



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

Investigation Report 225/15

Serious Marine Casualty

**Collision between the ferry FRISIA V
and a quay facility in Norddeich
on 16 June 2015**

7 March 2017

The investigation was conducted in conformity with the Law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law – SUG) of 16 June 2002, amended most recently by Article 22 of 24 May 2016, BGBl. (Federal Law Gazette) 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 investigation report.

Issued by:
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Table of Contents

1	SUMMARY.....	5
2	FACTUAL INFORMATION.....	6
2.1	Photo of ship	6
2.2	Ship particulars.....	6
2.3	Voyage particulars.....	7
2.4	Marine casualty or incident information	7
2.5	Shore authority involvement and emergency response.....	7
2.6	Nautical chart	8
3	COURSE OF THE ACCIDENT AND INVESTIGATION	9
3.1	Course of the accident	9
3.2	Investigation	10
3.2.1	Course of the voyage	10
3.2.2	The ferry	13
3.2.3	Controlling the ferry	14
3.2.4	Physical injuries.....	15
3.2.5	Passenger safety.....	16
3.2.6	Damage to the ferry.....	18
4	ANALYSIS.....	19
4.1	Course of the accident	19
4.2	Accident damage.....	19
5	ACTIONS TAKEN	20
5.1	Modification of the electrical circuitry	20
5.2	Passenger safety.....	20
6	SOURCES	21

Table of Figures

Figure 1: Photo of the FRISIA V	6
Figure 2: Nautical chart showing the scene of collision	8
Figure 3: Position at 135645, 7.7 kts SOG	11
Figure 4: Position at 135815, 7.0 kts SOG	11
Figure 5: Position at 135845, 6.4 kts SOG	12
Figure 6: Position at 135907, 5.5 kts SOG	12
Figure 7: Position at 135920, 4.9 kts SOG	13
Figure 8: View of the FRISIA V's stern	14
Figure 9: Overall view of the FRISIA V's bridge.....	14
Figure 10: Operating console for the control system on the starboard side of the bridge.....	15
Figure 11: Area in front of the door.....	16
Figure 12: Area of the baggage compartment	16
Figure 13: Circular of the Ship Safety Division (BG Verkehr) of 27 June 2014.....	17
Figure 14: Damage to the ferry's bow section (side view)	18
Figure 15: Damage to the ferry's bow section (front view).....	18
Figure 16: Safety notice on board the ferries.....	20

1 Summary

At about 1359¹ on 16 June 2015, the ferry FRISIA V collided with a quay facility while sailing into the port of Norddeich. A number of passengers were injured in the process. Two passengers had to be admitted into a hospital as in-patients. Another passenger was treated briefly and then discharged. A passenger vehicle was damaged due to the collision. The ferry sustained large indentations above the waterline in the bow section. The hull sustained a minor tear in this area. Moreover, a twin dolphin broke apart and the quay facility sustained minor damage due to the collision.

The ferry was usually manoeuvred using her two Schottel propellers. This was also the case during the third call at the port of Norddeich on that day. The cause of the collision was that the captain apparently only half-pressed a push button used for switching from autopilot to the manual control system for the Schottel propellers. Due to the switching characteristics of the push button, which had not been identified up until that point, the half-pressed push button did not cause the control system to switch completely, even though this was indicated visually. As a result, it was not possible for the captain to execute a planned turning and deceleration manoeuvre within the inner harbour. When the risk of colliding with the quay facility was recognised, the captain attempted to decelerate the ferry using her conventional propeller and warn the passengers. This was only partially successful. The ferry collided with the quay at a speed of about 5 kts.

¹ All times shown in this report are Central European Summer Time.

2 FACTUAL INFORMATION

2.1 Photo of ship



Figure 1: Photo of the FRISIA V

2.2 Ship particulars

Name of ship:	FRISIA V
Type of ship:	Passenger ship
Nationality/Flag:	German
Port of registry:	Norderney
IMO number:	8827181
Call sign:	DCSB
Shipping company:	Aktiengesellschaft Reederei Norden-Frisia ²
Year built:	1965
Shipyard/Yard number:	Jos. L. Meyer, Papenburg/529
Classification society:	DNV GL
Length overall:	63.75 m
Breadth overall:	12.00 m
Gross tonnage:	1,007
Deadweight:	220 t
Draught (max.):	1.75 m
Engine rating:	1,129 kW total
Main engine:	2 x Klöckner-Humboldt-Deutz AG SBA12M 816 (each 366 kW); 1 x AB Volvo Penta, TAMD 163 A-A (397 kW)

² The ship was sold to a ship breaker in November 2016.

