for communications between Hamburg Port Traffic on one hand and the WILSON FEDJE or the various vessels involved in emergency management, on the other. All attempts to contact the JADE on channel 14 failed, however.

3.3.3.3 VHF channel 74

Immediately after the report on channel 14, also at **0718**, the JADE's skipper notified shipping of his position and the current course of the voyage on channel 74: "*The JADE will soon be leaving Rethe-Hafen port; Köhlbrand downstream*"

A radio call at **0732** on channel 74 between two vessels not involved in the subsequent course of events leading up to and during the accident indicates that at the time in question, the JADE had passed the area of the Waltershof and Neuhof berths. The JADE did not make the position report on channel 74 required at this point according to the nautical chart (level with Köhlbrand Bridge).

At **0738**, the JADE's skipper duly notified the forthcoming departure from the Köhlbrand secondary fairway and further course of the voyage on channel 74: "[...], downstream, departure."

At **0741**, the JADE notified the departure from the Köhlbrand (probably now completed) and further course of the voyage once again: "[...], downstream." This was also the JADE's last position report before the subsequent collision.

The analysis of Hamburg Port Traffic's radar image recording reveals that the JADE passed the 'Mouth of the Parkhafen secondary fairway into the northern Elbe main fairway' reporting point at about **0753** (see **Figs. 25 f.**). However, in contrast to the previous report, the position report on channel 74 that was required there was not made (0738/0741; see blue marking in **Fig. 25**). (The JADE did not reach the 'Mouth of the Köhlfleet secondary fairway into the northern Elbe main fairway' reporting point marked green in **Fig. 25** due to the accident.)

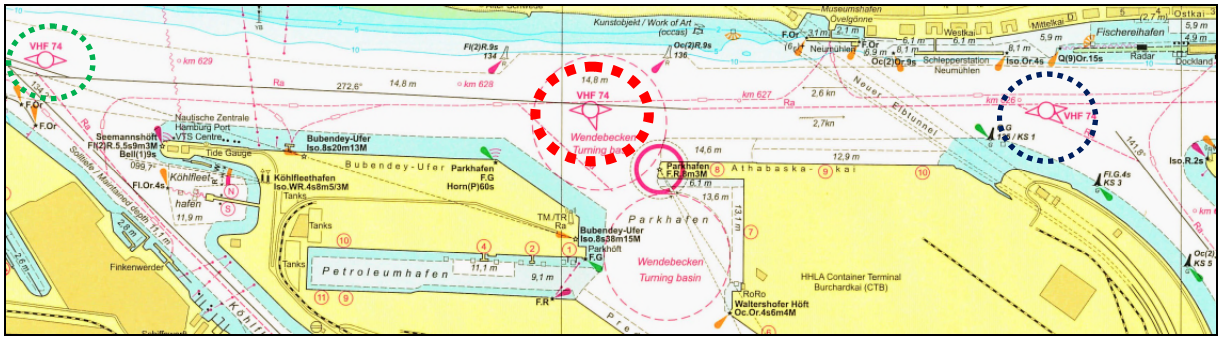

Figure 25: Reporting points in the northern Elbe main fairway (according to Official Nautical Chart No 48 (INT 1455), BSH[25])

[25] Note: Coloured marking of the reporting points in the extract from the nautical chart by the author of this report.

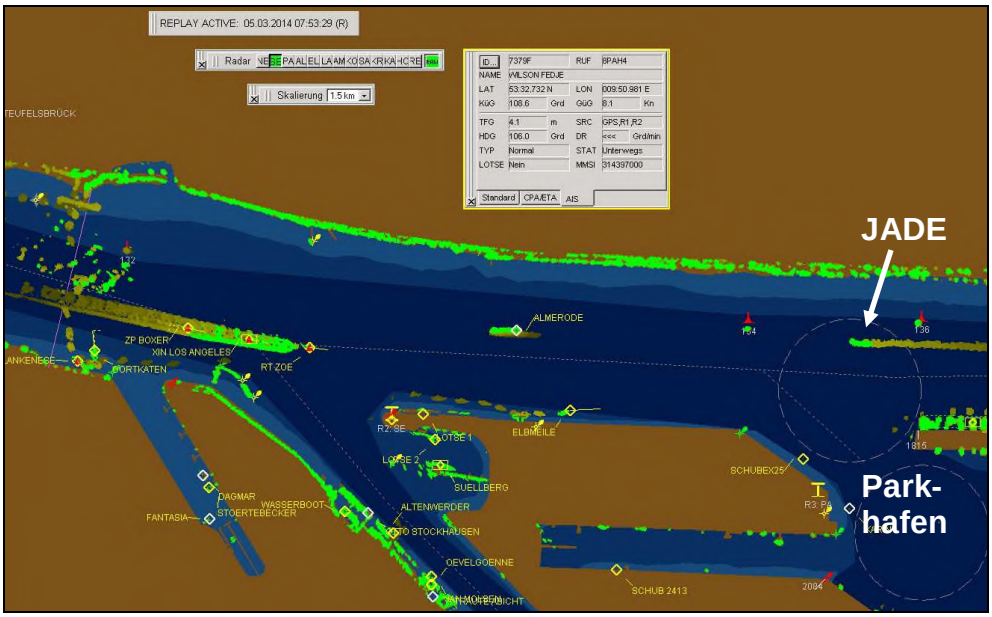

Figure 26: Radar/AIS recording from Hamburg Port Traffic (0753)
(the JADE is passing the 'Mouth of the Parkhafen secondary fairway into the northern Elbe main fairway' reporting point)

Immediately after the contact with Hamburg Port Traffic on channel 14, the WILSON FEDJE's Elbe pilot duly sent the current position of the ship on channel 74, also at **0726**, and the information: "Approaching Köhlbrand."

At about **0753**, i.e. immediately after the pilot transfer, the WILSON FEDJE's pilot sent shipping non-required information on the current position of the ship (Finkenwerder Pfähle East) and further course of the voyage on channel 74: *"Continuing to Köhlbrand."*

Immediately afterwards, the WILSON FEDJE received a call from the ALMERODE, also on channel 74. This vessel was drifting in a waiting position in the middle of the northern half of the northern Elbe main fairway east of where the main fairway branches toward Köhlfleet at the time in question. The ALMERODE basically asked if it would be possible to turn into the Köhlfleet after the passage of the XIN LOS ANGELES (which was ahead of the WILSON FEDJE) but before the WILSON FEDJE. The WILSON FEDJE's pilot readily agreed to the ALMERODE's request and stated that the WILSON FEDJE would therefore move further to the north.

At about **0756**, the WILSON FEDJE's pilot sent another position report on channel 74 ("*at the high-rise building*") and notified shipping that the WILSON FEDJE is now moving into the northern part of the fairway, will be making a green-green with the ALMERODE, and then return to the south. As with the previous position report, this one was not generally (or fundamentally) mandatory at the position in question, but in this specific case and the given context served to satisfy the obligation to inform shipping of the forthcoming green-green manoeuvre and to that extent the necessary temporary use of the northern side of the fairway.

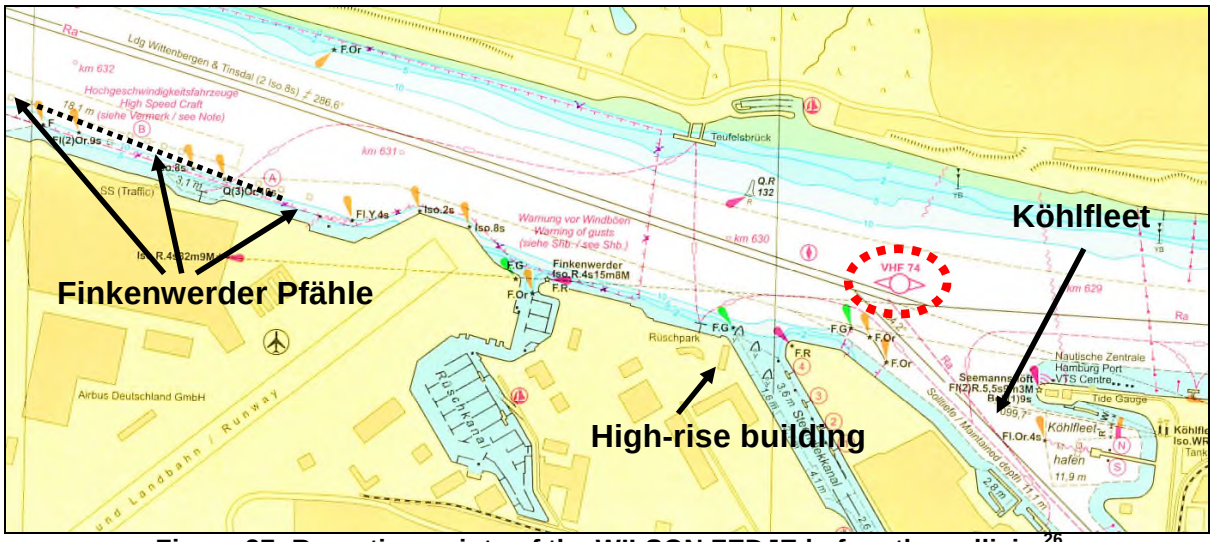

Figure 27: Reporting points of the WILSON FEDJE before the collision[26]

The announcement in question apparently served this purpose at least partially, for a few seconds later the pilot of the XIN LOS ANGELES called the WILSON FEDJE's pilot on channel 74, basically stating that an as yet unidentified vessel was located at buoy 134 "*moving quickly downstream*". The WILSON FEDJE's pilot briefly confirmed receipt of this information (initially without making any further enquiries).

About 1.5 minutes after receiving information regarding the unidentified vessel at buoy 134 from the pilot of the XIN LOS ANGELES, the WILSON FEDJE's pilot asked his colleague on channel 74 for notification as soon as he had identified the vessel in question.

At about **0759**, the WILSON FEDJE's pilot notified shipping of his current position and the further course of the voyage on channel 74: "*WILSON FEDJE off Köhlfleet; inside the northern part of the fairway; upstream to Köhlbrand*." This was a required report made at the 'Mouth of the Köhlfleet secondary fairway into the northern Elbe main fairway' reporting point plotted in the nautical chart and included information on the use of the northern part of the fairway.

Between **0800** and **0801**, the WILSON FEDJE's pilot repeated the information on the current status of the ship on channel 74: "*WILSON FEDJE inside the northern part of the fairway at the pilot station approaching Köhlbrand*."

