



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

Investigation Report 289/12

Serious Marine Casualty

**Ground contact by the
oil tanker KATJA
in the River Jade
on 14 August 2012**

18 November 2014

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 1 of 22 November 2011, BGBl. (Federal Law Gazette) I p. 2279.

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.

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1 Summary

The oil tanker KATJA, flying the flag of the Bahamas, was sailing from Hound Point in Scotland to Wilhelmshaven in Germany. The KATJA was laden with some 87,000 t of crude oil.

A German sea pilot went on board on the evening of 13 August 2012. A 5 to 6 Bft wind from the south east prevailed and visibility was good. The voyage through the German Bight towards the Jade fairway passed without any problems. After reaching pair of buoys 3/4 on the Jade, the speed of the ship was increased to 'full ahead sea'. The KATJA was proceeding against the ebb current at between 8 kts speed over ground and 9.5 to 10 kts speed through water.

The deck officers changed watch at midnight. The master had command of the ship. In addition to the pilot, a helmsman was also on the bridge. Shore-based radar guidance was also provided. The KATJA passed pair of buoys 17/18 at 0031. After the course alteration, her starboard side was on the western edge of the dedicated corridor. At 0040, some 250 m before the next course alteration, the ebb current increasingly acted on the KATJA and she only managed 7.5 kts speed over ground and 9 kts speed through water, despite proceeding at full speed ahead. Although the course of 164° recommended by the pilot was set after pair of buoy 19/20, the ship was displaced considerably to starboard due to the current. At 0043, the KATJA was almost one beam outside the western corridor. Since sand regularly accumulates in the area to the east of Minsener Oog Island, the existing water depth outside the dedicated corridor was not sufficient for the KATJA's draught of 13.45 m. At 0045, the KATJA slowly propelled herself onto the ground. However, the ship's bottom remained intact, meaning no oil escaped. Jade Traffic coordinated the initial emergency response.

It was not possible to refloat the ship without assistance. Initial attempts at towage started at 0222. These were unsuccessful, however. Therefore, it was decided to wait for high tide. The Central Command for Maritime Emergencies (CCME) assumed overall control of the operation at 0230. At 0618, the KATJA refloated again and continued her voyage to Wilhelmshaven, where she made fast at 1218.

There was no marine pollution.

2 FACTUAL INFORMATION

2.1 Ships photo



© Hasenpusch Photo-Productions

Figure 1: Photo of ship

2.2 Ship particulars

Name of ship:	KATJA ¹
Type of ship:	Oil tanker
Nationality/Flag:	Bahamas
Port of registry:	Nassau
IMO number:	9105906
Call sign:	C6NF8
Owner:	Lundqvist Rederierna AB
Year built:	1995
Shipyard/Yard number:	Sumitomo Heavy Industries Ltd. - Oppama Shipyard/1205
Classification society:	Det Norske Veritas
Length overall:	232.042 m
Breadth overall:	42 m
Gross tonnage:	52,067
Deadweight:	97,220 t
Draught (max.):	14.23 m

¹ The oil tanker has sailed under the name KAMILA (call sign: V4QZ2) and the flag of St. Kitts-Nevis (port of registry: Charlestown) since 1 December 2012.

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Engine rating:	12,181 kW
Main engine:	Diesel United Sulzer 6RTA62, 2-stroke engine
(Service) Speed:	14.5 kts
Hull material:	Steel
Hull design:	Double hull
Minimum safe manning:	15

2.3 Voyage particulars

Port of departure:	Hound Point, United Kingdom
Port of call:	Wilhelmshaven, Germany
Type of voyage:	Merchant shipping International
Cargo information:	87,230 t crude oil
Manning:	21
Draught at time of accident:	13.45 m
Pilot on board:	Yes
Canal helmsman:	No
Number of passengers:	0

2.4 Marine casualty information

Type of marine casualty:	Serious marine casualty, grounding
Date, time:	14/08/2012, 0045
Location:	River Jade
Latitude/Longitude:	ϕ 53°46.74'N λ 008°02.09'E
Ship operation and voyage segment:	Harbour mode
Place on board:	Ship's bottom
Consequences (for people, ship, cargo, environment, other):	Damage to shell plating: ship's bottom dented in places

Excerpt from Electronic Nautical Chart DE 421030, BSH

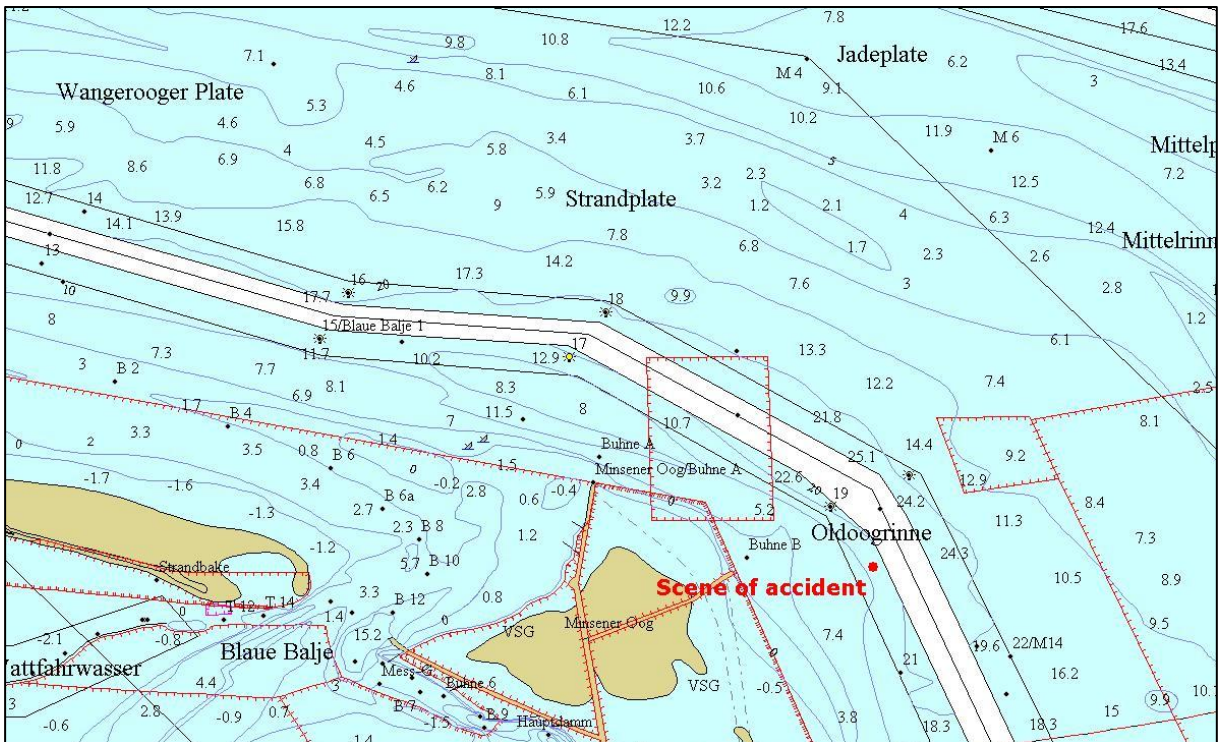


Figure 2: Nautical chart

2.5 Shore authority involvement and emergency response

<p>Agencies involved:</p>	<p>Vessel Traffic Service (VTS) Wilhelmshaven (Jade Traffic); CCME; Waterway Police (WSP) Wilhelmshaven and WSP Bremerhaven; WSP Coordination Centre Cuxhaven; Waterways and Shipping Authority (WSA) Wilhelmshaven and WSA Cuxhaven; SAR² (RCC³) Coordination Centre Glücksburg; MRCC⁴ Bremen; Federal Maritime and Hydrographic Agency (BSH); Naval Air Wing 3; Wiking Helicopter Service; Cuxhaven fire brigade and police service; Federal Police Sea; Hanover office of the Ministry of Interior; Federal Ministry of Transport, Building and Urban Development (BMVBS); Main Coordination Centre Oldenburg Land; Lower Saxony State Office for Water Management, Coastal Protection, and Conservation of Nature (NLWKN); Air Traffic Control Bremen; EMSA⁵</p>
<p>Resources used:</p>	<p>Tug BLEXEN; Tugs BUGSIER 1, 4 and 6; Tug ELBE; Tug EMS; Tug NORDIC; Tug WILHELMSHAVEN; Water Pollution Control Ship MELLUM; WSP Boat WS5; Pollution Control Plane Do228; Other tugs on standby</p>
<p>Actions taken:</p>	<p>Emergency towage; Drift calculation for oil spillage; Psychosocial emergency care</p>
<p>Results achieved:</p>	<p>Distressed vessel refloated without oil spillage</p>

² Search and rescue

³ Rescue coordination centre

⁴ Maritime Rescue Coordination Centre

⁵ European Maritime Safety Agency

3 COURSE OF THE ACCIDENT AND INVESTIGATION

3.1 Course of the accident

The oil tanker KATJA, flying the flag of the Bahamas, started her voyage from Hound Point in Scotland to Wilhelmshaven in Germany at 2030 on 10 August 2012. The KATJA was laden with 87,230 t of crude oil, which corresponded to 91.5% of her cargo capacity⁶.

At 2024 on 13 August 2012, a German sea pilot was taken on board by helicopter just as the KATJA was weighing anchor in the deepwater anchorage. The master, who had taken command of the ship at 1900, advised the sea pilot on the KATJA's manoeuvring characteristics. Amongst other things, a target speed of 8 kts and the fact that they would proceed against the tide were discussed. At 2038, the sea pilot ordered shore-based radar guidance for the KATJA as from 2330 on VHF.

The latest version of nautical paper chart INT 1456 – Approaches to the Jade and Weser – was used for navigation. The duty officer entered the ship's position as per GPS on the nautical chart and in the bridge bell book for the passage of buoys every six minutes. Moreover, the echo sounder was monitored. When passing buoys, the current heading and closest point of approach to the buoys were entered in the bridge log.

The maritime weather conditions were good. A 5 to 6 Bft wind from the south east prevailed and it was a clear night. The voyage through the German Bight towards the Jade fairway passed without any problems. The shore-based radar pilot made contact with the sea pilot on VHF channel 63 at 2324. Communication between the pilots was conducted in German and began shortly before reaching pair of buoys 3/4 on the Jade. The shore-based radar pilot gave the sea pilot current details of the ship's position regularly and advised on necessary course alterations when a pair of buoys was approached. The new course was set by the sea pilot, who then issued a helm command directly to the helmsman in English.

After reaching pair of buoys 3/4 on the Jade, the speed of the ship was increased to 'full ahead sea'. The KATJA was proceeding against the ebb current at between 8 to 8.2 kts speed over ground and 9.5 to 10 kts speed through water.

The deck officers and helmsmen changed watch at midnight. The master was still in command of the ship. The pilot continued to issue helm commands to the helmsman directly. For the most part, he used the X-band radar during the pilotage assignment, while the master monitored the S-band radar. Both radars were set to north-up display and switched back and forth to ranges of between 1.5 and 6.0 nm depending on the situation. Inter alia, the Mellumplate sector light was used during the approach

⁶ Total cargo capacity: 114,202.9 cbm; cargo on 14 August 2012: 104,619 cbm.

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to pair of buoys 15/16. From time to time, the master checked the position of the ship plotted by the duty officer at the chart table.

The KATJA passed pair of buoys 15/16 at 0023 on 14 August 2012. The ensuing course alterations at the next two pair of buoys were made to pass the Minsener Oog National Park area (see Figure 3).