Propulsion: Two SRP 300 Schottel rudder propellers, one fixed pitch propeller, and one Veth-Jet lateral thruster

(Service) Speed: 11 kts

Hull material: Steel

Minimum safe manning: 6

2.3 Voyage particulars

Port of departure: Norderney

Port of call: Norddeich

Type of voyage: Merchant shipping/national

Cargo information: Passengers and vehicles

Manning: 12, including five in the service department

Draught at time of accident: 1.75 m

Pilot on board: No

Canal helmsman: No

Number of passengers: 187

2.4 Marine casualty or incident information

Type of marine casualty: Serious marine casualty, collision with a quay facility causing injury to a number of passengers

Date, time: 16 June 2015, 1359

Location: Norddeich

Latitude/Longitude: $\varphi 53^{\circ} 37.6'N \lambda 007^{\circ} 9.5'E$

Ship operation and voyage segment: Berthing

Place on board: Bow section

Human factors: No, technical fault

Consequences: Eight injured passengers, including three taken to a hospital by ambulance; one slightly damaged motor vehicle; indentation on the ferry's fore section; tear above the waterline in the outer shell in the vicinity of the forepeak; one of the quay facility's twin dolphins broke apart; minor damage to the quay facility

2.5 Shore authority involvement and emergency response

Agencies involved: Waterway police, rescue service, Ship Safety Division (BG Verkehr)³

Resources used: Two ambulances

Actions taken: First aid administered to those injured; accident recorded by the police; safety certificate seized

Results achieved: Those injured were treated accordingly

³ BG Verkehr: Berufsgenossenschaft Verkehrswirtschaft Post-Logistik Telekommunikation [German Social Accident Insurance Institution for Commercial Transport, Postal Logistics and Telecommunication].