The manner in which this report was formulated implies that it was a (repeated) fulfilment of the information requirement arising from passing the mandatory reporting

[26] Extract from Official Nautical Chart No 48 (INT 1455), BSH; labels and markings inserted by the author of this report.

point. Advice from the radar guidance service, his colleague on the XIN LOS ANGELES, and in all likelihood his own monitoring of the radar image would mean that the WILSON FEDJE's pilot had been aware of the oncoming vessel following the ALMERODE for several minutes. Therefore, it is reasonable to assume that in repeating his position report, he also intended to notify this anonymous vessel, in particular, of the name and position of the WILSON FEDJE and further course of her voyage.

Moreover, from the seasoned tone of voice in the last position report made between **0800** and **0801**, it is reasonable to conclude that at this point, and thus less than two minutes before the collision with the JADE, the WILSON FEDJE's pilot was still convinced that despite the absence of a specific agreement, an entirely uncomplicated green-green encounter would take place with this oncoming vessel.

Further communication concerning the course of events leading up to and during the accident or vessels indirectly or directly involved did not continue on channel 74 until after the collision between the JADE and WILSON FEDJE. However, it was not possible to make contact with the stricken JADE on this channel, either.

3.3.3.4 VHF channel 19

The indirectly involved vessels XIN LOS ANGELES and ALMERODE, as well as the primarily affected WILSON FEDJE had registered for the shore-based radar guidance service, which the Hamburg Harbour Pilots' Association provides at the premises of Hamburg Port Traffic when there is fog. Hamburg Port Traffic clearly notified the JADE that radar guidance was available to her when she sent her departure report. However, she neither registered for this on the initially relevant channel 80, nor later on VHF channel 19, i.e. the VHF channel applicable in the section of the port of Hamburg of relevance to the development of the collision (northern Elbe in the area of the mouths of the Köhlbrand, Parkhafen, and Köhlfleet secondary fairways).

Guidance of the vessels registered is carried out by a radar pilot. His task is to advise vessels registered for the guidance service individually according to the needs arising from the prevailing traffic situation (possibly in dialogue) on their position within the fairway and, for example, on any deviations from the optimum heading line or on closest points of approach. Radar pilots have high-resolution radar units at their disposal for this purpose, which coupled with the AIS signals usually permit a more precise picture of the traffic situation than is the case with shipboard equipment.

Between **0753** and **0754**, the ALMERODE notified the radar pilot on channel 19 that the turn into the Köhlfleet was imminent and that arrangements had reportedly already been made with the WILSON FEDJE. The radar pilot advised the ALMERODE to give the XIN LOS ANGELES a little more room.

The radar pilot also notified the ALMERODE of a vessel without identification approaching her from behind and recommended that the ALMERODE liaise with her to prevent her from catching up completely. Radio contact between the ALMERODE and JADE did not occur subsequently, however.

Immediately after this radio contact (at about **0754**), the WILSON FEDJE's port pilot reported in to the radar pilot and informed him of the destination of his ship. Moreover, he also basically said that the ALMERODE was being allowed to pass behind the XIN LOS ANGELES. The radar pilot also briefly referred the WILSON FEDJE's pilot to ***"an outbound vessel at buoy 134."*** **A few seconds later, the radar pilot asked the WILSON FEDJE's pilot if they were**planning **a green-green with the ALMERODE.**

The pilot of the WILSON FEDJE confirmed this. The radar pilot replied:***"Okay, as I said, I still have a vessel without identification – currently outbound at 134. I do not know where she is headed or what her name is."***

This concluded the direct contact between the radar pilot and pilot of the WILSON FEDJE for the time being.

Immediately after the required position report by the WILSON FEDJE level with the mouth of the Köhlfleet into the northern Elbe on channel 74 at about**0759**, the radar pilot sent the following information to the ALMERODE and, in particular, to the WILSON FEDJE on channel 19: ***"WILSON FEDJE 80 metres north of the radar reference line; ALMERODE clear and moving south; and the second vessel, without identification, is currently ahead on your starboard shoulder – according to my radar screen."***

Several seconds after the WILSON FEDJE's pilot notified the passage of the 'Mouth of the Köhlfleet secondary fairway into the northern Elbe' reporting point for the second time on channel 74, the radar pilot called the WILSON FEDJE's pilot on channel 19 and gave the following warning: ***"WILSON FEDJE, the vessel ahead of you is turning to starboard. Caution! She is turning to starboard. She is turning north!"***
After a short interval (about five seconds), the radar pilot repeated his warning to the WILSON FEDJE: ***"Still a ship length to this vessel; she is almost at right angles. [...], she is right in front of your stem!"***

The WILSON FEDJE and JADE collided several seconds later with no further radio communications on channel 19.

3.3.4 Information available on the bridge of the WILSON FEDJE

The information available on the bridge of the WILSON FEDJE concerning the traffic situation prior to the accident was marked essentially by the ship's radio contacts with the XIN LOS ANGELES, the ALMERODE, and the radar pilot discussed above. The other – and given the circumstances in all likelihood used – information media available were the radar image and an electronic chart system.

The following reasoning supports the assumption that the radar image was indeed actively used for gathering information:

- dense fog prevailed, meaning there was no viable alternative for safe orientation;
- at 0747, the range of the radar image was reduced from 1.5 to 0.75 nm to improve resolution and observation at close-quarters;
- at 0754, the ship's own position was shifted to the west on the radar image (off-centre) to increase visibility forward of the bow, and
- at the latest after being notified of the anonymous oncoming vessel by the XIN LOS ANGELES and radar pilot, the WILSON FEDJE's pilot would have used the only medium at his disposal to observe the oncoming vessel. (It follows from the fact that the WILSON FEDJE's pilot used channel 74 to explicitly ask his colleague on the XIN LOS ANGELES for notification as soon as he had identified the vessel that the WILSON FEDJE's pilot did not completely ignore her.)

The radar's automatic radar plotting aid (ARPA)[27] was not used, however.
The following, largely self-explanatory radar image extracts show in selected stages how the approach of the WILSON FEDJE to the JADE unfolded from the perspective of the radar screen on the bridge of the WILSON FEDJE in the five minutes leading up to the collision.

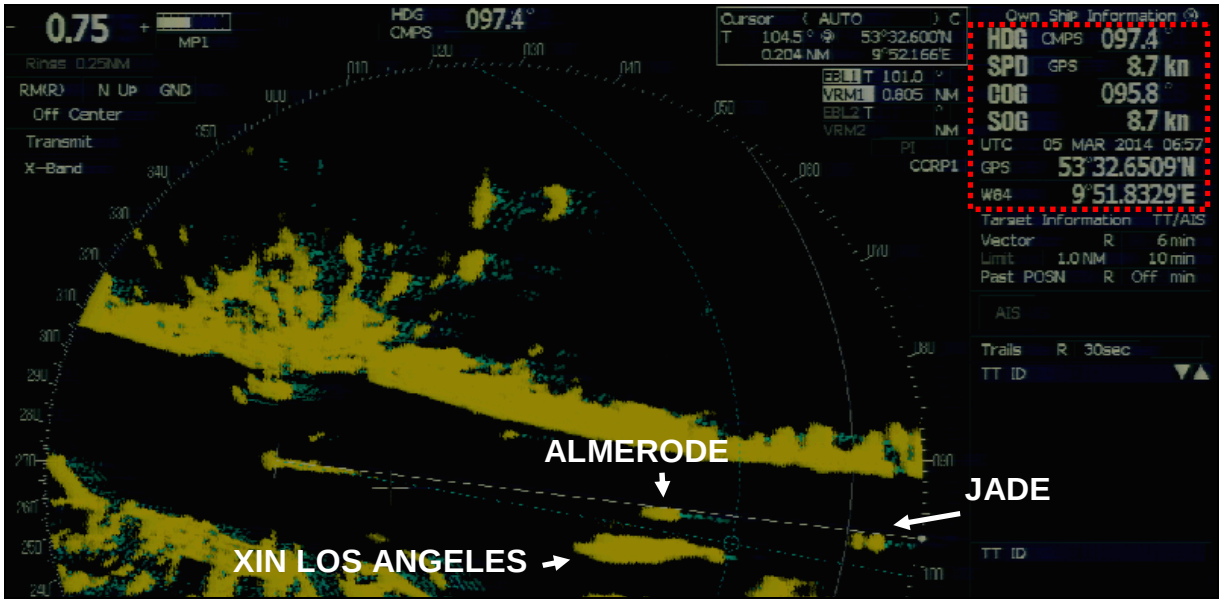

Figure 28: Extract from the WILSON FEDJE's radar image (X-band) at 0757 (echo of the JADE first appears at the edge of the configured range)

[27] ARPA: Feature in modern radar units used to track and display the course of the voyage (course, speed) of selected radar echoes automatically. With regard to the quality and reliability of the track information obtained, technically induced delays and interference that may render internal computations incorrect during radar reception must be allowed for. The use of this feature is evident from the fact that a marker is appended to the selected radar echo and its track data are displayed on the edge of the screen.

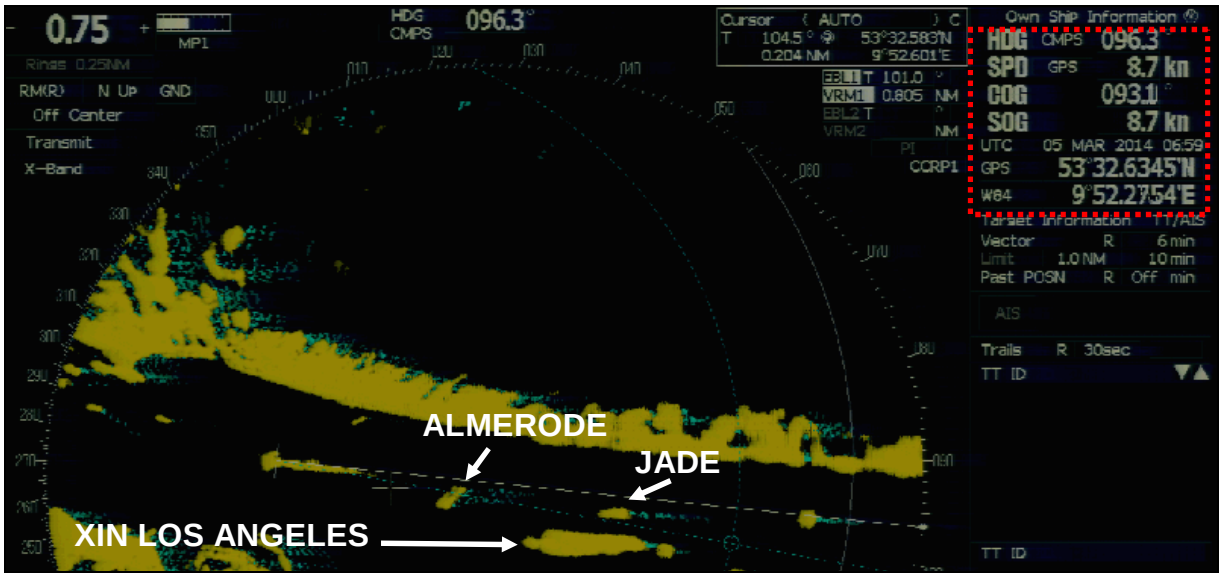

Figure 29: Extract from the WILSON FEDJE's radar image (X-band) at 0759 (echo of JADE is in line with that of the turning ALMERODE)