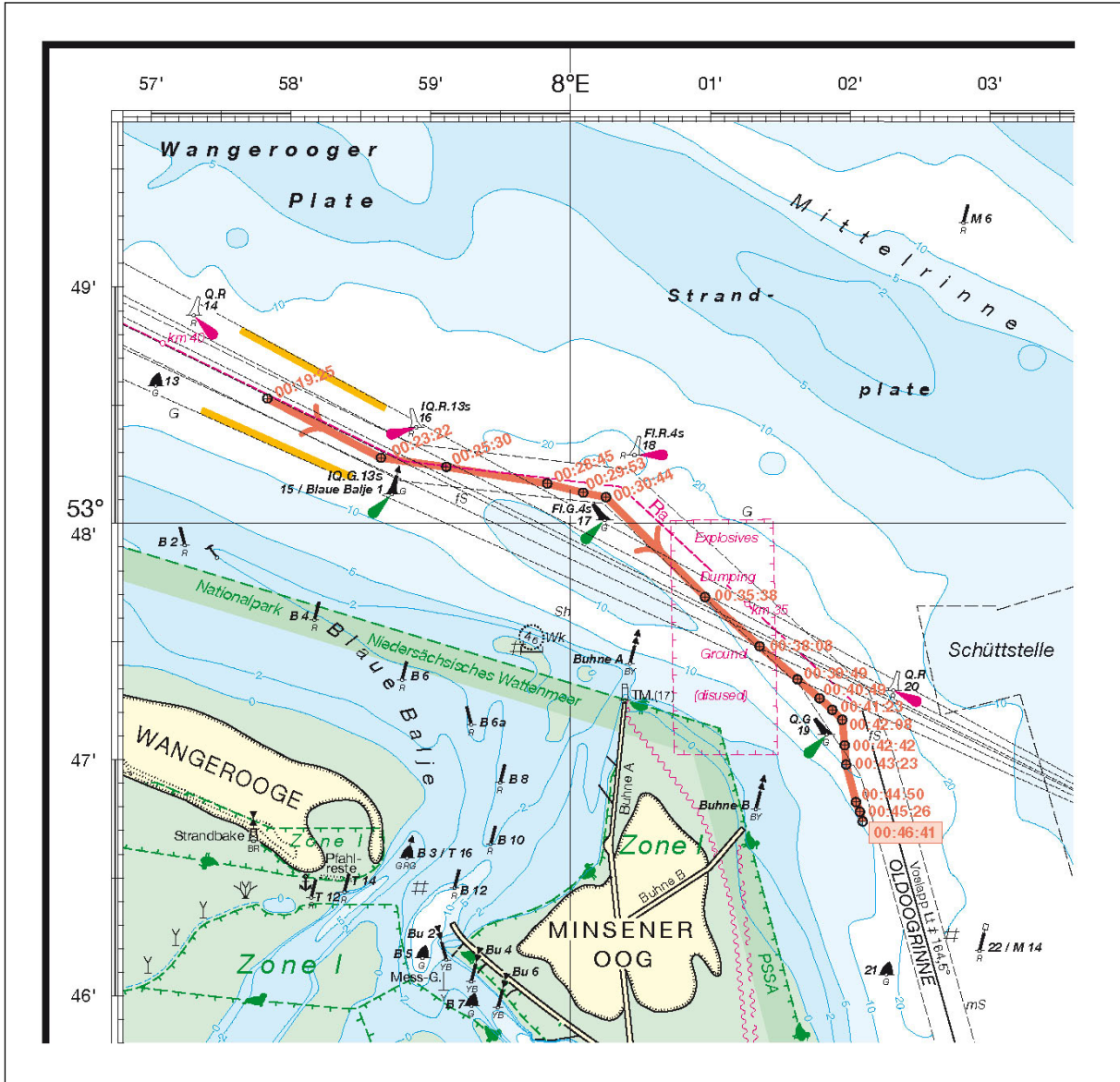


Figure 3: Course of the voyage taken by the KATJA

The KATJA passed pair of buoys 17/18 at 0031. After the course alteration, her starboard side was on the western border of the dedicated corridor, i.e. on the boundary of the 300-m-wide area that has a maintained depth of 17.6 m (see Figure 21).

At 0040, some 250 m before the next course alteration at pair of buoys 19/20, the ebb current⁷ increasingly acted on the KATJA, which could only manage 7.5 kts

⁷ Low tide was at 0436.

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speed over ground and 9 kts speed through water despite proceeding at full speed ahead (see Figures 4 and 5).

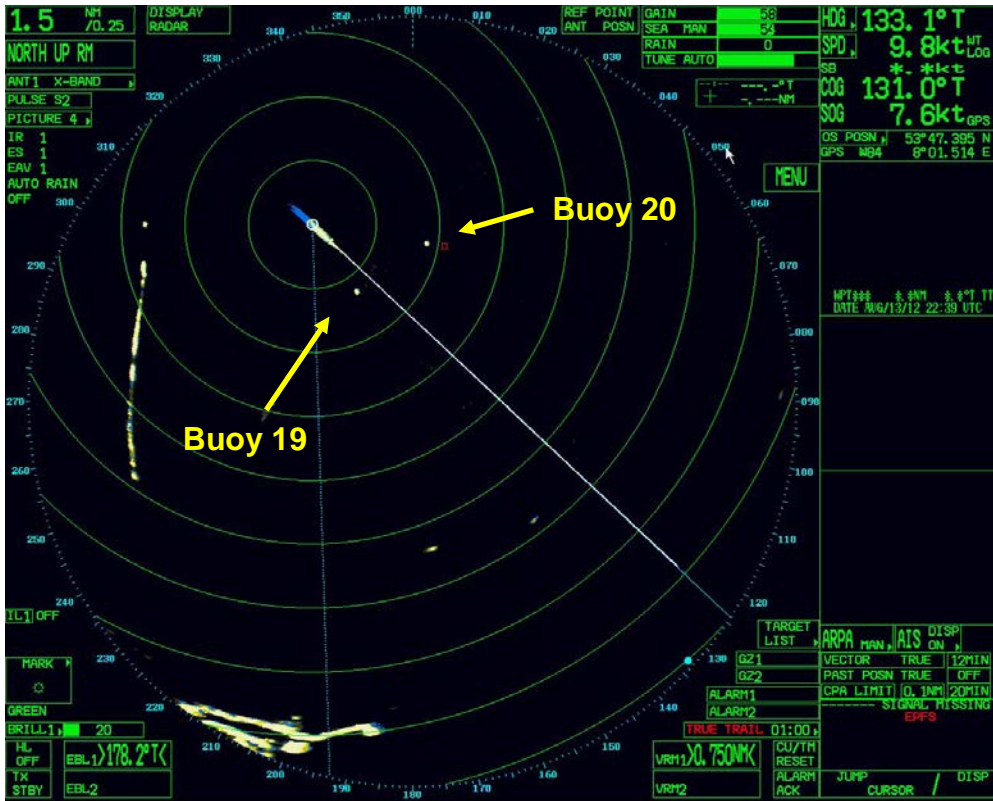


Figure 4: The KATJA's radar plot at 003910

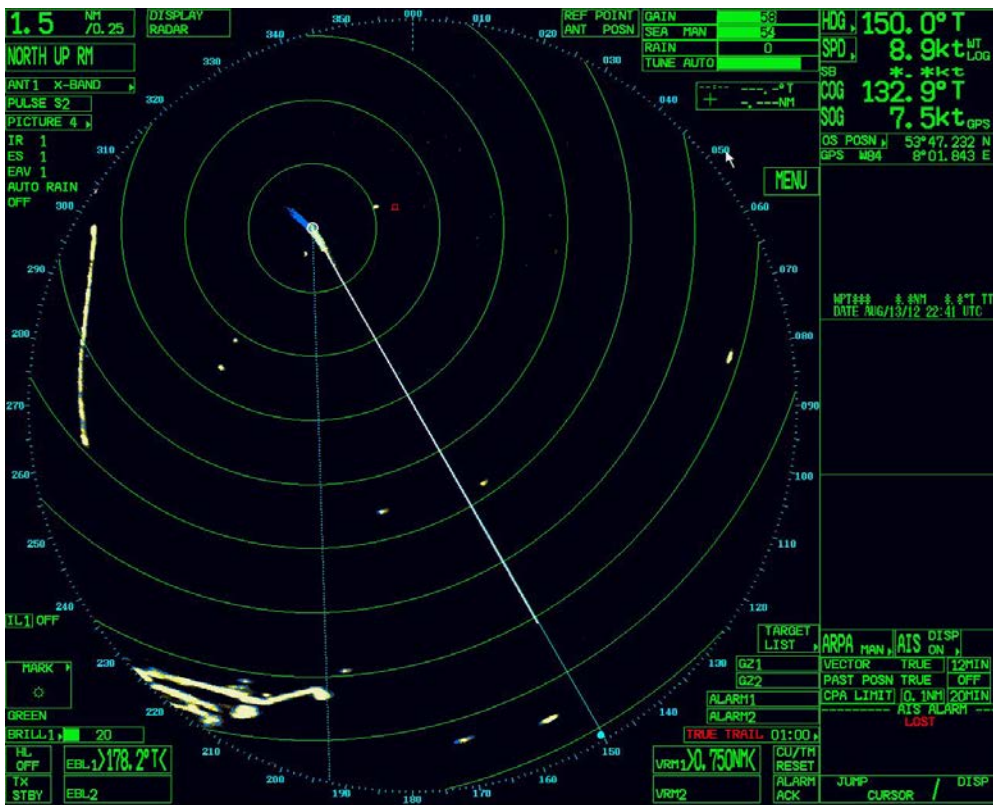


Figure 5: The KATJA's radar plot at 004110

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The shore-based radar pilot advised the sea pilot on VHF that after completing the course alteration (165°), the KATJA was approaching the western border of the dedicated corridor. At the same time, her tendency to set westward continued. The sea pilot ordered that the course be altered to 160° in response (see Spreadsheet 2). However, the tanker continued to be displaced considerably to starboard due to the ebb current (see Figures 6 and 7).