2.6 Nautical chart

Extract from Official Nautical Chart (21) 89, BSH

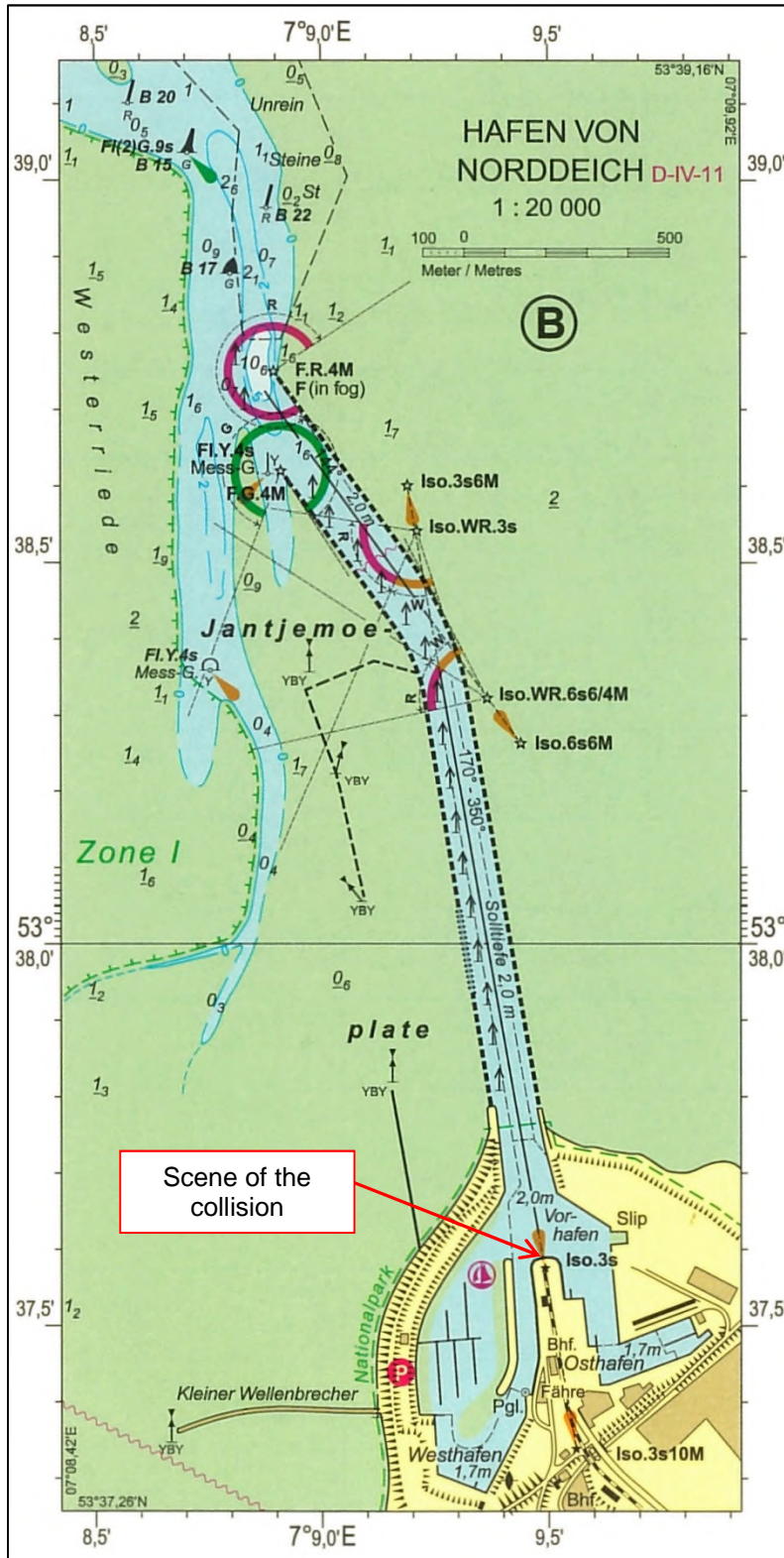


Figure 2: Nautical chart showing the scene of collision

3 COURSE OF THE ACCIDENT AND INVESTIGATION

3.1 Course of the accident

The account of the course of the accident is based on the captain's report, entries in the logbook and an interview with the captain.

The crew of the ferry started work in the early hours of the morning of 16 June 2015. The first departure from Norddeich was at 0615. The accident happened when the ship sailed to Norddeich for the third time. The ferry cast off in Norderney at 1315 to that end. All the previous berthing manoeuvres were completed without any irregularities.

12 crew members were working on board the ferry on that day. Seven of these crew members were involved in the immediate operation of the ferry. The others worked in the service department.

187 passengers, one caravan, 12 private vehicles, three transporters, and three heavy goods vehicles were carried during this crossing.

The captain and the chief mate were alone on the bridge at the time of the accident. The ferry was commanded by the captain. Initially, the ship was controlled using the autopilot. As a result, the set angle of the two Schottel propellers was controlled, at a constant rotational speed, by the autopilot, so as to follow the predefined course. The middle engine was not engaged at this point.

The fairway off the port was sailed at a speed of about 7.5 kts. Upon sailing into the inner harbour, the captain went from the starboard to the port control console and switched over to the port control console. He then intended to switch the control system to manual at this console. This involves pressing a push button on the control console. The associated illumination of a light in the push button indicated confirmation of this command. The captain intended to turn the ship to starboard by setting the Schottel propellers in a transverse position and thus simultaneously reduce the speed, as setting the ship transversely usually results in a sufficient reduction in speed. The Schottel propellers did not respond to the command, however. The captain immediately recognised the risk of colliding with the quay facility ahead. To reduce the speed, he engaged the middle engine and set it to full astern. He also set the bow thruster so that the bow of the ship would turn to starboard. These measures reduced the impact speed.

It was not possible to regain control of the Schottel propellers subsequently by switching back to the starboard control console, either.

The captain attempted to prepare the passengers for the impact by making an announcement shortly before it happened.

The ship first rammed a wooden dolphin on the quay facility and broke it off. The bow then struck the quay beneath the rub rail. This damaged the ship. The damage to the quay itself was only minor.

Several passengers were injured due to the relatively unforeseeable impact. Three of them were taken to a hospital. Five more passengers suffered contusions and/or whiplash. They were able to disembark from the ship without further care, however. One car was slightly damaged.