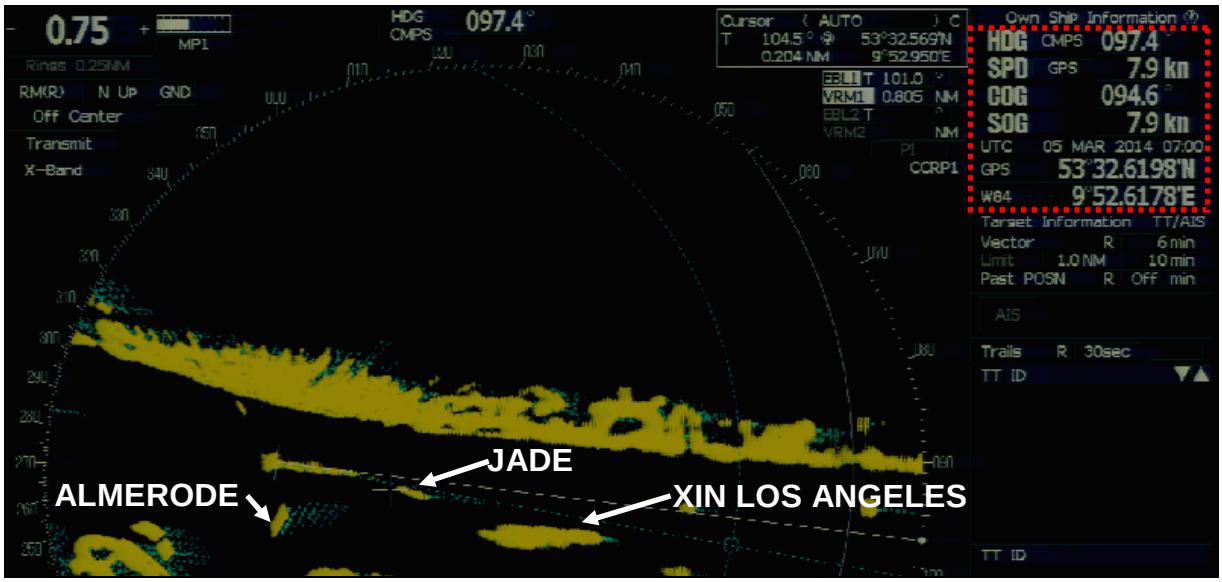

Figure 30: Extract from the WILSON FEDJE's radar image (X-band) at about 080045[28]

The JADE's course alteration to starboard gradually becomes visible on the following radar image (**Fig. 31**). The WILSON FEDJE's track data (see information marked red at the top right of the image) show that she essentially maintains her course and speed to begin with, i.e. an immediate risk of collision was not recognised on the bridge of the ship.

[28] Note: In accordance with its functionality, the VDR stores the radar image at approximately 15-second intervals in the manner shown on the radar screen (screenshot). Unfortunately, the GPS-based time on the radar screen does not indicate seconds. However, since the image selected for the report is the third screenshot, indicating 0700 (UTC) as the time, and the screenshot immediately after that already indicates 0701 (UTC), Fig. 30 must inevitably originate from the last quarter of the minute in question.

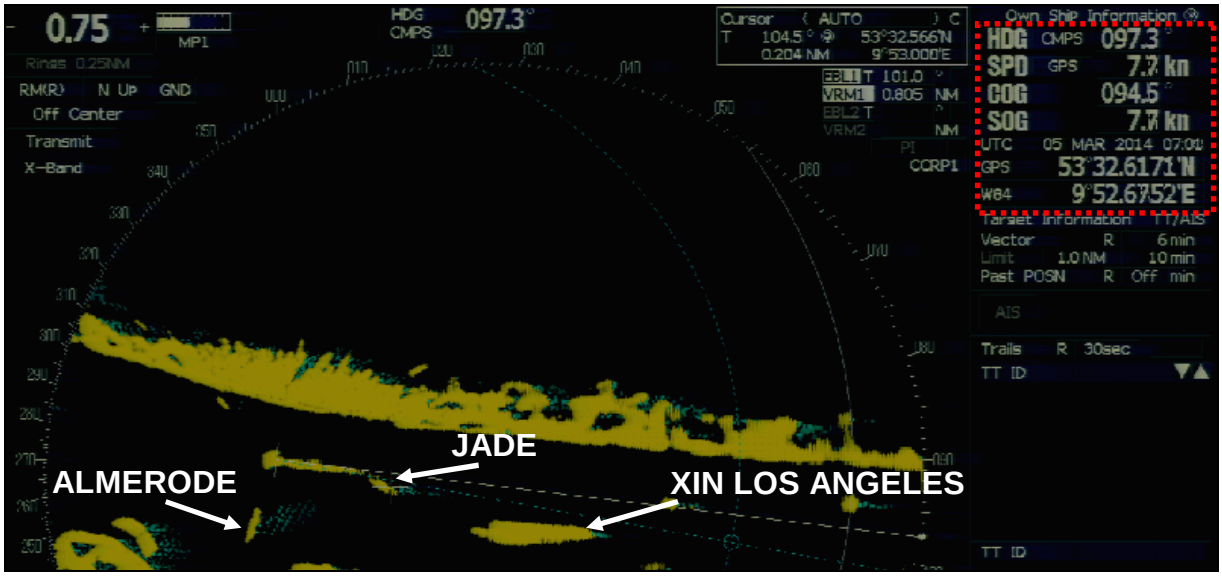

Figure 31: Extract from the WILSON FEDJE's radar image (X-band) at about 080110[29]

The JADE's starboard turn is more clearly visible below (see **Fig. 32**). The WILSON FEDJE still maintains an essentially consistent course and speed.

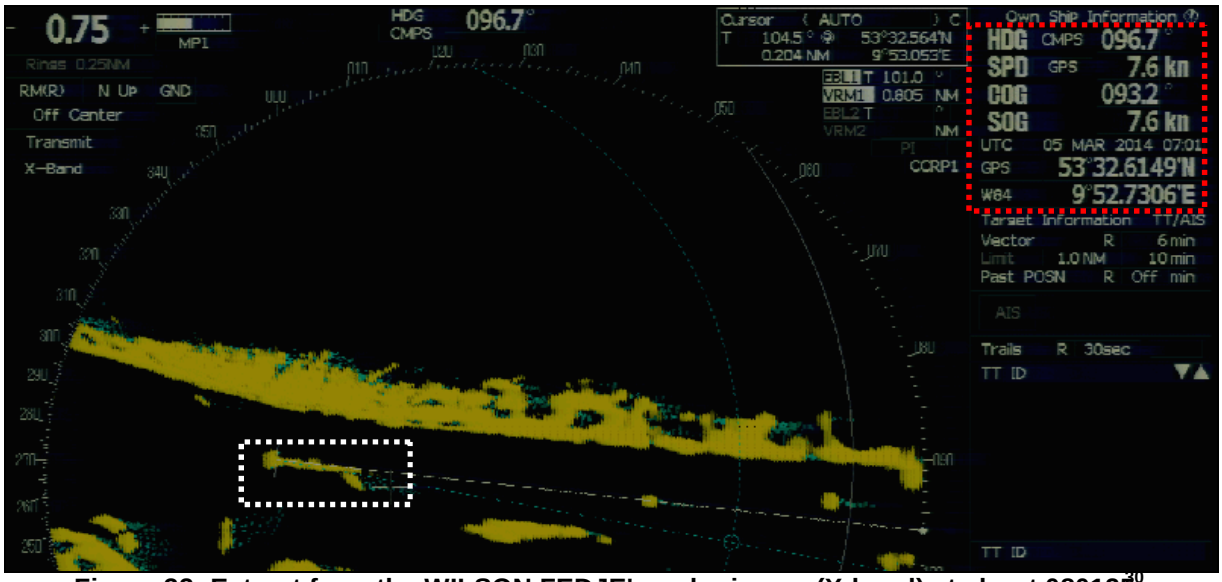

Figure 32: Extract from the WILSON FEDJE's radar image (X-band) at about 080125[30]
(the collision between the WILSON FEDJE and JADE is imminent)

Figs. 33 f. below were stored in the WILSON FEDJE's VDR in immediate succession (i.e. at an interval of 15 seconds). The significant reduction in the WILSON FEDJE's speed visible in the track data field of **Fig. 34** demonstrates that the collision between

[29] Note: See explanatory remarks in the preceding footnote. Since there are four images (at 15-second intervals) for the time 0701 (UTC), it is clear that the first screenshot selected here relates to the radar image situation in the first quarter of the minute in question.
[30] Note: This is the second of four screenshots stored in the minute in question.

the two vessels must have happened in the meantime, i.e. roughly within the time window **080145** to **080200**.