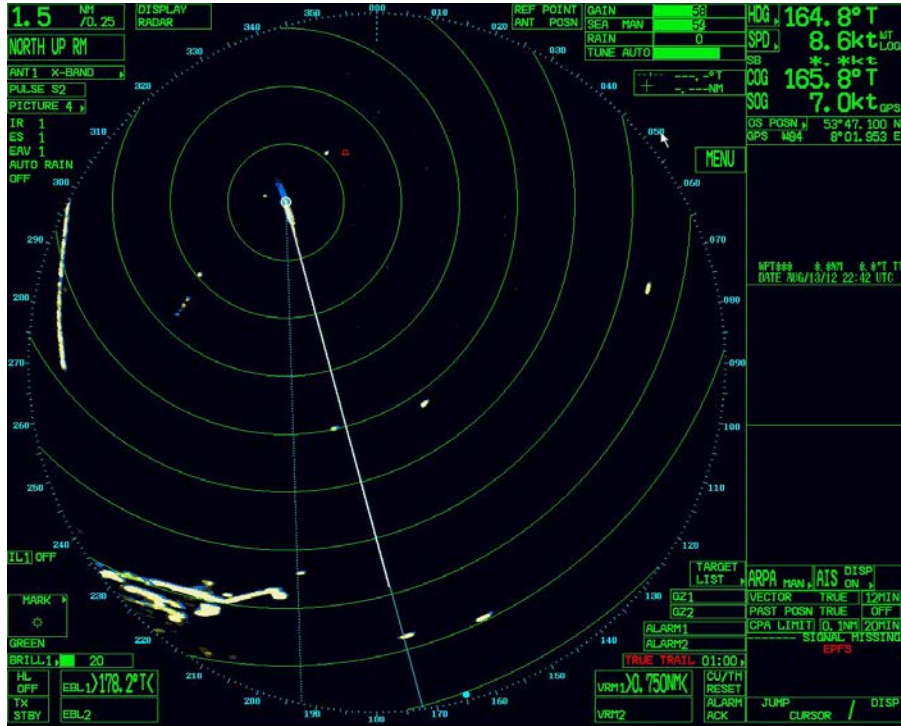


Figure 6: The KATJA's radar plot at 004225

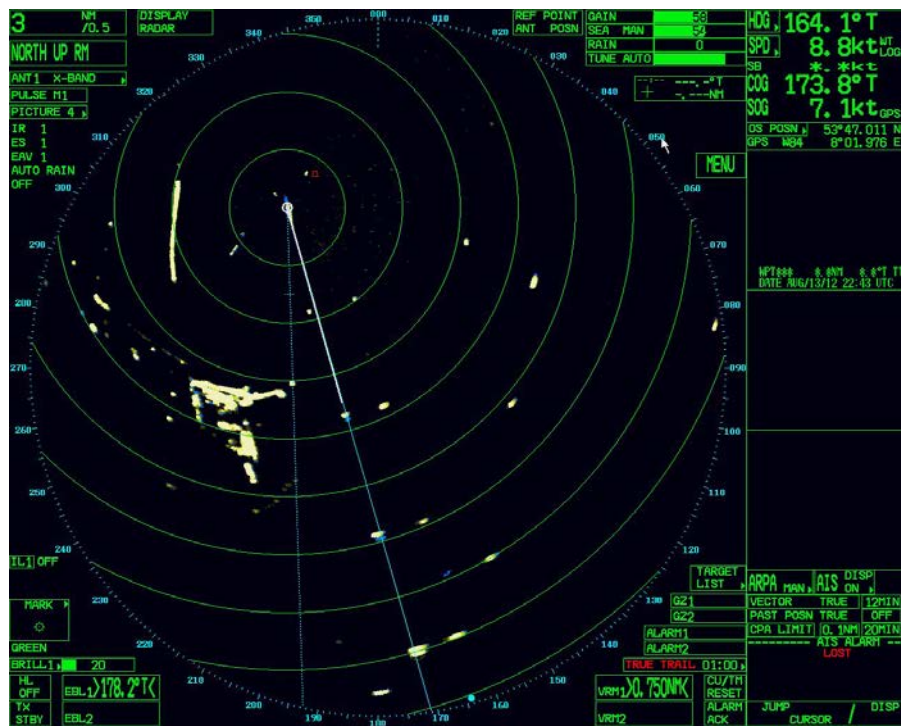


Figure 7: The KATJA's radar plot at 004310

At 0043, the KATJA was almost one beam outside the western corridor. Since sand regularly accumulates in the area to the east of Minsener Oog Island, the existing water depth outside the dedicated corridor was not sufficient for the KATJA's draught of 13.45 m. At 0045, the KATJA slowly propelled herself onto the ground (see Figure 8).



Figure 8: The KATJA's radar plot at 004525

This was noticed on the bridge due to the ship's declining speed. The sea pilot called the shore-based radar pilot at 004728 on VHF. When the position of the ship remained unchanged, Jade Traffic ordered available tugs to proceed to the distressed vessel at 0053. At virtually the same time, the sea pilot advised Jade Traffic on the situation at the scene on VHF. At this point, it was still assumed it would be possible to refloat the KATJA unassisted with alternating hard-over rudder angles (so-called fishtailing). The manoeuvre was unsuccessful, however.

3.2 Course of events after the accident

At 0100, Jade Traffic requested that the crew inspect the damage (in respect of possible oil spillage, in particular). Shortly afterwards, the sea pilot reported on VHF channel 63 that no spillage was visible and the ballast tanks were dry. Jade Traffic informed the CCME about the accident. The multipurpose and water pollution control vessel MELLUM was also notified that the KATJA had grounded. Weather conditions at the scene were still good.

At about 0200, the KATJA was listing slightly to port (1.5°). The CCME ordered Water Pollution Control Ship NEUWERK to proceed to the River Jade. Furthermore, a drift calculation for the theoretical case of an oil spillage was requested from the BSH.

BUGSIER 1 was the first tug to reach the distressed vessel at 0215 and the tug WILHELMHAVEN arrived five minutes later. An initial attempt to refloat the KATJA by tugging failed. Further attempts were made with the involvement of the BLEXEN (0248 at the scene) and the NORDIC (0330 at the scene).

CCME assumed overall control of the operation at 0230. Contact was made with the Lower Saxony State Office for Water Management, Coastal Protection, and Conservation of Nature (NLWKN). A member of the NLWKN's staff was sent to Cuxhaven to liaise with the staff of the CCME. A helicopter belonging to the Federal Police was kept on standby. The airspace over the scene of the accident was closed as a precaution. The CCME coordinated together with the NORDIC the take in tow from 0340.

At 0355, it was decided to wait for the next tide and a towing connection was established with the NORDIC. Tugs EMS, BUGSIER 4, BUGSIER 6, and ELBE reached the distressed vessel at 0500. The on-scene coordinator (OSC) of the CCME was transferred to the MELLUM by helicopter. From there he coordinated in cooperation with the pilot on board the KATJA the further measures on site. The LEYHÖRN and THOR, multipurpose vessels belonging to the NLWKN for pollution control, were kept on standby. Moreover, the CCME had now received the drift model requested from the BSH.

Tug BUGSIER 3 arrived at the scene at 0600. The situation there was still stable. In particular, no cargo was escaping. A total of seven support tugs, as well as the emergency tug NORDIC, the MELLUM, and the NEUWERK were at the distressed vessel to prevent the KATJA from possibly drifting into the Wadden Sea. The KATJA was grounded at about 1.5 m (13.45 m draught, 12 m immersion). A towing attempt at 0615 with simultaneous tugging by four tugs (see Figure 9) and the onset of the tide finally resulted in the KATJA refloating.

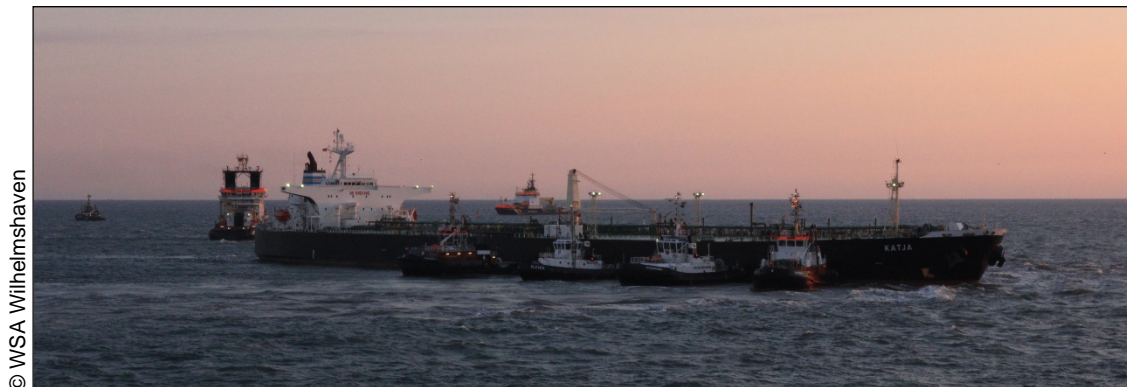


Figure 9: The KATJA refloats

The tanker gradually picked up speed sternward. Escorted by the tugs BUGSIER 1 and WILHELMSHAVEN, the KATJA finally reached Wilhelmshaven (see Figure 10) under her own steam. The MELLUM escorted the convoy.



Figure 10: The approach to Wilhelmshaven

Pilotage on the KATJA was taken over by the port pilot at about 0810. After the KATJA was made fast, the sea pilot notified the VTS and the CCME's OSC that he was standing down in due form. An investigation of the hull by divers after the KATJA was made fast at the pier revealed no evidence of leakage. CCME discontinued overall control of the operation at 1200.

3.3 Investigation

The BSU started the investigation on the morning of the accident. The competent authority of the KATJA's flag State (Bahamas Maritime Authority) provided comprehensive information for the safety investigation, as did her owner, the pilots involved, the Central Police Directorate at WSP Wilhelmshaven, the CCME, the BSH, and WSA Wilhelmshaven. Co-operation with all the participants progressed smoothly. Changes in the BSU's staffing gave rise to new lead investigators while the investigation was ongoing. This delayed completion of the investigation. Consequently, the BSU published an interim investigation report on 1 August 2013.

3.3.1 The island of Minsener Oog

The accident occurred in the Oldoogrinne at the western mouth of the Jade, just short of the island of Minsener Oog, which is part of the core zone of the Wadden Sea National Park of Lower Saxony. The National Park's main purpose is to preserve the mudflats and their biological diversity. The Park is divided into three zones, each with different provisions on protection:

- a restricted zone⁸ (Zone I) is subject to the most stringent protection;
- an intermediate zone (Zone II), and
- a recreation zone (Zone III).

⁸ <http://www.nationalpark-wattenmeer.de/nds/overview-english>, [05.11.14]

Minsener Oog Island (Frisia administrative district) as well as the surrounding sandbanks and mudflats belong to the stringently protected restricted zone (see Figure 11). The casualty happened within the restricted zone (Zone I/51).