After the collision, the captain attempted to regain command of the control system. The system started to work again after the two buttons were pressed several times alternately. It was not possible to identify a fault to begin with. The ferry was then manoeuvred to the berth, where the measures for administering first aid to the passengers were initiated. According to information given by the captain, the control system does not have a fault memory.

3.2 Investigation

The Federal Bureau of Maritime Casualty Investigation (BSU) became aware of the accident on the same day. Since the ferry was scheduled to shift to a shipyard in Emden on the following day, a survey of the ship was arranged for 18 June 2015. The ferry was laid dry in a floating dock at the time of the survey. The captain was available for questioning.

3.2.1 Course of the voyage

The long-standing captain and his experienced chief mate were on the bridge of the ship during the approach to the port of Norddeich. The other crew members needed for the operation of the ship had taken up their positions on the fore and aft manoeuvring station, at the exit door, and in the engine room.

A force 4-5 Bft north-westerly wind prevailed at the time of the accident. The sky was overcast but visibility was good. High tide was reached at 1208.

The Joint Control Centre of the Waterway Police of the Coastal States in Cuxhaven prepared an analysis of the course of the collision based on the movement data transmitted by the ferry's AIS⁴ and provided it to the BSU. The following Figures 3 to 7 taken from this help to illustrate the course of the voyage and speeds sailed.

It was also possible to trace the course of the accident on board the ferry using the electronic chart display's logbook function, which delivered a similar account.

⁴ AIS: Automatic Identification System.



Figure 3: Position at 135645, 7.7 kts SOG⁵

The ship's course was still kept by the autopilot at 1356.