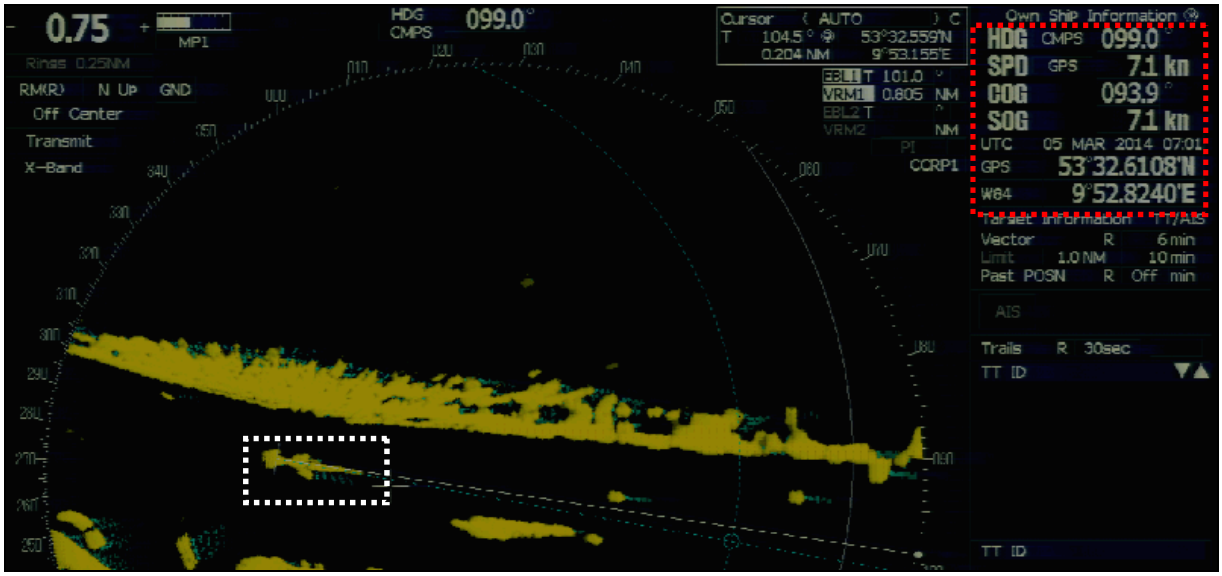

Figure 33: Extract from the WILSON FEDJE's radar image (X-band) at about 080145[31]

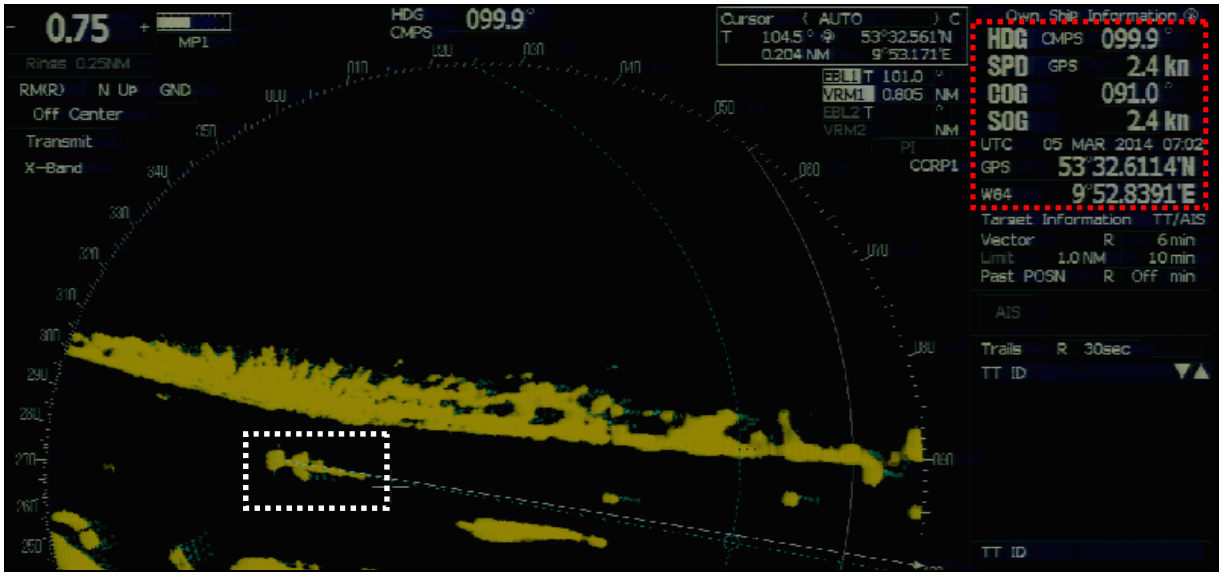

Figure 34: Extract from the WILSON FEDJE's radar image (X-band) at about 080200[32]

3.3.5 Information available on board the JADE

There are no technical recordings concerning the availability of information on the bridge of the JADE. The JADE last reported in by radio at**0741**. Following that, she did not play an active role in the audio recordings of Hamburg Port Traffic up until the collision. Consequently, there are no objective sources of information that would

[31] Note: This is the fourth of four screenshots indicating the time 0701 UTC.
[32] Note: This is the first of five figures indicating the time 0702 (UTC), meaning the screenshot must have inevitably been saved at the beginning of the minute in question.

indicate the basis specifically available to or actually used by the JADE's skipper in the course of his decision making.

However, the overall sequence of events permits the conclusion that up until the initiation of the starboard course alteration, the JADE's skipper was not expecting a green-green encounter with the WILSON FEDJE, which from his radar perspective was following the XIN LOS ANGELES. In all likelihood, he did not identify her radar echo by name until immediately before the collision for lack of his own AIS display and due to poor visibility. This is the only possible explanation for the fact that he did not link the WILSON FEDJE's previous position reports on channel 74, including the information that the northern part of the fairway would be used to pass the ALMERODE green-green, with the radar echo on the reciprocal course, nor take the precaution of addressing the WILSON FEDJE directly on channel 74 so as to obtain information on her intentions.

3.3.6 Competence of the ship's commands, fatigue, and influence of alcohol

The BSU is not in possession of any evidence to suggest that inadequate competence of the ship's commands and pilots involved, fatigue or influence of alcohol can be seriously considered as having caused or facilitated the accident.

3.3.7 Communication in German

In accordance with the requirements of the HVO, the mandatory position reports and all other communication leading up to and following the accident between the stations directly or indirectly involved was conducted in German. The JADE's Polish skipper also spoke in German when he reported in to Hamburg Port Traffic at the beginning of the voyage. His command of German was also sufficient to answer queries of the nautical supervisor at Hamburg Port Traffic.

4 Analysis

4.1 Assessment of the accident situation

4.1.1 Actual account of events

An analysis of all the information available has revealed unequivocally that the cause and starting point of the ensuing events that ultimately led to the collision between the WILSON FEDJE and JADE was the decision of the WILSON FEDJE's pilot to allow the ALMERODE, which actually had an obligation to give way, to turn from the northern Elbe main fairway into the Köhlfleet after the XIN LOS ANGELES but before the passage of the WILSON FEDJE.

To facilitate the passage of the ALMERODE forward of the WILSON FEDJE's bow, the two vessels agreed on a green-green encounter and notified the radar pilot of this at about **0754**.

In the course of executing the green-green passage, the WILSON FEDJE started to alter her course to port at about **0755** and then used the northern part of the fairway.

Following the ALMERODE, the JADE had still not appeared on the WILSON FEDJE's radar image, which was 'looking forward' some 1.2 nm, at the time the course alteration begun. The JADE's last position report was made at **0741**, i.e. before the pilot transfer on the bridge of the WILSON FEDJE, on VHF channel 74 when she turned from the Köhlbrand into the northern Elbe. However, the JADE passed the next reporting point ('Mouth of the Parkhafen into the northern Elbe) at about **0753** without duly reporting in on channel 74.

In direct temporal proximity with the agreement between the WILSON FEDJE and ALMERODE on the green-green encounter and the associated information to the radar pilot, the radar pilot notified the ALMERODE and, in particular, the WILSON FEDJE of an unknown vessel at buoy 134.
The pilot of neither of the two vessels acknowledged this advice explicitly.[33] The ALMERODE started to turn into the Köhlfleet. In execution of the agreed green-green encounter, the WILSON FEDJE moved into the northern part of the northern Elbe fairway and notified shipping **at 0756** on channel 74 of the forthcoming encounter with the ALMERODE and intention to return to the south afterwards.

In response to the WILSON FEDJE's report with regard to moving into the northern part of the fairway, the pilot of the XIN LOS ANGELES felt compelled to notify her on channel 74, as with the radar pilot some time earlier, of a vessel

[33] Note: Acknowledging advice from the shore-based radar guidance service is neither practiced, nor is there a legal obligation to do so.

at buoy 134 sailing downstream. The pilot of the WILSON FEDJE acknowledged this message. However, as far as is evident, he initially took no further action in respect of the forthcoming approach with the vessel, which was anonymous to all stations and starting to appear on his radar image at approximately the same time.

At **0759**, the WILSON FEDJE's pilot sent his next position report on channel 74. The radar pilot responded by repeating his advice on the still anonymous vessel sailing downstream on the River Elbe on the starboard side of the WILSON FEDJE.

Since the distance between the ALMERODE and the JADE behind her was most recently less than 0.2 nm, and since – from the WILSON FEDJE's radar perspective – the JADE was approaching her on the starboard side on a consistent course, the WILSON FEDJE's pilot decided not to continue with his plan to return to the southern part of the fairway after passing the ALMERODE. Instead, he reportedly assumed that they had tacitly agreed on a green-green encounter, even though a corresponding arrangement had not been made with the oncoming JADE, which was still anonymous.

As a precaution, the WILSON FEDJE's pilot once again repeated his position report between **0800** and **0801**: *"WILSON FEDJE inside the northern part of the fairway at the pilot station approaching Köhlbrand."*

Contrary to his expectation, still strong even at this point, a tacit agreement on the manner of the forthcoming encounter remained outstanding from the perspective of the JADE. Rather, the intentions of the WILSON FEDJE approaching him on the 'wrong' side of the fairway remained entirely unclear to the JADE's skipper up until the very last minute. Consequently, he felt compelled to assume there was an immediate risk of collision and therefore believed he should evade to starboard.

As a perfectly logical consequence of the above, entirely different (opposing) assessments of the approach on the bridges of the two vessels, the collision ultimately occurred at between **0801** and **0802**.

4.1.2 Legal assessment of the events

4.1.2.1 Traffic law provisions

The Free and Hanseatic City of Hamburg's legislation on port traffic and shipping takes priority in the area of the River Elbe within the state boundaries of Hamburg.[34]

[34] Inter alia, this includes the Law on port traffic and shipping (Hafenverkehrs- und Schifffahrtsgesetz), the HVO (Regulation on traffic in the port of Hamburg and on other waters), the Regulation on port craft (Hafenfahrzeugverordnung), the Regulation on certificates of proficiency to control port craft (Hafenpatentverordnung), and the Regulation on port safety (Hafensicherheitsverordnung).

Beyond Article 21(1)(2) of the Law on port traffic and shipping[35] in conjunction with Article 1(1) HVO[36], both the national (federal) and the international shipping regulations must also be applied, where the more specific take priority.

Accordingly, in terms of traffic legislation, Germany's traffic regulations for navigable maritime waterways (Seeschifffahrtsstraßen-Ordnung – SeeSchStrO) and the international Regulations for Preventing Collisions at Sea (COLREGs) should be referred to for the assessment of the collision under investigation when Hamburg's HVO contains no derogations.