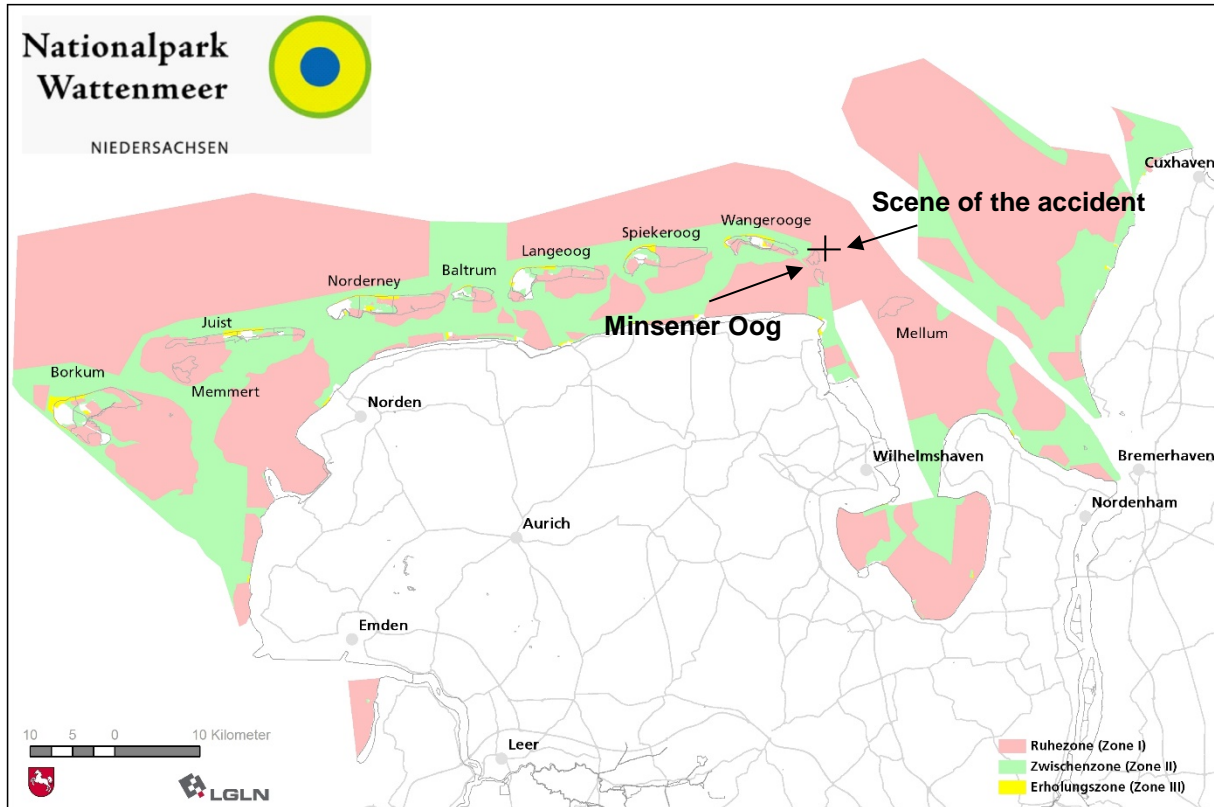


Figure 11: Wadden Sea National Park of Lower Saxony

Minsener Oog is situated nearly two kilometres south east of Wangerooge and four kilometres off the coast of Lower Saxony. The island is approximately four square kilometres, uninhabited and considered an important nesting and resting area for waterfowl. Most of the Wadden Sea National Park of Lower Saxony is a special protection zone pursuant to the EU Birds Directive⁹, as well as part of the 'Natura 2000' protection network, a coherent European network of special protection zones in accordance with the Habitats Directive¹⁰. The IMO¹¹ has placed the National Park under protection by designating it a PSSA¹². Moreover, the German-Dutch Wadden Sea (and thus Minsener Oog) was recognised as a World Heritage Site by UNESCO¹³ in 2009.

The NLWKN is responsible for combating pollution in this area.

⁹ Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

¹⁰ Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

¹¹ International Maritime Organization

¹² Particularly sensitive sea area

¹³ United Nations Educational, Scientific and Cultural Organization

3.3.2 Motor Tanker KATJA

Staff of the BSU, WSP Wilhelmshaven, as well as an expert appointed by the flag State (Bahamas) surveyed the KATJA.

The KATJA is an oil tanker with double hull and double bottom. The ballast tanks are, as usual, u-shaped and situated around the cargo tanks. The cargo capacity is 114,202.9 cbm. A right-handed fixed pitch propeller is used for propulsion. The rudder is a semi-balanced rudder with a maximum rudder angle of 35°. The tanker is not equipped with a bow thruster.

Her navigation equipment includes two Furuno radar sets (X-band and S-band) with target tracking function, Furuno FE-880 T echo-sounding equipment, an electronic chart with AIS overlay, a speed log, and a VDR-100G2/G2S S-VDR¹⁴ manufactured by Rutter. All the systems were operational. The latest version of nautical paper chart BSH 3617 (INT 1456) was used for navigation in the Jade/Weser approach area.



Figure 12: Bridge of the KATJA

According to the IOPP¹⁵ certificate, the double-hull tanker meets the damage stability criteria as defined in Regulation 28 of Annex I to MARPOL¹⁶ 1973/78. The SOPEP¹⁷ was available. In accordance with Regulation 37 of Annex I to MARPOL, the emergency plan provides for immediate access to shore-based calculation software for stability after damage and residual structural strength, inter alia.

The ground contact damaged the bottom of the ship. Web frames and longitudinals were deformed in places (level with Ballast Tank 1 on the starboard side, in particular). The KATJA was taken to a dry dock in Hamburg for the repair work (see Figure 13).

¹⁴ Simplified voyage data recorder

¹⁵ International Oil Pollution Prevention

¹⁶ International Convention for the Prevention of Pollution from Ships

¹⁷ Shipboard oil pollution emergency plan

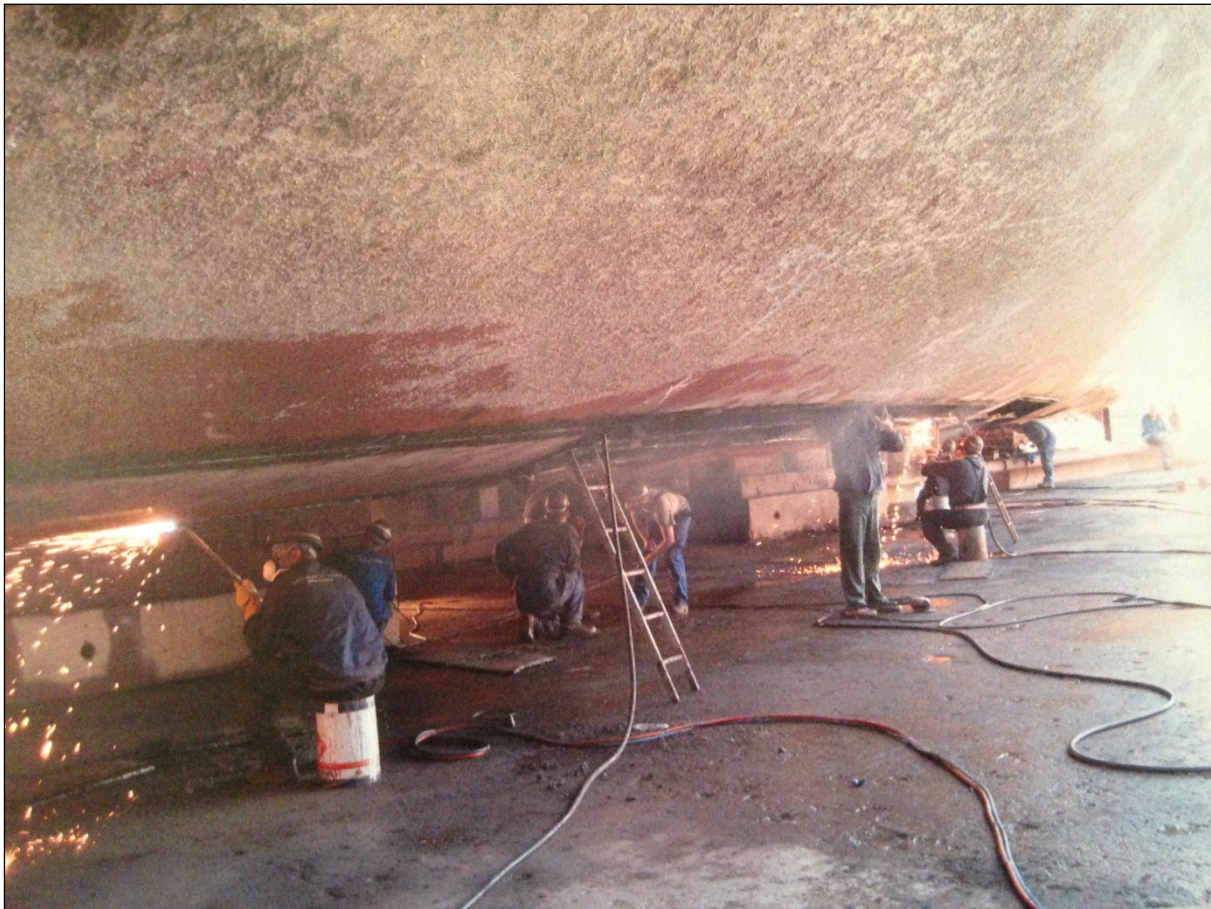


Figure 13: Repair work in the dry dock

3.3.3 Crew

The KATJA's crew consisted of 20 Croatian seamen and a Finnish master. The master of the KATJA was 47 at the time of the accident and has been engaged in seagoing service since 1981. He took command of the KATJA for four months in June 2009 before being engaged on three other tankers belonging to the fleet. He resumed command of the KATJA on 5 May 2012.

The deck officer who took over the navigational watch almost one hour before the accident has been engaged in seagoing service since 2003. He has served on tankers since 2007. He had been on the KATJA for 21 months.

Staff of the BSU interviewed the bridge team when the ship was surveyed on 30 August 2014. Information given to WSP Wilhelmshaven was also drawn on for the investigation.

The bridge team described the voyage on the night of the accident as uneventful before the ground contact. The duty officer reportedly monitored correct

implementation of the sea pilot's helm commands to the helmsman. Furthermore, the ship's position and echo-sounder data were logged every six minutes. Reportedly, the positions were generally read from the S-band radar and compared with the GPS position data from time to time. Moreover, all the buoys were reportedly easy to see because of the good weather conditions. The sea pilot reportedly viewed the paper chart at least three times between the change of watch at midnight and the accident. The pilot reportedly switched the X-band radar's display from 3 nm to 1.5 nm when they were roughly level with pair of buoys 15/16.

There was reportedly the feeling that the distance was a bit tight shortly before reaching buoy 19. However, the courses ordered by the sea pilot afterwards were reportedly considered sufficient to bring the KATJA back to the other side of the fairway. Therefore, they reportedly saw no need to intervene. However, implementation of the subsequent course alteration to starboard was reportedly a little too hard. The ground contact itself was reportedly barely noticeable.

3.3.4 Pilots

The pilots advising on the night of the accident are German. The sea pilot was 59 at the time of the accident and has been engaged in seagoing service since 1976. He was appointed the role of pilot in 1988 and works in an advisory capacity on all ship sizes.

The shore-based radar pilot was 50 at the time of the accident. He gained his certificate in 1987 and was promoted to master in 1996. In 2000, he was appointed the role of pilot at the Lotsenbrüderschaft Weser II/Jade (Brotherhood [sic] of Weser II/Jade Pilots), where he works in an advisory capacity on all ship sizes. He is employed mainly on the Jade.

Written statements from both pilots were available for the investigation. Co-operation was also displayed as regards providing written answers to further questions. Circumstances were reported as follows:

The sea pilot's assignment on the KATJA was made at short notice, as another colleague had been unable to do it. The KATJA's manoeuvrability was sufficient, although the tanker was slow to respond to course alterations. Helm orders were executed very well. A precise course was set for buoy 19. The pilot opted for the commonly known course along the border of the corridor. The depth of water there is generally always sufficient. This was not opposed by the most recent sounding data he was aware of. However, considerable displacement to starboard occurred after the course alteration. A course of 164° was set at a speed of 7.5 kts. A course correction to port failed to prevent the ground contact. At the time of the accident, a course of 158° was set on the gyrocompass.

The shore-based radar pilot also described the KATJA's voyage as quite normal. She was initially steered on the radar reference line and later, between buoys 9 and 11, a little further on the eastern corridor. This is done because a shoal is situated in the western section. Similarly, the eastern/northern channel section is used up until pair of buoys 17/18 because of a marl edge reportedly situated in the western/southern section. They continued to steer the KATJA in the western section of the corridor

between buoys 17 and 19. This was perceived as understandable and quite normal because the water is deeper there. After the course alteration at buoy 19, it was evident that the KATJA was one beam outside the western corridor. The starboard side of the tanker was clearly visible on the radar because the radar antenna covering this area is located on Minsener Oog. The course deviation was communicated on VHF and acknowledged. No forward movement was evident shortly after that.