Figure 4: Position at 135815, 7.0 kts SOG

⁵ SOG: Speed over ground



Figure 5: Position at 135845, 6.4 kts SOG



Figure 6: Position at 135907, 5.5 kts SOG

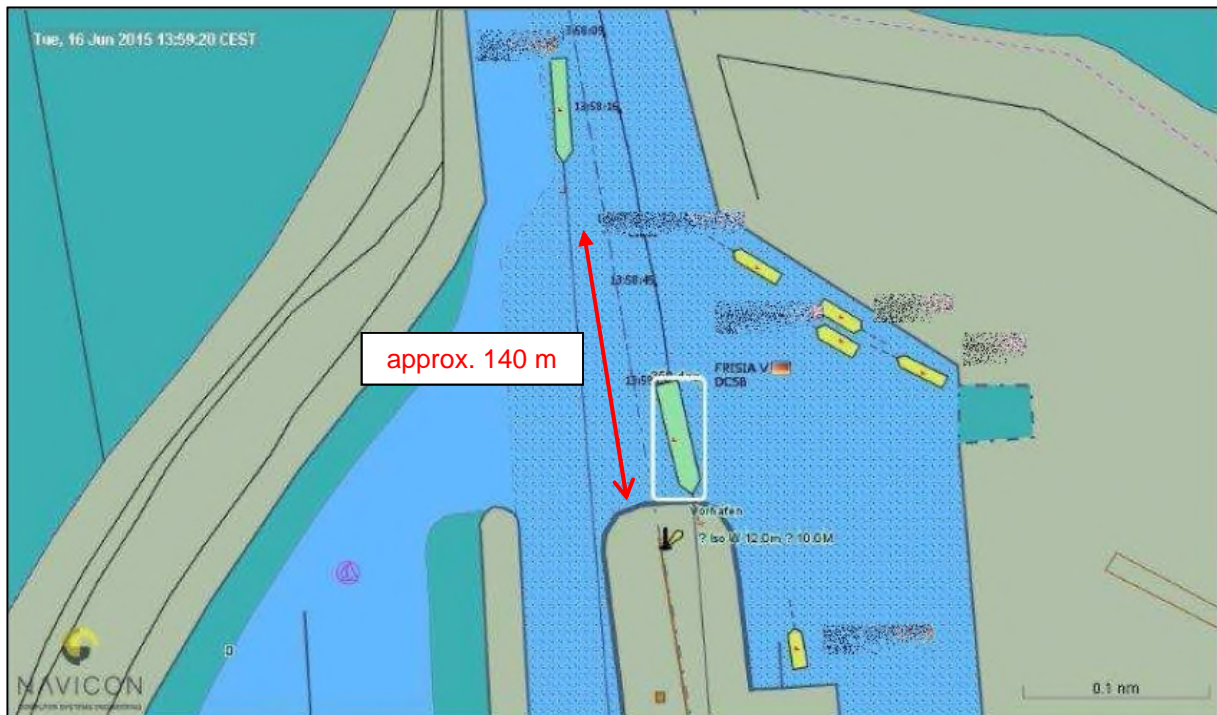


Figure 7: Position at 135920, 4.9 kts SOG

Shortly after leaving the narrow section between the breakwaters (Figure 5), the captain attempted to switch the steering gear to manual on the port control console, so as to then manoeuvre resp. turn the ship using the Schottel propellers. This was unsuccessful, meaning the autopilot continued to head for the quay. The force of the impact was reduced by the full astern manoeuvre with the help of the middle engine. The speed was about 5 kts on impact.

3.2.2 The ferry

The FRISIA V was a ferry used for carrying people and vehicles. The ferry was licenced to carry up to 1,338 passengers in the summer months. This number depended on how many vehicles were carried at the same time, however.

The continuous and completely enclosed passenger deck was level with the main deck. Almost the entire surface of the deck above that was able to accommodate vehicles. The ferry had been lengthened twice since she was put into service. During the third conversion, the uppermost deck – the bridge deck – was designed so that it covered the entire breadth of the ship. Good visibility of the fore section prevailed from there. A smaller open passenger deck was situated one deck beneath the bridge. This acted as a type of semi-roof for the vehicle deck. Another deck with a small surface area was situated between this deck and the vehicle deck. Another lounge was installed there. The rescue boat was located in the outer area.

The ferry had three independent propulsion units. Two main engines were each coupled with a Schottel propeller. Another main engine acted as a middle engine on a conventional propeller. The ferry was also equipped with a Veth-Jet lateral thruster.

Due to its design, this was only fully effective from low speeds. The Schottel propellers lent the ship good manoeuvrability.



Figure 8: View of the FRISIA V's stern

3.2.3 Controlling the ferry

Two control consoles were installed on the bridge of the ferry. They were located on the outer sides of the bridge console and offered good visibility of the respective side of the ferry and fore section. The autopilot's operating panel was installed in the console on the starboard side.