4.1.2.1.1 Rules governing right of way in the port of Hamburg (extract)

According to Article 25(2)(2) SeeSchStrO, vessels following the course of the fairway have right of way over vessels entering or crossing the fairway. At the same time, whether 'crossing' refers to the entire width or only part of the fairway is of no relevance. Consequently, a vessel initially following the course of the fairway, which leaves the fairway at right angles, must be regarded as a vessel crossing an oncoming vessel and has an obligation to give way.[37]

4.1.2.1.2 Requirement to proceed on the right

The collision between the two vessels occurred in a fairway within the meaning of Articles 2(1)(1) SeeSchStrO and 4(1)(1) HVO.
Articles 1(4) and 2(1)(1) SeeSchStrO in conjunction with Rule 9(a) COLREGs stipulate a basic requirement to proceed on the right in (narrow) fairways. According to the above, a vessel must keep her starboard side as near to the outer limit of the channel or fairway as is safe and practicable.

Article 20(1) HVO (General steering rules), which applies to the Hamburg port area, modifies the foregoing obligation as follows:

"Where possible, vessels shall keep to the right of the fairway on all traffic routes and areas, and proceed such that they do not make use of traffic areas any more or for any longer than necessary. [2] *The use of the left side of the fairway is permitted*

1. *for vessels in pilot transfer service;*
2. *when manoeuvring large ships, or*
3. *only for short distances between adjacent docks, entrances or berths*

and on condition that any risk to transiting shipping is precluded."

An exception within the meaning of Article 22 SeeSchStrO, which permits derogation from the requirement to proceed on the right in certain sections of the fairway, as officially notified, does not exist for the section in question (northern Elbe main fairway).

[35] Authority to issue regulations – for traffic organisation, in particular. In each case, naming this enabling rule has been dispensed with below in the interest of improving the legibility of the remarks.
[36] Referral rule – viewed as dispensable and also omitted below in the interest of improving the legibility of the remarks.
[37] See Graf/Steinicke, SeeSchStrO, p. 85.

4.1.2.1.3 Conduct when on a head-on course

The regulations applicable on German navigable maritime waterways, and by way of referral also in the Hamburg port area, for vessels *encountering* correspond with the above requirements concerning the basic obligation to *use* the right-hand side of the fairway.

To that extent, the basic obligation to take evasive action to the starboard side when encountering on a head-on or almost head-on course is provided for in Article 24(1) SeeSchStrO, which is consistent with Rule 14(a) COLREGs. By way of derogation from Rule 14 COLREGs (which is also applicable on German navigable maritime waterways for vessels not in sight of each other)[38], *Article 24(3) SeeSchStrO* permits the evasion of an oncoming vessel to port within certain sections of the fairway, as defined by regulation, in exceptional cases. The rule goes on to state:

"The intention to do so shall be indicated to the approaching vessel. According to this rule, the vessel may indicate to the approaching vessel via VHF radiotelephony in the following circumstances:

1. *all participants in the communication process are unambiguously identified by all other participants;*
2. *an unambiguous understanding and agreement can be achieved through VHF radiotelephony;*
3. *the selection of the VHF channel used ensures that preferably all participants in traffic involved in the process are put in a position to overhear the understanding and agreement being reached through VHF radiotelephony, and*
4. *the traffic situation allows the above action to be taken.*

When the pre-requisites for reaching an agreement on radiotelephony are not met, then the intention shall be indicated to the approaching vessel using the sound signal described in Section 5 Annex II.2. […]"

The northern Elbe main fairway is not a fairway section for the purposes of this rule.

4.1.2.1.4 Conduct of vessels in restricted visibility/(safe) speed

Rules 19 and 6 COLREGs, the substance of which is supplemented by Article 26 SeeSchStrO, apply. In summary, these rules provide the obligation to proceed at a speed that taking into account the restricted visibility would allow for any action necessary to bring the vessel to a standstill within a distance appropriate to the given circumstances at all times.

Moreover, Rule 19(d) COLREGs states that a vessel which detects by radar alone the presence of another vessel shall determine if a close-quarters situation is developing and/or risk of collision exists. If so, she shall take avoiding action in ample time. Furthermore, if a course alteration is executed for a vessel forward of the beam, then evasion to port must be avoided wherever possible.

[38] Note: The requirement that Rule 14 COLREGs is also applicable on German navigable maritime waterways for vessels not in sight of each other (but that have located each other by radar) is laid down in Article 21(1) SeeSchStrO.

Article 23(1) HVO states that the permissible speed through water for commercial shipping in the port of Hamburg is 10 kts (19 kilometres per hour).

4.1.2.1.5 Basic rules for conduct in traffic

Article 5 of the Law on port traffic and shipping and Article 3(1) SeeSchStrO require as basic rules that the conduct of all traffic be such as to ensure the safety and efficiency of traffic. Accordingly, damage and detriment are prohibited, as is impeding or molestation beyond that inevitable in the circumstances prevailing.

Article 3(1) SeeSchStrO goes on to stipulate any precaution as may be required by the practice of good seamanship or by the special circumstances of the case. Finally, the second paragraph of the discussed rule provides that having due regard to the specific circumstances prevailing, any necessary action shall be taken to avoid imminent peril, even if so doing necessitates derogation from the requirements.

4.1.2.1.6 Reporting requirements (VHF radio)

Various sections of this report already address the obligation of traffic to make position reports on VHF channels 14 and 74 arising from Article 8 HVO, in particular. Accordingly, the relevant remarks may be referred to at this point.

4.1.2.2 Compliance with legal requirements in this particular case

4.1.2.2.1 Admissibility of the green-green encounter by the WILSON FEDJE and ALMERODE

An isolated view of the course of the WILSON FEDJE's voyage gives rise to the following findings when the relevant legal requirements are applied.

1) The WILSON FEDJE dispensed with her right of way over the ALMERODE and supported her turning manoeuvre by agreeing on a green-green encounter. To execute the green-green encounter in derogation from the rule of encountering port side to port side and the requirement to proceed on the right, the WILSON FEDJE moved to the northern part of the fairway.
2) According to the letter of the law, neither the pre-arranged green-green passage nor the derogation from the requirement to proceed on the right necessary in this specific case was admissible in the section in question.
3) That vessels liaise on VHF with regard to forthcoming approaches and – having regard to the specific circumstances (traffic situation and local conditions in the fairway section in question, size of vessel, manoeuvrability, mooring situation, for example) – derogate from the steering rules in the process is consistent with common practice in the port of Hamburg. In particular, agreeing on green-green encounters (and thus a possible infringement of the requirement to proceed on the right) is actually conducted regularly. During the VHF radio traffic analysed in the course of this investigation alone (period from 30 minutes before up until 30 minutes after the accident), several green-green arrangements were made on channel 74 in various parts of the port of Hamburg as a matter of routine. Such arrangements and possibly necessary infringements of the

requirement to proceed on the right regularly go unsanctioned by the shipping police authorities.[39]

4) Given the very restricted visibility, the green-green passage between the ALMERODE and WILSON FEDJE made it possible to avoid an extremely hazardous drift/lay-up on the part of the ALMERODE on the main fairway. Inasmuch, it facilitated the safety and efficiency of traffic.
5) Although the green-green passage between the ALMERODE and WILSON FEDJE was not in a fairway section in which Article 24(3) SeeSchStrO permits one in exceptional cases, in analogous application of the rule referred to, the two vessels observed three of its four provisions. They clearly identified each other, liaised over VHF, and notified other traffic (and the radar guidance service) of the manoeuvre on channel 74, which all vessels are required to listen in on.[40]
6) Recognition of the admissibility of the green-green encounter under common law is subject to the mandatory observance of the basic rules for conduct in traffic. They state that other traffic must not be exposed to any damage or detriment, be put at risk, or be impeded or molested any more than is inevitable in the circumstances prevailing as a result of such agreements. In reverse, Article 24(3)(4) SeeSchStrO (in this case applied analogously) allows a green-green encounter only if the traffic situation so permits. The indirectly relevant Article 20 HVO contains the same condition in that it stipulates that the requirement to proceed on the right may only be derogated from if any risk to transiting shipping is precluded.

Interim findings

The green-green arrangement between the WILSON FEDJE and ALMERODE and subsequent navigation of the WILSON FEDJE into the northern part of the fairway were not consistent with the steering rules. Based on the common law practices in the port of Hamburg and the valid objective of ensuring that the flow of traffic is as smooth as possible and thus safe and efficient, these 'infringements of the rule' were – **apart from the aspect of the traffic situation, which still needs to be considered separately** – justified, however.

[39] Note: In a criminal case concerning a collision between two vessels in the port of Hamburg brought before the Hamburg Local Court, which considered common law and customary practices that derogate from legal requirements, inter alia, the judge commented as follows: *"The port can only function if we remain pragmatic and liaise with one another."* (Quote taken from the report 'ENA2 Disaster: Master of Tanker Awarded a Suspended Sentence' in the 3 June 2006 issue of the 'DIE WELT' daily newspaper).

[40] Note: With regard to the fourth requirement of Article 24(3) SeeSchStrO (traffic situation), see comments below in Section 4.1.2.2.2.

4.1.2.2.2 Traffic situation as grounds against the green-green arrangement between the WILSON FEDJE and ALMERODE?

1. The traffic situation in this specific case was objectively marked by the fact that the JADE was following the ALMERODE.
2. The JADE last reported in on channel 74 at 0741 when she turned from the Köhlbrand into the northern Elbe; stating her name, she notified her position and the further course of her voyage.
3. Although the WILSON FEDJE had not identified the JADE by name before the accident (without her being open to reproach to that extent), the radar pilot had informed her twice that an oncoming vessel was following the ALMERODE.
4. Indeed, the two times that the radar pilot informed her were after the green-green agreement between the WILSON FEDJE and ALMERODE. However, they were before the WILSON FEDJE started to execute the arrangement and move into the northern part of the fairway.
5. In the course of the green-green encounter between the WILSON FEDJE and ALMERODE, the JADE moved into the range of the radar unit used by the WILSON FEDJE's pilot. Moreover, the latter was also informed about the oncoming vessel a total of two times (by the pilot of the XIN LOS ANGELES and by the radar pilot). The green-green passage between the ALMERODE and WILSON FEDJE had now passed the point of no return, however.
6. Due to the relatively close proximity between the ALMERODE and JADE, it was no longer possible for the WILSON FEDJE to return safely to the southern part of the fairway so as to then execute a port side to port side encounter with the JADE after passing the ALMERODE.