In the course of the investigation, BSU personnel spoke with pilots who were not involved in the accident but familiar with the circumstances when sailing around Minsener Oog. During these discussions, passing Minsener Oog in the manner seen at the time of the accident was described as a well-known stumbling block in pilot circles because the charted depth is reportedly not reached there. Suggestions have reportedly been made on behalf of the pilots to relocate not only buoy 19, but also buoy 16 further northwards. This is because of cross currents that occur there, in particular.

The sea pilot involved in the accident did not share these general sentiments. Reportedly, the ebb current does not necessarily set to the west when sailing around Minsener Oog Island. Even pilotage assignments on larger ships have reportedly ran smoothly. Apart from the minor influx in the area of the accident, other difficulties of a general nature were not known. However, the influx found on the day of the accident was quite substantial.

3.3.5 Voyage preparation

3.3.5.1 Voyage preparation on board

The voyage planning for Hound Point to Wilhelmshaven was carried out on board the KATJA with the aid of a checklist. This divided the voyage into the following sections:

- leaving the port of departure;
- voyage, and
- calling at the port of destination.

Inter alia, a separate calculation of the underkeel clearance (UKC) was made for each section of the voyage. In each case, this was based on a draught of 13.45 m. According to the calculation for 14 August 2012 (at 0000), the minimum depth of water required for the KATJA stood at 14.85 m, where 0.90 m should not be fallen short of according to the form. The tidal range was specified as 4 m. The UKC form also indicated that the ship tables should be consulted to determine squat values for UKCs of less than 4 m.

The voyage plan was prepared by the second officer and approved by the chief officer. The voyage from the deepwater anchorage to Wilhelmshaven (44.2 nm) was planned in consideration of the water depths inside the dedicated corridors, as provided by the official nautical paper charts.



Figure 14: Excerpt from Paper Chart INT 1456 from aboard the KATJA

3.3.5.2 Voyage preparation by the sea pilot

The sea pilot was informed of the route to be piloted and the tide expected during the voyage. He is regularly assigned as a pilot on this route, meaning separate advance planning was not carried out in this case. Moreover, he stepped in for a colleague at short notice. Furthermore, his counsel informed the BSU that the pilot's office in Wilhelmshaven – and therefore also the sea pilot – was not provided with the most recent sounding data of 8 August 2012 (see item 3.3.7.3) on time.

The master gave the pilot card to the sea pilot on the bridge. According to the pilot card, the tanker's draught at the bow, amidships, and aft was 13.45 m. Furthermore, the sea pilot was advised of the UKC calculations, as well as the KATJA's key manoeuvring characteristics by means of a checklist from the owner's bell book, inter alia.

3.3.5.3 Voyage preparation at the VTS

At VTS Wilhelmshaven, the latest sounding charts are displayed directly adjacent to the workstations (see Figure 15).



Figure 15: Sounding charts displayed at the VTS

There are five screens available for the shore-based radar guidance. In addition to the electronic nautical chart, weather data (force and direction of the wind, visibility) and water levels can be retrieved on those, amongst other things. In terms of radar coverage, each screen is responsible for a section of the Jade. Unlike conventional electronic nautical charts, the fairway is displayed with distance markers (so-called raster) prior to course alteration positions (see Figure 16). Using the raster, it is possible to precisely identify the position of a vessel, what distances still need to be covered (to the next course alteration, for example), and whether a vessel is located in the middle of the corridor on the so-called radar reference line. Furthermore, the tendency of a ship to set in any particular direction can be identified using the vectors.

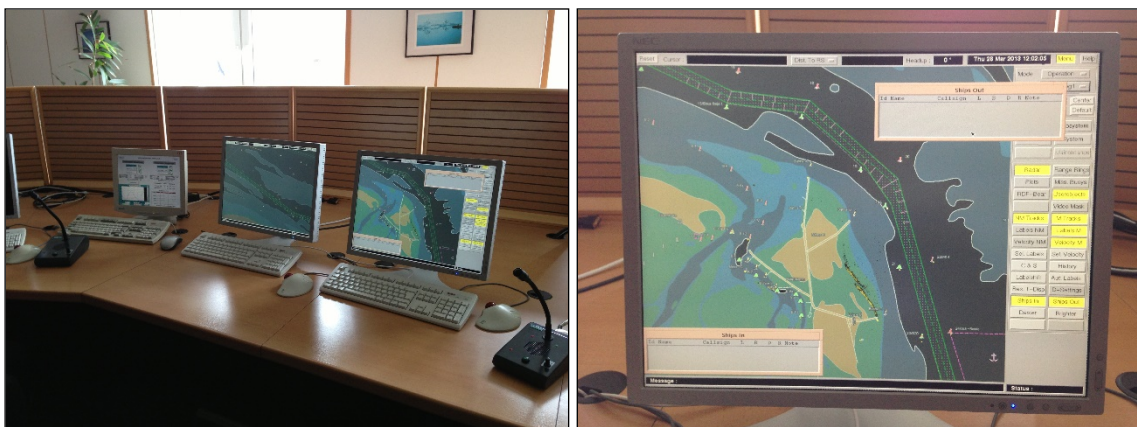


Figure 16: Fairway around Minsener Oog – shown on a computer at VTS Wilhelmshaven

The workstations for the shore-based radar guidance are separate to the workstations belonging to the staff of the VTS centre. During guidance, the findings gained from the radar image are communicated to the pilot on board for information.

3.3.6 Execution of the voyage

The information recorded by the S-VDR (radar images and recording of the bridge microphones, in particular) was available for the investigation. This made it possible to follow the discussions on the bridge. Accordingly, it is possible to listen to the initial exchange of information concerning the KATJA's manoeuvrability (in particular, regarding the target speed of 8 kts), as well as the discussion about the approach against the expected ebb current. The discussions indicated that the ship's command and sea pilot were in agreement on how to proceed. Communication for the remaining duration of the voyage was essentially limited to specification and acknowledgement of the course between the sea pilot and helmsman.

The duty officer logged the ship's position and echo-sounder data every six minutes. Inter alia, the "Log book for passing buoys/landmarks" contained the following entries for the period relevant to the accident¹⁸:

Spreadsheet 1: Excerpt from the "Log book for passing buoys/landmarks"

Local time	Buoyage	UKC according to the echo sounder
(...)		
2224	Jade 1	15 ft = 4.57 m
2230	"-	14 ft = 4.27 m
2236	"-	12 ft = 3.66 m
2242	"-	12 ft = 3.66 m
2248	"-	11 ft = 3.35 m
2254	"-	10 ft = 3.05 m
2300	"-	10 ft = 3.05 m
2306	"-	9 ft = 2.74 m
2312	Buoy 3/Jade 2 racon	9 ft = 2.74 m
2318	"-	10 ft = 3.05 m
2324	Buoy 6	9 ft = 2.74 m
2330	"-	9 ft = 2.74 m
2336	Buoy 8	8 ft = 2.44 m
2342	"-	6 ft = 1.83 m
2348	Buoy 10	6 ft = 1.83 m
2354	"-	6 ft = 1.83 m
2400	Buoy 12	6 ft = 1.83 m
0006	"-	7 ft = 2.13 m

¹⁸ The special log book was kept in English. Conversion of the echo-sounder data from imperial (ft) to metres (m) made by the BSU. The list of data on bearings and distances to buoys passed contained in the original was dispensed with for the sake of clarity.

Local time	Buoyage	UKC according to the echo sounder
0012	Buoy 14	13 ft = 3.96 m
0018	Buoy 16	12 ft = 3.66 m
0024	-"	8 ft = 2.44 m
0030	Buoy 18	11 ft = 3.35 m
0036	Buoy 20	12 ft = 3.66 m
0042	-"	16 ft = 4.88 m
0048	Buoy 22	
0300	Buoy 21	
0624	Buoy 21	13 ft = 3.96 m
(...)		

The request for shore-based radar guidance was not discussed on the bridge. The regular reports by the shore-based radar pilot on VHF were not mentioned on the bridge. The S-VDR recording of the discussions in the relevant period before the accident was compared with the recording of VHF channel 63 saved by the VTS and listed in the following spreadsheet (colour highlighting added by the BSU):

Spreadsheet 2: Log of the bridge conversation and VHF channel 63

Time	Pos.	HDG COG	STW SOG	Speaker	Content
001925	53°48.53'N 007°57.83'E	116° 117.4°	9.6 kts 8.2 kts	Radar pilot VHF C63	Jade upstream, KATJA, another 1,000 m to cover until the next course alteration at pair of buoys 15/16. Port side line 2° west (<i>tendency</i>).
002028	53°48.46'N 007°58.05'E	116° 118.8°	9.6 kts 8.2 kts	Radar pilot VHF C63	KATJA, distance is now 750 m, port side still just on the line, 2° west (<i>tendency</i>).
002130	53°48.39'N 007°58.26'E	116° 119.1°	9.6 kts 8.2 kts	Radar pilot VHF C63	Jade upstream, KATJA, distance is now 500 m, port side is <u>on</u> the Mellumplate radar reference line, 2° west (<i>tendency</i>).
002144	53°48.38'N 007°58.30'E	116° 118.6°	9.6 kts 8.2 kts	Pilot on the KATJA	1 – 0 – 0. <i>Helmsman acknowledges.</i>
002225	53°48.33'N 007°58.45'E	111° 120.0°	9.5 kts 8.2 kts	Radar pilot VHF C63	KATJA, distance is now 250 m, port side of the line, still no tendency.
002322	53°48.28'N 007°58.64'E	100° 104.2°	9.5 kts 7.8 kts	Radar pilot VHF C63	And Jade upstream, KATJA, the starboard stem is now in the intersection point at pair of buoys 15/16.
002433	53°48.26'N 007°58.90'E	100° 98.6°	9.4 kts 7.8 kts	Radar pilot VHF C63	Jade upstream, KATJA, stern has passed the intersection point, [first name of pilot], after completed course alteration, starboard side just on the small intermediate radar line with 2°, 3° tendency to west.
002530	53°48.24'N 007°59.11'E	100° 99.6°	9.4 kts 7.9 kts	Pilot on the KATJA	1 – 0 – 3 – please. <i>Helmsman acknowledges.</i>