Figure 9: Overall view of the FRISIA V's bridge

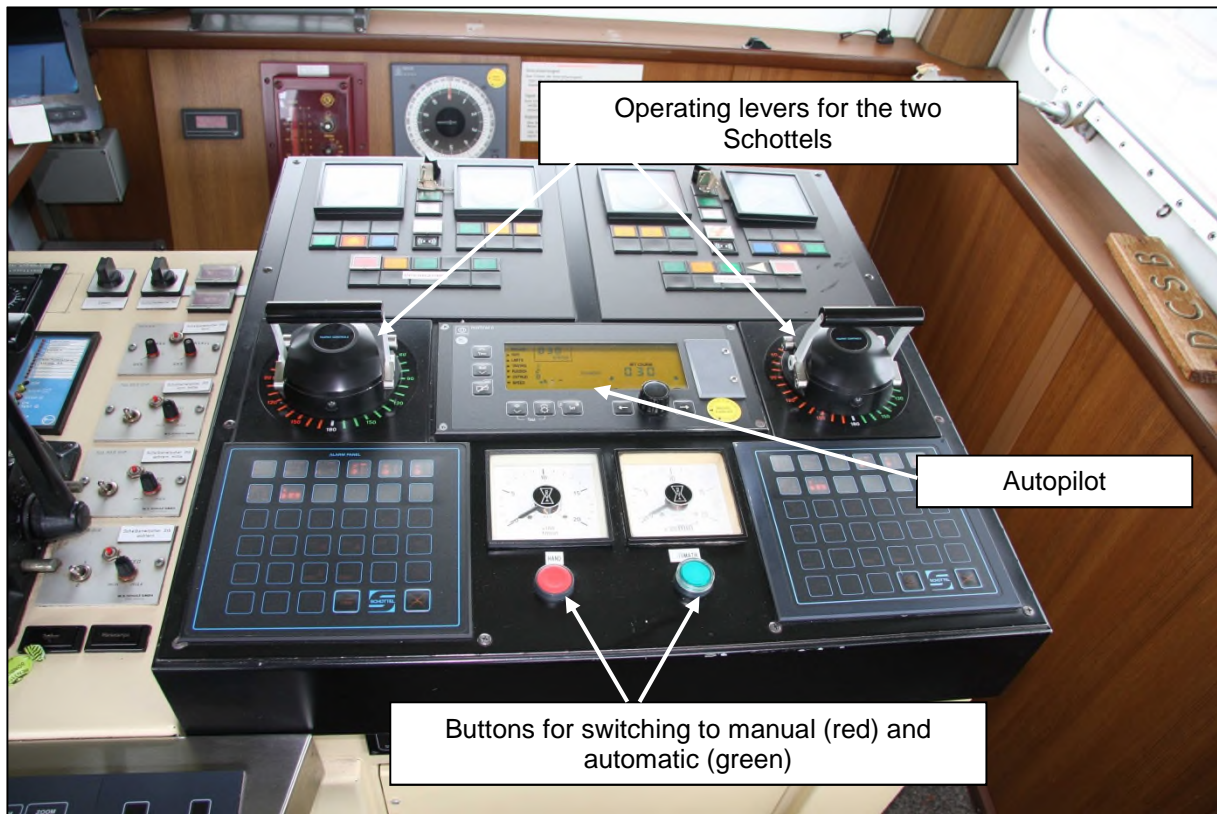


Figure 10: Operating console for the control system on the starboard side of the bridge

During the inspection of the control system for the engines and the Schottel propellers by a service engineer from the manufacturer, Kwant Controls, on 22 June 2015, it was found that the operating panels for controlling the Schottel and switching from one control console to the other worked without any problems. A potential malfunction was found in the push buttons for switching between autopilot and the manual control system, however. It was possible to reproduce the fault on both buttons on each control console if the push button was not pressed down to a sufficient depth. In the event of an 'operating error', the connection between autopilot and the control system for the Schottel propellers was not switched on or off completely, even though the indicator light signalled this, as it illuminated or extinguished if the push button was only half-pressed. Consequently, the autopilot only appeared to be switched off and only part of the control system for the propulsion units was active during the accident.

It was possible to guarantee the desired function by installing relays within the circuitry.

3.2.4 Physical injuries

It was not possible for the shipping company to establish in retrospect in which positions of the ship the passengers injured were situated when the impact happened. The casualties suffered contusions, whiplash and other minor injuries. Two passengers were admitted as in-patients. Another passenger was treated briefly and then discharged from hospital.

During the inspection of the ferry, it was found that prior to berthing larger groups of people usually gathered in the area in front of the door and in the area of the baggage compartment. In the event of unforeseen movements of the ship, a greater risk of injury prevailed there due to the limited number of handholds available.



Figure 11: Area in front of the door



Figure 12: Area of the baggage compartment

3.2.5 Passenger safety

During the survey of the ferry, the BSU's investigators found that the circular (Figure 13) drawn up by the Ship Safety Division (BG Verkehr) and sent to passenger ferry shipping companies in response to the ADLER EXPRESS's collision

with the quay facility in Wittdün on 4 June 2014⁶ had not been implemented on board the FRISIA V.

BG Verkehr, Ottenser Hauptstr. 54, 22765 Hamburg

Ihr Zeichen:
Ihre Nachricht vom:
Unser Zeichen:

Ansprechpartner:
Telefon:
Fax:
E-Mail:

Datum: 27.06.2014

Vorbeugende Sicherheitsmaßnahmen an Bord von Fahrgastschiffen

Sehr geehrte Damen und Herren,

aus aktuellem Anlass möchten wir Sie bitten, Ihre Vorkehrungen zur Gewährleistung eines sicheren Schiffsbetriebes hinsichtlich der folgenden Empfehlungen zu überprüfen:

Anweisungen für Fahrgäste

Fahrgäste sollten durch Ansagen und/oder Aushänge darauf hingewiesen werden, dass

1. vor dem Anlegemanöver die Sitzplätze eingenommen werden oder ein sicherer Halt gesucht wird,
2. während des Anlegemanövers das Stehen auf Treppen oder Betriebsgängen zu vermeiden ist und
3. die Fahrgäste die Ausgänge erst aufsuchen, nachdem das Schiff sicher im Hafen oder an der Anlegestelle festgemacht hat.