Interim findings

Viewed in hindsight and objectively, the traffic situation opposed the arrangement of a green-green passage between the ALMERODE and WILSON FEDJE because this inevitably gave rise to a further need to arrange a green-green encounter with the JADE, which was immediately behind the ALMERODE. However, it was not possible to make such an arrangement because for lack of a AIS (non-required) ID, the JADE could not be identified by name and thus not addressed directly over VHF. Furthermore, not registering for the (voluntary) radar guidance service and omitting to send the mandatory position report at the 'Mouth of the Parkhafen into the northern Elbe' reporting point, which the JADE passed immediately before the arrangement between the ALMERODE and WILSON FEDJE, objectively opposed the opportunity and necessity for the WILSON FEDJE to request a green-green encounter from the JADE.

However, supporting the WILSON FEDJE is the fact that the agreement on the green-green passage with the ALMERODE and the initial (unspecific) indications regarding the oncoming vessel, JADE, were in very close temporal proximity. What is more, the ALMERODE and the WILSON FEDJE drew attention to their green-green arrangement clearly and unambiguously on channel 74.

Moreover, the WILSON FEDJE's pilot also notified his position ('*inside the northern part of the fairway*') and the course of the voyage ('*approaching Köhlbrand*') in clear terms on channel 74 as events unfolded. Consequently, taking the subjective, ex ante-based view of the WILSON FEDJE's pilot, it is quite understandable that he did not immediately reconsider the green-green arrangement with the ALMERODE after receiving initial information about the oncoming JADE, but was confident that the ensuing close-quarters situation with the anonymous JADE would be executed without any complications.

4.1.2.2.3 Green-green encounter by the WILSON FEDJE and JADE

An isolated view and assessment of the green-green encounter with the JADE intended by the WILSON FEDJE's pilot would give rise to the conclusion that it was not permitted pursuant to the above legislation for lack of an agreement between the two vessels. As far as is evident, the passage of two vessels to their respective starboard side without making an explicit agreement on VHF is not consistent with the common law practices in the port of Hamburg, either.

The specific approach between the WILSON FEDJE and JADE was marked by the atypical anomaly that the latter was anonymous to the WILSON FEDJE for lack of an AIS ID, for lack of a position report at the 'Mouth of the Parkhafen into the northern Elbe' reporting point, and for lack of registering for the radar guidance service. Consequently, the WILSON FEDJE's pilot was unable to address the JADE directly during the course of the approach. Added to the above is the fact that the JADE was moving on a consistent course downstream on the River Elbe, the WILSON FEDJE's pilot had communicated the position and (future) course of his ship several times on channel 74 and kept the course of his ship (also consistent) in the northern part of the fairway. Given the circumstances it is therefore understandable that from a seafaring perspective he was confident that a green-green encounter had been tacitly agreed on even without a direct agreement that one would be executed, as is basically required.

4.1.2.2.4 Observance of the reporting requirements

It has been noted at various points in this investigation report that the WILSON FEDJE complied fully with the reporting requirements in the port of Hamburg. The JADE complied with her reporting requirements only partially. It is reasonable to assume with a great degree of certainty that the failure to send a position report at the 'Mouth of the Parkhafen into the northern Elbe' reporting point significantly influenced the process surrounding the development of the accident situation immediately afterwards.

4.1.2.2.5 Speed

It is difficult for the BSU to assess conclusively and objectively whether the WILSON FEDJE and JADE had adapted their speeds to sufficiently account for the prevailing visibility retrospectively. However, it is important to note that a certain minimum speed, which is dependent on the size of the vessel and possibly other factors, must be maintained to preserve effective manoeuvrability.

The BSU has no evidence to suggest that the speed of about 8.5 kts selected by the WILSON FEDJE or that of the JADE of about 6 kts exceeded actual necessities significantly.

4.2 Responsibilities and flow of information on board the WILSON FEDJE

The BSU was unable to make a detailed analysis of the discussions between the ship's command and the pilot on the bridge of the WILSON FEDJE due to the limited quality of the corresponding recordings of the VDR inherent in the system. However, the statements of the witnesses interviewed indicate that the WILSON FEDJE's pilot and her master liaised on the manoeuvring characteristics of the ship after the pilot boarded. By his own admission, the Russian master did not understand the substance of the discussions between the pilot, the radar pilot, and vessels indirectly involved in the course of events leading up to and during the accident due to insufficient knowledge of German, however.

The master also stressed in a written statement that he was confident in the pilot and the pilot's decisions and believed he had the traffic situation under control.

4.3 Role of Hamburg Port Traffic

4.3.1 Legal requirements

Hamburg Port Traffic is responsible for information, traffic surveillance and traffic organisation services with a view to guaranteeing the safety, efficiency and environmental compatibility of shipping traffic, as well as preventing dangers and environmental nuisance posed by shipping.

The International Maritime Organization issued the Guidelines for Vessel Traffic Services (VTS) in Resolution A.857(20). This distinguishes between three possible duties of a VTS: traffic information, assistance, and organisation, where defining the nature and extent of the duties of a VTS is the responsibility of the notified body of a contracting State.

Ports on Germany's federal waterways are the responsibility of the respective federal state. The Hamburg Port Authority is the body responsible for the port of Hamburg. The nature and extent of the services of Hamburg Port Traffic are laid down in the 'Hamburg Port Authority's administrative instruction on the operation of Hamburg Port Traffic'.

Section 1 of this administrative instruction states that Hamburg Port Traffic is assigned the central duties of the information, traffic surveillance and traffic organisation service in the port of Hamburg. Sections 26 to 28 define the duties of information, assistance, and organisation pursuant to the above IMO Resolution in greater detail. Moreover, the definitions under Section 3 of the administrative

instruction distinguish between 'continuous observation/analysis' and 'uninterrupted observation/analysis'. According to the relevant legal definitions, 'continuous' means 'in such time intervals as to permit a general overview of the situation in the area'. By contrast, 'the sustained observation recognised as necessary from case to case in order to be able to encounter an approaching danger in time with the means available' is meant by 'uninterrupted'.

According to Section 26 of the administrative instruction, traffic information consists of 'individual items of information provided to shipping on the recognised operating channels as required or on request'.

Section 27 states that traffic assistance 'comprises advice and warnings to shipping, as well as recommendations within the framework of a ship guidance service'. The advice and warnings are intended to draw the attention of traffic to hazardous situations.

Traffic organisation under Section 28 'comprises shipping-police orders issued from case to case when assistance is not sufficient'. It should be noted here that in areas where the manoeuvring of ships can no longer be analysed as regards desired success, Hamburg Port Traffic may not intervene in the handling of vessels. However, Section 28 explicitly states that warnings to the ship's commands concerned are beyond the scope of this restriction.

According to Section 25(2) of the administrative instruction, information, assistance and organisation have a hierarchical relationship, where the next higher measure must be taken if the desired objective could not be achieved with the measure preceding it. The third paragraph goes on to explain that nautical supervisors at Hamburg Port Traffic are required to prioritise if an assessment of the situation reveals simultaneous hazards.

According to information given by the Hamburg Port Authority, some 39,000 seagoing ship movements are recorded in the Hamburg port area each year. Accordingly, in addition to general information on the traffic situation, nautical supervisors on duty at Hamburg Port Traffic concentrate on traffic assistance for seagoing ships. This assistance for outbound and inbound ships is provided on VHF channel 14 such that entries and departures of large ships are planned and coordinated according to tidal windows, berths, and possible encounters among one another. In the process, nautical supervisors at Hamburg Port Traffic make use of continuous observation and analysis of radar images and the radio traffic on channel 74.

Traffic information on other vessels, in particular, port craft and inland waterway vessels, is obtained regularly by seagoing ships and their pilots on board by listening in on channel 74, where Hamburg Port Traffic does not process reports made by these vessels any further. Conversely, port craft and inland waterway vessels obtain their traffic information about other vessels, including information about seagoing ships, only through the mandatory reports on channel 74.

To that extent, Hamburg Port Traffic only represents an information service for this group of vessels. Traffic arrangements between individual vessels, including between seagoing ships and port craft or inland waterway vessels, should be made by the individuals in command or pilots of those vessels directly on channel 74 or individually agreed operating channels.

4.3.2 Implementation of legal requirements

The nautical supervisor at Hamburg Port Traffic acknowledged the mandatory reports of the WILSON FEDJE (when she reached the port boundary) and the JADE (after leaving her berth) on VHF channel 14 and advised that the radar guidance service was available in each case.

The position reports of the two vessels on channel 74 were not acknowledged separately. This does not merit any criticism. The reports and any other advice sent on this channel are items of information, which a vessel directs primarily to all other traffic. Acknowledgements to such radio messages or reports by Hamburg Port Traffic are basically not provided for.

In the course of Hamburg Port Traffic's analysis of the overall situation, specific priority was evidently not placed on observing the movement of the vessels directly or indirectly involved in the accident. Besides the fact that it is basically impossible for the limited human resources at Hamburg Port Traffic to monitor the flow of traffic in the Hamburg port area permanently and comprehensively, the fact that the shore-based radar guidance service, implemented due to fog, monitored the flow of traffic in various parts of the port is likely to also have played an important role.

Traffic assistance within the meaning of Section 27 of the Hamburg Port Authority's administrative instruction on the operation of Hamburg Port Traffic, which could have consisted of advice and/or warnings issued to the vessels involved, was dispensed with up until the very last minute.

According to Section 25(2) of the administrative instruction discussed, the warnings or advice would have had to be transmitted to the vessels in good enough time for them to take any measures necessary to avert threats through liaising immediately and appropriate vessel handling. Section 3(1) of the administrative instruction defines danger in this context as the possible occurrence of damage evident in the foreseeable future should events continue unabated. Impairment of the safety and efficiency of traffic or of the port as a traffic route must be sufficiently probable.

Making an assessment of the time at which the nautical supervisor at Hamburg Port Traffic believed the occurrence of damage within the meaning of the rules discussed was sufficiently probable in the situation reviewed is difficult in retrospect.

This is all the truer when the nautical supervisor's understandable confidence that routine encounter situations will basically unfold without any complications and that traffic will liaise is also considered.

Although the forthcoming dangerous close-quarters situation between the two vessels would have become increasingly apparent at Hamburg Port Traffic based on the radar recordings of the relevant section of the fairway showing the approach of the WILSON FEDJE with the oncoming vessel following the ALMERODE, it must be considered that the nautical supervisor at Hamburg Port Traffic is required to monitor and organise shipping traffic throughout the port area. Moreover, in addition to the permanent radar-based observation of the various vessel movements in the different areas of the port, the nautical supervisor must also perform the function of coastal radio station Hamburg Port Traffic and the associated task of controlling and handling radio traffic.