Time	Pos.	HDG COG	STW SOG	Speaker	Content
002617	53°48.23'N 007°59.29'E	102° 97.7°	9.2 kts 7.9 kts	Radar pilot VHF C63	Jade upstream, KATJA, [first name of pilot], another 1,000 m to cover until the next course alteration at pair of buoys 17/18. Your starboard side is right on the small intermediate radar line. Now 2° west (<i>tendency</i>), that's fine.
002641	53°48.22'N 007°59.38'E	103° 99.5°	9.1 kts 7.9 kts	Helmsman on the KATJA	1 – 0 – 3. <i>Pilot takes note.</i>
002717	53°48.21'N 007°59.50'E	103° 102.6°	9.3 kts 7.9 kts	Radar pilot VHF C63	KATJA, distance now 750 m, positioned diagonally on the small intermediate radar line from port stem to starboard sternpost, and 3° tendency to west.
002819	53°48.18'N 007°59.73'E	103° 100.1°	9.6 kts 8.0 kts	Radar pilot VHF C63	Upstream, KATJA, now another 500 m to cover until the course alteration.
002845	53°48.17'N 007°59.83'E	103° 101.1°	9.7 kts 8.0 kts	Pilot on the KATJA	Starboard 20 please. <i>Helmsman acknowledges.</i>
002920	53°48.16'N 007°59.96'E	105° 97.3°	9.6 kts 8.0 kts	Radar pilot VHF C63	KATJA, distance now 250 m, port stem at the small intermediate radar line, sternpost on the intermediate radar line.
002953	53°48.13'N 008°0.09'E	116° 98.2°	9.5 kts 8.0 kts	Pilot on the KATJA	Midships. <i>Helmsman acknowledges.</i>
003004	53°48.14'N 008°0.13'E	122° 101.8°	9.3 kts 7.9 kts	Helmsman on the KATJA	Midships. <i>Pilot takes note.</i>
003007	53°48.14'N 008°0.14'E	123° 103.3°	9.2 kts 7.8 kts	Radar pilot VHF C63	KATJA, stem level with the intersection point at pair of buoys 17/18, starboard stem just free of the western border of the corridor, course alteration clearly visible.
003009	53°48.14'N 008°0.14'E	123° 103.7°	9.2 kts 7.8 kts	Pilot on the KATJA	Port 10. <i>Helmsman acknowledges.</i>
003022	53°48.13'N 008°0.19'E	128° 111.7°	9.1 kts 7.5 kts	Pilot on the KATJA	Port 20. <i>Helmsman acknowledges.</i>
003037	53°48.12'N 008°0.23'E	131° 120.4°	9.1 kts 7.3 kts	Pilot on the KATJA	Midships. <i>Helmsman acknowledges.</i>
003044	53°48.11'N 008°0.25'E	132° 124.7°	9.0 kts 7.3 kts	Pilot on the KATJA	Steady 1 – 3 – 3 please. <i>Helmsman acknowledges.</i>
003121	53°48.06'N 008°0.35'E	134° 135.5°	8.9 kts 7.1 kts	Radar pilot VHF C63	Jade upstream, KATJA, stern now just past the intersection point. After completed course alteration, your starboard side is on the western border of the corridor, currently 1° tendency to west.
003538	53°47.69'N 008°0.96'E	133° 133.6°	9.3 kts 7.3 kts	Radar pilot VHF C63	Jade upstream, KATJA has almost covered half the distance between buoys 17 and 19; [first name of pilot], completely on the western border of the corridor, still 2° tendency to west according to this image.
<i>003656-003800: pilot on the KATJA makes call on mobile phone.</i>					

Time	Pos.	HDG COG	STW SOG	Speaker	Content
003808	53°47.48'N 008°1.35'E	133° 133.0°	9.7 kts 7.5 kts	Radar pilot VHF C63	Jade upstream, KATJA, [first name of pilot], now another 750 m to cover until the next course alteration at pair of buoys 19/20, <u>on</u> the western border of the corridor, now 1° east (<i>tendency</i>).
003910	53°47.39'N 008°1.51'E	133° 131.0°	9.8 kts 7.5 kts	Radar pilot VHF C63	KATJA, distance now 500 m, <u>on</u> the western border of the corridor, now 3° east (<i>tendency</i>).
003949	53°47.34'N 008°1.62'E	134° 131.5°	9.5 kts 7.5 kts	Pilot on the KATJA	Starboard 10. <i>Helmsman acknowledges.</i>
004004	53°47.32'N 008°1.66'E	133° 131.5°	9.7 kts 7.6 kts	Pilot on the KATJA	Starboard 20. <i>Helmsman acknowledges.</i>
004019	53°47.30'N 008°1.70'E	135° 129.0°	9.5 kts 7.6 kts	Radar pilot VHF C63	And upstream, KATJA, [first name of pilot], distance now another 250 m, almost in the middle of the western corridor.
004049	53°47.26'N 008°1.78'E	142° 127.2°	9.0 kts 7.6 kts	Pilot on the KATJA	Midships. <i>Helmsman acknowledges.</i>
004059	53°47.25'N 008°1.80'E	146° 128.6°	9.0 kts 7.6 kts	Helmsman on the KATJA	Midships. <i>Pilot takes note.</i>
004110	53°47.23'N 008°1.84'E	150° 133.6°	8.9 kts 7.5 kts	Radar pilot VHF C63	And upstream, KATJA, stem level with the intersection point at pair of buoys 19/20, stem to middle of the western corridor.
004123	53°47.21'N 008°1.87'E	154° 139.4°	9.0 kts 7.4 kts	Pilot on the KATJA	Port 10 please. <i>Helmsman acknowledges.</i>
004138	53°47.18'N 008°1.89'E	159° 146.4°	8.9 kts 7.2 kts	Pilot on the KATJA	Port 20. <i>Helmsman acknowledges.</i>
004205	53°47.14'N 008°1.93'E	164° 159.9°	8.7 kts 7.0 kts	Pilot on the KATJA	Midships. <i>Helmsman acknowledges.</i>
004208	53°47.17'N 008°1.94'E	164° 161.6°	8.7 kts 7.0 kts	Pilot on the KATJA	Steady on 1-6-5. <i>Helmsman acknowledges.</i>
004225	53°47.10'N 008°1.95'E	165° 165.5°	8.6 kts 6.9 kts	Radar pilot VHF C63	Jade upstream, KATJA, stern now past the intersection point, [first name of pilot], after completed course alteration, you are now propelling yourself onto the western border of the corridor, still with tendency to west.
004242	53°47.06'N 008°1.96'E	165° 169.3°	8.7 kts 7.0 kts	Pilot on the KATJA	1 – 6 – 0 please. <i>Helmsman acknowledges.</i>
004310	53°47.01'N 008°1.97'E	164° 173.9°	8.8 kts 7.1 kts	Radar pilot VHF C63	And Jade upstream, KATJA, the intersection point is now a good 300 m astern, [first name of pilot], you are now already almost one beam outside the western corridor, still with considerable tendency to west.
004323	53°46.98'N 008°1.97'E	162° 174.4°	8.8 kts 7.1 kts	Pilot on the KATJA VHF C63	In progress.

Ref.: 289/12

Time	Pos.	HDG COG	STW SOG	Speaker	Content
004339	53°46.95'N 008°1.98'E	160° 172.4°	9.3 kts 7.0 kts	Helmsman on the KATJA	1 – 6 – 0. <i>Pilot takes note.</i>
004450	53°46.82'N 008°2.04'E	158° 163.5°	8.7 kts 6.5 kts	Radar pilot VHF C63	Jade upstream, KATJA, now a third of the distance covered between buoys 19 and 21, [first name of pilot], still half a beam outside the western corridor but now with 3°, 4° tendency to east.
<i>KATJA runs aground during the message from the radar pilot; 004506 → 5.6 kts SOG.</i>					
004526	53°46.78'N 008°2.07'E	158° 155.1°	5.0 kts 3.5 kts	Officer on watch on the KATJA	Speed...
004556	53°46.75'N 008°2.08'E	160° 157.5°	4.0 kts 2.8 kts	Master on the KATJA	[Unintelligible] What's going on? Pilot: [Unintelligible] ... water.
004641	53°46.74'N 008°2.09'E	160° 121.1°	1.9 kts 0 kts		
004728				Pilot on the KATJA VHF C63	[First name of radar pilot].
004729				Radar pilot VHF C63	[First name of pilot].
004731				Pilot on the KATJA VHF C63	Why is zero speed displayed here?
004734				Radar pilot VHF C63	Same here. I was just about to ask.
004737				Pilot on the KATJA VHF C63	Engine running.
004740				Radar pilot VHF C63	Not good. ...I've lost the echo there before, when I was navigating, right at the same position, but ... nothing's happening here.
004751				Pilot on the KATJA VHF C63	Yes, just monitor for a couple more seconds.
004837				Pilot on the KATJA VHF C63	[First name of radar pilot], can you give me the position?
004842				Radar pilot VHF C63	One moment. ... [first name of pilot], you are exactly on 53
004851				Pilot on the KATJA VHF C63	I don't mean that.
004854				Radar pilot VHF C63	What do you mean?
004857				Pilot on the KATJA VHF C63	(I) mean to the corridor.
004859				Radar pilot VHF C63	Your port side is on the western border of the corridor and you have 3°, 4° tendency to the east.

Ref.: 289/12

Time	Pos.	HDG COG	STW SOG	Speaker	Content
005037				Pilot on the KATJA VHF C63	What's your water level?
005039				Radar pilot VHF C63	MELLUM now displayed at 2 m and 9.
005044				Pilot on the KATJA VHF C63	2 m and 9 ...
005330				Jade Traffic VHF C63	Wilhelmshaven Port, Jade Traffic. ... Yes, can you send the tug to the KATJA, she has run aground at buoy 21. ... Yes, everything you've got, okay? Like WILHELMSHAVEN, and ... and whatever's there, okay?
005404				Pilot on the KATJA VHF C63	Jade Traffic, KATJA.
004510				Jade Traffic VHF C63	Yes, KATJA, Jade Traffic.
005411				Pilot on the KATJA VHF C63	Yes, good morning to you, [last name of pilot]. Well, we're stuck somewhere on the starboard side, but the ship's still moving, ship's turning and ... even seems to be picking up speed again at the moment.
005422				Jade Traffic VHF C63	Yes, precautions will be taken for the shipping, anyway. Even though you are underway.
005427				Pilot on the KATJA VHF C63	All right.
005619				Pilot on the KATJA VHF C63	[First name of radar pilot].
005621				Radar pilot VHF C63	Yes, I'm listening.
005623				Pilot on the KATJA VHF C63	Give me a rough estimate of when the tugs will get here, please, if you can. If that's possible for you. The master asked.
005631				Radar pilot VHF C63	[First name of pilot], as soon as I see one, I'll come back to you.
005634				Pilot on the KATJA VHF C63	Thank you.
005924				Radar pilot VHF C63	The KATJA, [first name of pilot], are you receiving?
005931				Pilot on the KATJA VHF C63	[First name of radar pilot]?

Ref.: 289/12

Time	Pos.	HDG COG	STW SOG	Speaker	Content
005932				Radar pilot VHF C63	Right, it will be most probably be the WILHELMSHAVEN and BUGSIER 1, the two strongest. And if they set sail any minute now, they're both still in the outer port, then I guess it will take one and a half hours. One and a half to one and three-quarter hours until they get to you.
005950				Pilot on the KATJA VHF C63	One and a half to one and three quarters. Okay, thanks. We're doing our best with fishtailing and engine set to full at the moment ... but without much success at the moment.
010001				Radar pilot VHF C63	No, I can't see anything here, either.
010042				Jade Traffic VHF C63	KATJA, Jade Traffic.
010048				Pilot on the KATJA VHF C63	KATJA receiving.
010050				Jade Traffic VHF C63	Yes, can you send out a few people from the crew, to see whether oil has escaped? Or is escaping?
010324				BUGSIER 1 VHF C63	Jade Traffic, BUGSIER 1.
010332				Radar pilot VHF C63	BUSGIER 1, this is the KATJA's radar pilot, [name of radar pilot], hello.
010338				BUGSIER 1 VHF C63	Yes, hello, this is BUGSIER 1, and we'll come out of the fourth entrance in a minute and be on the way.
010344				Radar pilot VHF C63	Be on the way, all right. And on channel 9, I assume, yes?
010348				BUGSIER 1 VHF C63	On channel 9, yes.
010351				Radar pilot VHF C63	Okay, I'll tell the pilot on board to go on channel 9. You can then communicate with him.
010356				BUGSIER 1 VHF C63	All right.
010359				Radar pilot VHF C63	You now have about 16 miles to go, I guess ... you need one and a half hours, yes?
010408				BUGSIER 1 VHF C63	Yes, about that. ... do you have any more info for me?
010411				Radar pilot VHF C63	No, I'll ... tell the pilot on board to go on channel 9. He knows considerably more than I do.