Umsteuereinrichtung der Antriebsanlage

Die Umsteuereinrichtung für die Antriebsanlage des Schiffes sollte regelmäßig überprüft werden, insbesondere sollte die Umsteuereinrichtung vor dem Beginn des Anlegemanövers getestet werden. Falls notwendig, sollten vorbeugende Wartungsmaßnahmen für Teile der Umsteuereinrichtung im Wartungsplan vorgesehen werden.

Für Rückfragen stehen wir Ihnen gerne zur Verfügung.

Mit freundlichen Grüßen
Dienststelle Schiffssicherheit

(Dieses Schreiben ist auch ohne Unterschrift gültig.)

Postanschrift: BG Verkehr Dienststelle Schiffssicherheit Ottenser Hauptstr. 54 22765 Hamburg	Besucheranschrift: Brandstwiete 1 20457 Hamburg	Telefon: +49 40 36 137 - 0 Telefax: +49 40 36 137 - 204 Internet: www.dienststelle-schiffssicherheit.de	Servicezeiten: Mo.-Do. 8:00 - 16:00 Uhr Fr. 8:00 - 14:00 Uhr	Hamburger Sparkasse BLZ: 200 505 50 Konto: 1280 343 748 IBAN: DE66 2005 0550 1280 343 748 BIC: HASPDEHHXXX
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Figure 13: Circular of the Ship Safety Division (BG Verkehr) of 27 June 2014

⁶ BSU Report 155/14.

On board the FRISIA V, there were neither announcements nor notices to advise on passenger behaviour in accordance with the recommendation of the Ship Safety Division (BG Verkehr). The safety notices displayed contained no such information, either.

3.2.6 Damage to the ferry

The ferry sustained deep indentations in the bow section and a minor tear above the waterline due to the impact with the quay.



Figure 14: Damage to the ferry's bow section (side view)



Figure 15: Damage to the ferry's bow section (front view)

4 ANALYSIS

4.1 Course of the accident

The FRISIA V sailed into the port of Norddeich at a relatively high speed. In principle, the BSU's investigators do not view this as a problem. Her shallow draught means that the ship needs to run at a high speed so as to keep within the fairway, especially when wind forces are higher. The ship can then be turned in a small space and decelerated rapidly due to her good manoeuvrability. However, the leeway for reducing the consequences of or preventing a collision in the event of a malfunction is extremely limited.

It is not clear whether the switching characteristics of the push buttons observed could be caused by wear or not pressing the push button down far enough. The design existing up until the accident occurred had been used several times a day over a number of years. According to information given by the shipping company, a malfunction had never been observed before. Therefore, the captain was surprised by the incident, because the lights in the push buttons indicated the corresponding function.

The captain's response to the failure of the control system was appropriate and quick.

4.2 Accident damage

The number of injured passengers and/or the severity of the injuries may have been lower if the shipping company had already implemented the circular of the Ship Safety Division (BG Verkehr) before the accident occurred.

The investigators assume that the measures taken by the captain to decelerate the ferry and the notification of passengers reduced physical injuries and the damage to the ship.

5 Actions taken

5.1 Modification of the electrical circuitry

A company commissioned by the shipping company modified the electrical circuitry during the call at the shipyard. The alterations implemented in the circuitry's design prevented an incident of this nature from reoccurring up until the ship was taken out of service.

5.2 Passenger safety

Measures in the circular of the Ship Safety Division (BG Verkehr) have been implemented on all the shipping company's ships as follows:

- ships command make the passengers aware of the safety notices with an announcement at the beginning of each crossing;
- safety notices that summarise the hazards have been displayed at various different places in which passengers are likely to spend their time.



Figure 16: Safety notice on board the ferries

Due to the measures implemented by the shipping company in the meantime, the publication of additional safety recommendations has been dispensed with.

6 SOURCES

- Investigations of Waterway Police Wilhelmshaven
- Written statements of the
 - Ship's command
 - Shipping company
 - Classification society
- Witness testimony
- Recordings of the electronic chart display and entries in the FRISIA V's logbook
- Nautical charts and ship particulars, Federal Maritime and Hydrographic Agency
- AIS analysis, Joint Control Centre of the Waterway Police of the Coastal States in Cuxhaven
- Certificates of the Ship Safety Division (BG Verkehr)