Greater concentration on hazardous situations, such as in the present case, on the part of the nautical supervisor is objectively desirable but contrasts with the practical need to prioritise when monitoring traffic.

Moreover, it is highly unlikely that traffic assistance (advice/warning) by Hamburg Port Traffic would actually have prevented the collision at the time at which the hazardous situation became apparent.

4.4 Determinants

4.4.1 Area language

The first sentence of Article 8(1) HVO states that German is the area language in the port of Hamburg. This requirement is accounted for by the first sentence of Article 6 of Hamburg's Law on pilots (Lotsgesetz), which provides for the professional requirements to serve as a port pilot and refers to Article 9 of Germany's Law on sea pilots (Seelotsgesetz), inter alia. Paragraph 2(4) of the above rule states that pilots must be fluent in spoken and written German. This also applies to the skipper of any vessel exempt from the obligation to engage a pilot under Articles 6 and 7 of Hamburg's Regulation on pilots (Lotsordnung).

Any communication leading up to and following the accident was conducted in German. The JADE's Polish skipper also sent his position reports in German. He was able to give readily understandable answers to the queries of Hamburg Port Traffic concerning his departure report. Accordingly, the BSU has no evidence to suggest that language deficits were the reason for the JADE's skipper not taking note of the messages from the ALMERODE and WILSON FEDJE regarding their green-green encounter or subsequent position reports of the WILSON FEDJE.

4.4.2 Pilot requirements

4.4.2.1 Legal requirements

Article 5 of Hamburg's Regulation on port pilots (Hafenlotsordnung) specifies which vessels are required to make use of the port pilotage service. Articles 6 ff. provide exemptions from the above, which are subject to certain conditions.

Article 10 of the Regulation on port pilots provides that vessels exempt from the obligation to engage a port pilot are required to register for radar guidance when visibility is less than 2,000 metres or west of Seemannshöft on the lower Elbe less than 3,000 metres. All ships exempt from the obligation to engage a pilot under Articles 6 to 8 are required to make use of the port pilotage service when visibility is less than 500 metres.

4.4.2.2 Situation in respect of the WILSON FEDJE and JADE

The WILSON FEDJE had a port pilot on board in accordance with legal requirements. Moreover, the ship registered voluntarily for the additional shore-based radar guidance service.

As an inland waterway vessel, the JADE was basically not obliged to engage a port pilot. She was therefore not part of the addressee group of vessels merely exempt from the obligation to engage a pilot. Consequently, the JADE was not required to register for shore-based radar guidance due to poor visibility. A special rule that in certain situations obliges vessels basically not required to make use of the port pilotage service to take a port pilot on board or at least register for the shore-based radar guidance service does not exist at the port of Hamburg.

4.4.3 Weather conditions

Dense fog prevailed at the time of the accident. This significantly complicated mutual identification of the two vessels by name. Inter alia, the assessment and evaluation of the courses and/or course alterations of each oncoming vessel, in particular, was heavily impeded by the fact that visual observation was impossible due to the poor visibility.

4.5 Emergency management after the accident

After the accident, any action necessary was initiated immediately by the pilot and ship's command of the WILSON FEDJE, Hamburg Port Traffic, and the other vessels operating in the area of the collision.

The rapid offer of assistance by the tug BUGSIER 14, which became aware of the collision by listening in on the accident reports sent on VHF channels 14 and 74 and immediately proceeded to the distressed vessel as a precaution, is worthy of note. The actions of pilot boat 3, which had a port pilot on board, were also extremely judicious when she also immediately proceeded to the JADE without being specifically requested to, so as to investigate the distressed vessel's situation and provide assistance if necessary.

It was not possible to clarify why the skipper of the JADE did not respond to any of the various attempts to make contact with her on VHF by the WILSON FEDJE or Hamburg Port Traffic after the collision. This may have been due to the excessive stress situation in which he found himself following the life-threatening collision with the much larger WILSON FEDJE.

At any event, that he succeeded in manoeuvring his ship safely to the embankment and ground her there after the collision and despite the heavy damage she had sustained must be viewed positively when considering the actions of the JADE's skipper after the accident. In so doing, he not only averted further danger to his own and his deckhand's life and limb, but by steering for the embankment may also have prevented a serious obstruction to the flowing traffic on the northern Elbe main fairway, especially given the prevailing fog.

5 Conclusions

5.1 Primary cause of the accident

5.1.1 Description of the problems

In the final analysis, the collision between the WILSON FEDJE and JADE was caused by the fact that the JADE's skipper did not interpret the oncoming WILSON FEDJE (or her radar echo), approaching his ship on the 'wrong' side of the fairway, as a vessel sailing upstream on the River Elbe with which an uncomplicated green-green encounter could have been executed with no specific navigational action. Instead, after a direct close-quarters situation had occurred with an object that from his perspective was unknown in terms of name and intentions, he felt compelled to initiate a last-minute avoiding action. In the context of Rule19(d)(i) COLREGs quite logical, he altered his course rigorously to starboard and sailed directly in front of the WILSON FEDJE's bow for that reason only. For its part, her ship's command assumed up until the very last minute that the JADE, detected on the radar but also anonymous, would readily continue her voyage downstream on the River Elbe and that the vessels would pass safely starboard to starboard, even without liaising directly, as was actually necessary here.
There were several closely linked reasons involving the aspects of information and communication for the unfortunate misunderstanding, which are summarised below.

5.1.2 Information and communication deficits

The starting point for the opposing (thus responsible for the accident) assessments and evaluations of the approach between the WILSON FEDJE and JADE on each vessel's bridge, which ultimately resulted in the vessels colliding, was the fact that the WILSON FEDJE was unable to identify the JADE for lack of an AIS ID (not required on inland waterway vessels) and because of the mandatory but omitted position report at the 'Mouth of the Parkhafen into the northern Elbe' reporting point, which was upstream of the subsequent scene of the accident. Moreover, since the JADE had not registered for shore-based radar guidance voluntarily, the WILSON FEDJE was unable to use this means of (indirectly) identifying the JADE in the course of her own shore-based radar guidance.

Conversely, the JADE's skipper was also unable to identify the WILSON FEDJE by name using technical means for lack of mandatory AIS receiving equipment (preferably implemented in a radar image or an electronic nautical chart). Duly monitoring the radio traffic on the relevant area radio channel, 74, would have given him the opportunity to identify the WILSON FEDJE in terms of name and establish her intentions in good time, however. It was not possible to determine why he did not make use of this opportunity. There was no evidence to suggest that language deficits were responsible for this.

5.1.3 Possible methods of resolution

With a probability bordering on certainty, the collision between the WILSON FEDJE and JADE would not have occurred if the inland waterway vessel, JADE, had been equipped with AIS and/or registered for shore-based radar guidance or had a pilot on board.

5.1.3.1 AIS requirement for inland waterway vessels

As regards the Rhine, the Member States of the Secretariat of the Central Commission for the Navigation of the Rhine passed a resolution on the mandatory use of Inland AIS[41] as from 1 December 2014.[42] Apart from certain exceptions, this includes all inland waterway vessels.

According to information given by the Directorate-General for Waterways and Shipping (GDWS), which is responsible for the management of Germany's federal waterways, similar arrangements are planned for the other inland waterways.

The BSU welcomes these plans. On inland waterways used simultaneously as navigable maritime waterways, in particular, it means a considerable increase in safety for the regularly encountered coexistence of seagoing ships and inland waterway vessels when the traffic from both categories of ship are able to identify and on that basis communicate with each other at all times.

5.1.3.2 Obligation of inland waterway vessels to make use of the port pilotage service or register for shore-based radar guidance

The BSU is of the opinion that the Regulation on port pilots, currently applicable in the port of Hamburg, constitutes a problem in terms of the exclusion of a large percentage of inland waterway vessels. As has been made clear by the course of events leading up to and during the accident, this is especially true when inland waterway vessels thus far not required to carry AIS equipment and exempted from the obligation to engage a pilot form part of the shipping traffic in restricted visibility.

Although an obligation to engage a pilot applicable to all inland waterway vessels, at least in restricted visibility, would bring about the greatest increase in safety, it appears to be hardly realistic for reasons of limited human resources on the part of the port pilotage service (even if generous individual exemptions were granted).

One possible compromise would be to place inland waterway vessels under an obligation to register for shore-based radar guidance or at least (passively) monitor the relevant radar guidance channels if they decide to circulate in the Hamburg port area, which is characterised by extremely complex traffic flows and a network of different traffic routes and areas, in restricted visibility.

[41] Note: Inland AIS is a type of AIS designed for the specific needs of inland waterway vessels. As far as the basic details are concerned like name of ship, position, course and speed, full compatibility with the systems stipulated for seagoing ships prevails (on international voyages 300 GT and above, otherwise 500 GT and above; see SOLAS Chapter V Regulation 19(2.4)).

[42] Note: With regard to the carriage requirements, see Article 4.07 of the Rhine Navigation Police Regulations.

5.2 Communication and navigational responsibilities on the bridge of the WILSON FEDJE

The navigational activities on the bridge of the WILSON FEDJE were marked by the fact that the pilot and master of the ship agreed that the pilot would assume responsibility for navigation. Accordingly, the pilot did not consult the master further when deciding on the course and speed of the ship. Article 7 of the Free and Hanseatic City of Hamburg's Law on port pilots (Hafenlotsgesetz) in conjunction with Article 23(2) of Germany's Law on sea pilots (Seelotsgesetz) cover explicitly the admissibility of such action, which is common practice in the port of Hamburg. However, it also follows from the above rule that in keeping with the principles of international law and in spite of the existing obligation of pilotage, the master remains responsible for the ship in such a case in every respect under maritime law.

Article 23(2) Seelotsgesetz
[…]
(2) The master remains responsible for navigating the ship even if he permits the sea pilot to independently issue orders relating to navigation of the ship.
[…]

Chapter VIII Section A Part 4-1 Point 49 STCW Code
Despite the duties and obligations of pilots, their presence on board does not relieve the master or the officer in charge of the navigational watch from their duties and obligations for the safety of the ship. The master and the pilot shall exchange information regarding navigation procedures, local conditions and the ship's characteristics. The master and/or the officer in charge of the navigational watch shall cooperate closely with the pilot and maintain an accurate check on the ship's position and movement.

Witness testimony and the corresponding VDR audio recordings of the bridge communication underpin the assumption that the WILSON FEDJE's pilot neither informed the Russian master about the green-green encounter agreed with the ALMERODE in German nor about the warnings, also in German, concerning the oncoming vessel, which had not been identified by name.
It is not possible for the BSU to judge retrospectively whether the master would have actually opposed the course of the voyage determined by the pilot in this case. However, it is clear that it is reasonable to rate this lack of information as a risk-increasing factor at the very least.