Time	Pos.	HDG COG	STW SOG	Speaker	Content
010418				BUGSIER 1 VHF C63	Yes okay.
010421				Radar pilot VHF C63	And the KATJA, [first name of pilot].
010423				Pilot on the KATJA VHF C63	I'm on nine.
010425				Radar pilot VHF C63	Yes, super, they're both getting underway now, BUGSIER 1 and WILHELMSHAVEN. And as I said, I guess one and a half hours.
010431				Pilot on the KATJA VHF C63	Okay. And Jade Traffic, KATJA.
010439				Jade Traffic VHF C63	Yes, KATJA, Jade Traffic.
010442				Pilot on the KATJA VHF C63	Yes, no visible spillage and the ballast tanks are dry.
010448				Jade Traffic VHF C63	No visible spillage and the ballast tanks are dry, well there's some good news. Thank you.

3.3.7 Drift calculation

On the night of the accident, the BSH's on-call service calculated several drift models on behalf of the CCME in case of an oil spillage. At about 0445, information that potential oil pollution would move in the direction of Wangerooge due to the easterly winds and prevailing currents was received by phone. Scenarios were calculated on the assumption of introduction times at 0600 and 1000 and faxed to the CCME.

The first scenario predicted the oil to drift between Wangerooge and the mainland (see Figure 17).

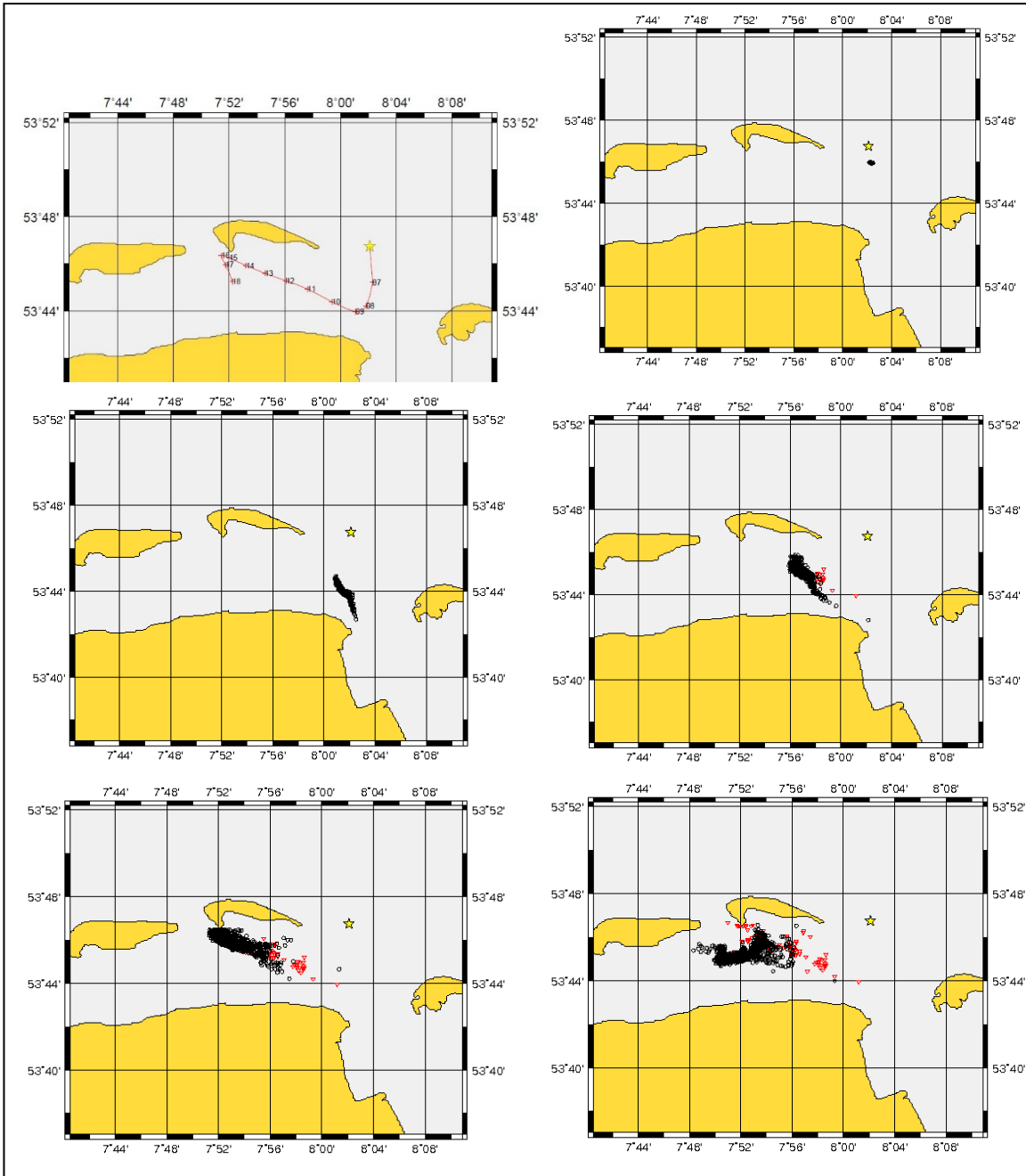


Figure 17: Excerpt from the BSH's drift model (oil drift between Wangerooge and the mainland between 0630 and 1800)

The second scenario illustrated a drift north of Wangerooge on the assumption of oil spillage at 1000 (see Figure 18).

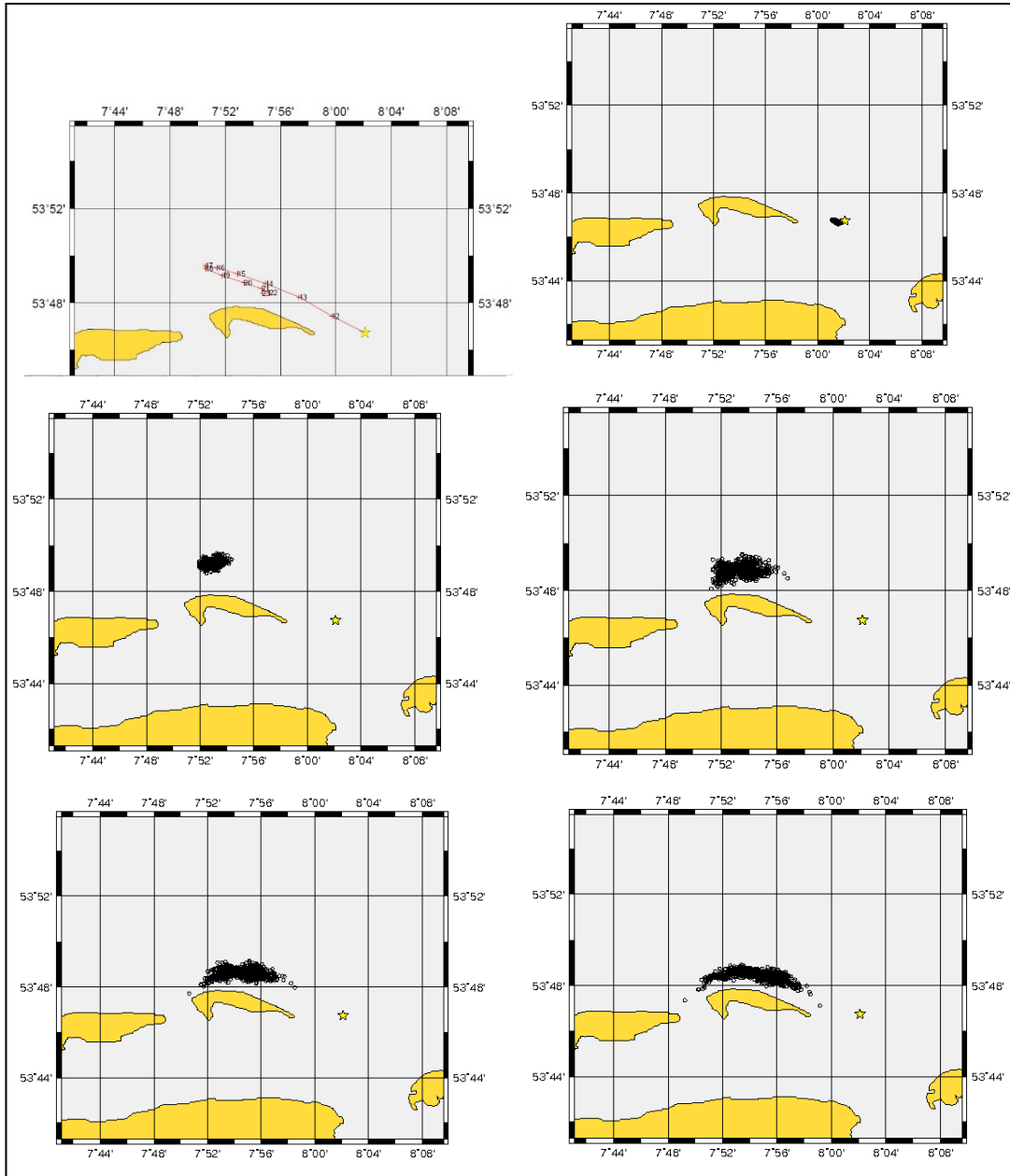


Figure 18: Excerpt from the BSH's drift model (oil drift north of Wangerooge between 1100 and 2300)

3.3.8 Fairway maintenance

Maintenance of the fairway that rounds Minsener Oog was the subject of a meeting in Wilhelmshaven on 28 March 2013. This was attended by BSU personnel, representatives of the Directorate-General for Waterways and Shipping (GDWS) - Outstation North West¹⁹, the Fairway Maintenance department of WSA Wilhelmshaven, as well as VTS Wilhelmshaven. In addition to general maintenance measures, the relocation of buoys in the area of the accident after it took place was discussed at length. The outcome of the meeting is shown below.

¹⁹ Formerly Waterways and Shipping Directorate (WSD) North West

3.3.8.1 Morphological assessment of the sandbank in the area of the accident

With regard to the morphological characteristics of the sandbank, the Fairway Maintenance department of WSA Wilhelmshaven stated:

A sediment flow (literal drift) exists from west to east along the East Frisian Islands due to the prevailing wind conditions on the coast and as a result of the induced wave direction. The bank concerned has existed at this point for years. By all accounts, it is essentially a type of sediment (sand) spur, which accumulates at the Minsener Oog river structure and then continuously runs north of Minsener Oog from west to east. Although the bank itself is quite stable locally, its embankment formation is said to be morphologically dynamic and heavily dependent on the swell.