In this context, the BSU refers to IMO Resolution A.960(23) concerning the recommendations on training and certification and on operational procedures for maritime pilots, which the 23rd Assembly of the IMO adopted at its session of 24 November to 5 December 2003. In addition to various other important aspects of the work of a pilot, the Resolution also covers various aspects of cooperation between a pilot and the ship's command, which are stated in Annex 2 (Recommendation on operational procedures for maritime pilots) to the Resolution, at

Points 2, 5, and – with regard to the importance of verbal communication – 6, in particular.

Excerpt of IMO Resolution A.960(23), Annex 2:

2 DUTIES OF MASTER, BRIDGE OFFICERS AND PILOT

2.1 Despite the duties and obligations of a pilot, the pilot's presence on board does not relieve the master or officer in charge of the navigational watch from their duties and obligations for the safety of the ship. It is important that, upon the pilot boarding the ship and before the pilotage commences, the pilot, the master and the bridge personnel are aware of their respective roles in the safe passage of the ship.

2.2 The master, bridge officers and pilot share a responsibility for good communications and understanding of each other's role for the safe conduct of the vessel in pilotage waters.

2.3 Masters and bridge officers have a duty to support the pilot and to ensure that his/her actions are monitored at all times.

5 MASTER – PILOT INFORMATION EXCHANGE

5.1 The master and the pilot should exchange information regarding navigational procedures, local conditions and rules and the ship's characteristics. This information exchange should be a continuous process that generally continues for the duration of the pilotage.

5.2 Each pilotage assignment should begin with an information exchange between the pilot and the master. The amount and subject matter of the information to be exchanged should be determined by the specific navigation demands of the pilotage operation. Additional information can be exchanged as the operation proceeds.

[…]

6 COMMUNICATIONS LANGUAGE

6.1 Pilots should be familiar with the IMO Standard Marine Communication Phrases and use them in appropriate situations during radiocommunications as well as during verbal exchanges on the bridge. This will enable the master and officer in charge of the navigational watch to better understand the communications and their intent.

6.2 Communications on board between the pilot and bridge watchkeeping personnel should be conducted in the English language or in a language other than English that is common to all those involved in the operation.

6.3 When a pilot is communicating to parties external to the ship, such as vessel traffic services, tugs or linesmen and the pilot is unable to communicate in the English language or a language that can be understood on the bridge, the pilot should, as soon as practicable, explain what was said to enable the bridge personnel to monitor any subsequent actions taken by those external parties.

Although the preceding Recommendation 6.3 does not explicitly address cases where a VTS or another vessel sends messages to the pilot in a language not spoken by the master, it is beyond doubt that its purpose and objectives also cover such scenarios.

The ship's command can only satisfy its duty and ultimate responsibility for the safety of the ship, her crew, and the environment if it is fully informed about any information and orders addressed to and/or concerning the ship at all times.

The BSU can only speculate on whether a more in-depth exchange of information between the WILSON FEDJE's pilot and her master would have prevented the accident but believes it to be highly unlikely in this specific case. Nevertheless, the facts investigated provide another opportunity to remind ship's commands and pilots of the necessity and importance of close cooperation and a steady exchange of information.[43]

5.3 Opportunities for the VTS to intervene

A marine casualty occurring in an area monitored by a VTS always gives rise to the question as to whether the port of Hamburg's vessel traffic centre had the opportunity to prevent the marine casualty by giving verbal recommendations to the ship's crew(s) and the pilot on VHF.

Here, it should generally be noted that ship's commands and pilots 'on the ground' normally have a better overall view of the traffic situation than the nautical supervisor acting remotely at the centre. Furthermore, when monitoring the various vessels operating in his area of responsibility, the latter is unable to and/or ought not focus his attention on individual traffic movements for an extended period in most cases.

What is more, the party responsible at the centre can normally rely on the fact that the generally well-trained ship's commands and the pilots, highly qualified and subject to ongoing in-service training, carefully exercise their profession in accordance with the universal legal requirements, as well as the specific instructions issued and the necessities. These considerations apply to the traffic in the port of Hamburg to the fullest extent. They are confirmed by the fact that based on the extremely high number of traffic movements there, collisions between encountering vessels caused by human error occur only rarely.

At best, an opportunity for Hamburg Port Traffic to intervene therefore arises from possibly observing the approach of the WILSON FEDJE and JADE on the radar. As already broadly explained above, the limited human resources at Hamburg Port Traffic cannot be expected to permanently monitor and analyse every ship movement that they are basically able to observe by technical means, however.

5.4 Area language

As already stated several times, the BSU has no specific evidence to suggest that insufficient knowledge of the German language was one of the causes of the course of events leading up to and during the accident investigated.

[43] Note: See also the comments in Section 6 of the BSU's Investigation Report No 330/13 of 15 March 2016 and the Safety Recommendation No 7.1.2 contained therein (source: www.bsu-bund.de).

However, this cannot be ruled out, either, and therefore raises the question of whether the implementation of current political considerations in Germany with regard to defining English as the area language would have significantly changed the course of events leading up to and during this specific accident, and more importantly, whether it would have enhanced the safety of shipping in the port of Hamburg.

The BSU does not believe this to be so in either case. In this specific case, it cannot be readily assumed that the JADE's skipper would have understood English better than German. Moreover, in respect of the general definition of English as the area language, it must be remembered that a large number of inland waterway vessels and small craft from the commercial and non-commercial sector circulate in the port of Hamburg, in particular. It can neither be assumed that all of the individuals in command of such vessels have a knowledge of English (as far as recreational craft are concerned, in particular), nor simply required of them by law or regulation.

Finally, it is also important to remember that Article 23(1) of Germany's Law on administrative procedure (Verwaltungsverfahrensgesetz) states that German is the (sole) official language in Germany (at least thus far). In respect of legally binding communication between German (shipping police) authorities and German and/or foreign traffic, a corresponding change in public shipping law in favour of English involves an array of administrative and possibly even constitutional issues. The BSU believes that it would probably be extremely difficult to respond to these with legal certainty.

Moreover, the fact that English is the international language of shipping is accounted for without a corresponding definition as area language in that both pilots and nautical supervisors at vessel traffic centres (must) have sufficient knowledge of English, meaning that communication between foreign ship’s commands and pilots or German shipping police authorities in English is already possible and where necessary the order of the day.

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 Federal Ministry of Transport and Digital Infrastructure (BMVI); Directorate-General for Waterways and Shipping (GDWS)

AIS carriage requirement for inland waterway vessels

The Federal Bureau of Maritime Casualty Investigation recommends that the BMVI and its subordinate GDWS establish a carriage requirement for AIS on inland waterway vessels at short notice within their geographic area of responsibility, similar to the measures already adopted for the River Rhine. In particular, on heavily congested navigable waterways used by both inland waterway vessels and seagoing ships, the BSU believes that extending the scope of the AIS carriage requirement on federal waterways to include inland waterway vessels is urgently necessary to enhance the safety and efficiency of shipping traffic.[44]

6.2 Senate of the Free and Hanseatic City of Hamburg; Authority for Economic Affairs, Transport and Innovation; Hamburg Port Authority

6.2.1 Revision of the Regulation on traffic in the port of Hamburg and/or the Regulation on port pilots

The Federal Bureau of Maritime Casualty Investigation recommends that the bodies responsible for the administration and regulation of port traffic and port pilotage in the port of Hamburg critically review the provisions of the Regulation on port pilots in relation to the existing complete exclusion of a large percentage of inland waterway vessels from the obligation to make use of pilotage services. If the outcome of such a review is that a percentage of inland waterway vessels is neither required to engage a port pilot nor register for shore-based radar guidance even in restricted visibility in the future, then the BSU recommends that the applicable provisions at least be adapted to the effect that all vessels are required to use – i.e. listen in on (passively) – the radar guidance channel relevant in the particular section as an information medium in addition to the traffic channel if the technical requirements on board for that are given.

6.2.2 AIS carriage requirement for inland waterway vessels

The Federal Bureau of Maritime Casualty Investigation recommends that the bodies responsible for the administration and regulation of port traffic and port pilotage in the port of Hamburg introduce a carriage requirement for AIS on inland waterway vessels

[44] Note: According to a communique from the BMVI to the BSU, a requirement to carry and use AIS and ECDIS is scheduled for inclusion within the scope of Germany's Regulation on navigable inland waterways (Binnenschifffahrtsstraßen-Ordnung) and the River Danube as from 1 January 2017.

within their area of responsibility, similar to the recommendation (6.1) addressed to the federal government.

6.3 Hamburg Harbour Pilots' Association

6.3.1 Communication between pilot and ship's command

The Federal Bureau of Maritime Casualty Investigation recommends that the Hamburg Harbour Pilots' Association urge its pilots during in-service training and/or by written information to make available any information of importance to the vessel under pilotage, including any derogations from the steering rules, to the party on the bridge responsible for the ship's command. It is especially important to ensure that ship's commands which understand only a little German or none at all are always aware of the content and outcome of radio communications held in German.

6.3.2 Derogations from the steering rules applicable in the port of Hamburg

The Federal Bureau of Maritime Casualty Investigation recommends that the Hamburg Harbour Pilots' Association raise awareness among its pilots during in-service training and/or by written information of the indispensable need to ensure that any traffic affected by a derogation from the steering rules (agreement on a green-green encounter, temporary use of the 'wrong' side of the fairway, for example) is informed reliably and in good time and – wherever necessary – has agreed explicitly and unequivocally.

7 SOURCES

- Written accounts, statements, documents, and logs
  - MV WILSON FEDJE
  - JADE
- MV WILSON FEDJE's VDR data
- Statement of the legal representative of the WILSON FEDJE's pilot
- Statements of the Hamburg Harbour Pilots' Association
- Nautical charts and ship particulars, BSH
- Photos of the MV WILSON FEDJE and the JADE, Dietmar Hasenpusch Photo-Productions, Hamburg
- Findings and photos of WSP Hamburg
- Audio, radar, and AIS recordings from Hamburg Port Traffic
- Official report by the DWD of 27 March 2014 on the weather conditions in the vicinity of the port of Hamburg level with fairway buoys 132/134 at about 0800 CET (0700 UTC) on 5 March 2014
- Graf, Kurt; Steinicke, Dietrich (publ.); Traffic Regulations for Navigable Maritime Waterways, Commented, 4th Edition; publishing house Delius, Klasing & Co. KG, Bielefeld, 2009
- Various statements on the draft investigation report