3.3.8.2 Dredging in the area of the accident

The Fairway Maintenance department of WSA Wilhelmshaven continued: As with the rest of the fairway, the aim is to provide a 300-m-wide corridor within the fairway²⁰. As with other areas, too, this aim is complicated by the continual accumulation of sediment at various points of the fairway, like this bank. Regular soundings made it possible to identify such accumulations along the Jade's some 55-km-long dedicated corridor and resulted in dredging operations within the corridor. Dredging along the edge of the corridor to remove sediment that runs into the corridor was carried out both

- before the accident
in February, April, May, June, and August 2011
in March (twice), April, and June 2012
- and after the accident
in August, September, and November 2012
in January 2013

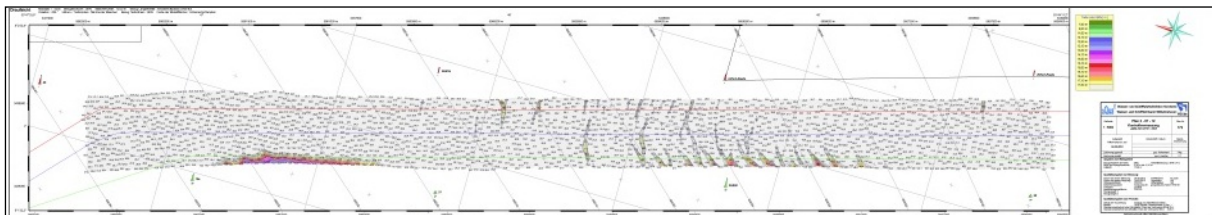


Figure 19: Sounding chart of 3 September 2012

The sounding chart of 3 September 2012 (see Figure 19) reportedly shows that actually an accumulation cannot always be removed completely or permanently, in spite of dredging in the interim. By all accounts, this is usually because sediment reportedly flows back at the 'cutting edge' immediately after dredging. Therefore, the dredger was reportedly in operation at the scene of the accident once again in mid-September. The amount of sediment that accumulates there is reportedly unpredictable, as it is heavily dependent on the weather, tide, and swell at the time.

²⁰ See Figure 21 for the course of the channel in the area of the accident.

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Consequently, accumulations and the resulting shallows in the corridor are reportedly to be taken for granted. They were detected by regular soundings and made known to the VTS and pilots immediately in the form of sounding charts (in electronic and paper form).

3.3.8.3 Soundings in the area of the accident

In the course of the investigation, the BSU viewed and analysed the sounding charts for the area in which the accident occurred (Jade 27.9 to 33.9 km). These were created before and after the accident using data from Sounding Vessel JADE.

The Fairway Maintenance department of WSA Wilhelmshaven stated that the 300-m-wide fairway corridor is regularly sounded once a month and in response to specific situations. Any further soundings from the boundaries of the fairway to the buoy line would take place twice a year. Immediately after sounding is finished, the corresponding data would be processed and translated into sounding charts at the WSA. These charts would be provided both by email as a PDF file attachment and post in paper form to the VTS and the pilot brotherhood responsible for the operating area, inter alia. The hydrography itself is reportedly conducted in accordance with the aQua quality management system. This means it is subject to constant quality assurance.

The last sounding up to the buoy line was made on 6 August 2012, i.e. shortly before the accident (see Figures 20 and 21: Chart excerpt from 8 August 2012 with the KATJA's course inserted).

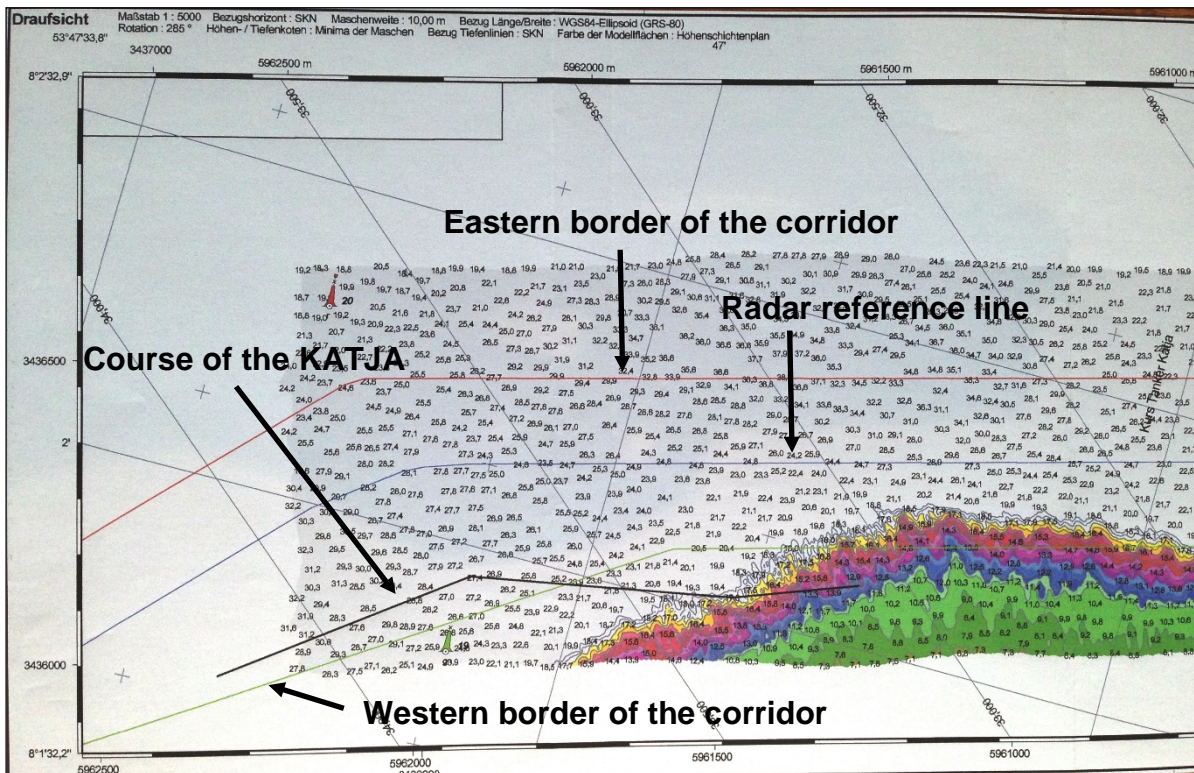


Figure 20: Excerpt from the sounding chart of 8 August 2012 with the KATJA's course inserted

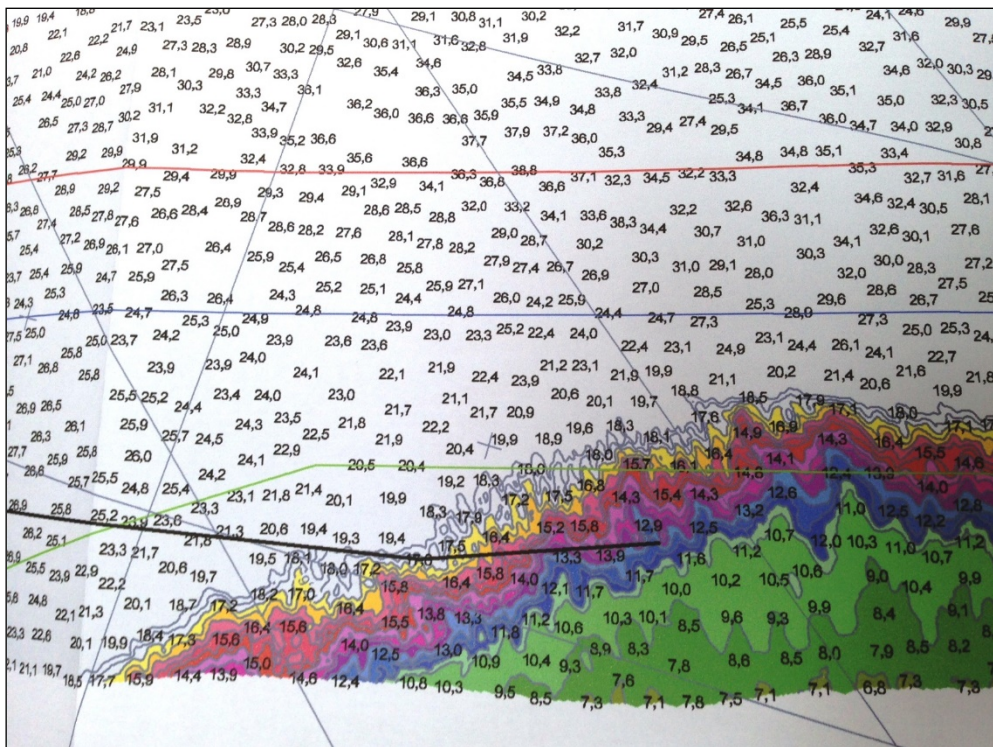


Figure 21: Details of the accident area, sounding chart of 8 August 2012

According to the sounding chart, the depth of water outside the corridor was not sufficient for the draught of the KATJA (13.45 m). The black course line of the KATJA ends in an area for which depths of much less than 13 m are shown. It should be noted here that the chart only shows the depth conditions for the day the sounding was made, 6 August 2012, but not for the day of the accident.

The first chart after the accident was created on 4 September 2012 (see Figure 22) after further dredging. Rather than the entire fairway to the buoy line, it only covers the dedicated corridor within the fairway.

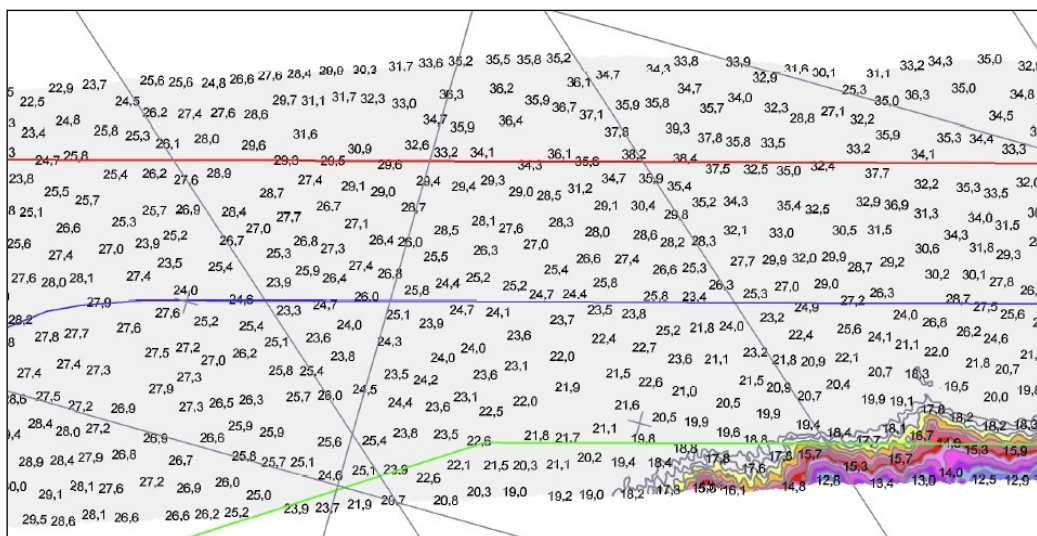


Figure 22: Details of the accident area, sounding chart of 4 September 2012

With regard to the last sounding before the accident, GDWS Outstation North West stated:

The soundings that formed the basis for preparing the 'Jade Chart 3' sounding chart were made on Monday 6 August 2012. The sounding data were prepared accordingly, printed on Wednesday 8 August 2012, and sent to VTSs Wilhelmshaven and Bremerhaven in accordance with the sounding office of WSA Wilhelmshaven's distribution list on Friday 10 August 2012. Consequently, the chart was available at both VTSs in printed form by no later than Monday 13 August 2012. When the printed copies were posted, PDF copies of the sounding chart in question were sent to the pilot stations in Wilhelmshaven and Bremerhaven by email simultaneously. The next day, after analysing the charts, the 'Fairway status report' was also sent to VTS Jade by email.

3.3.8.4 Relocation of buoys

After the accident, the course of the fairway that rounds Minsener Oog was changed by the addition of a new buoy, 19a, and several other buoys in the area were relocated (see Figure 23). This relocation was made in the course of opening the JadeWeserPort on 21 September 2012 and had already been initiated before the accident involving the KATJA.

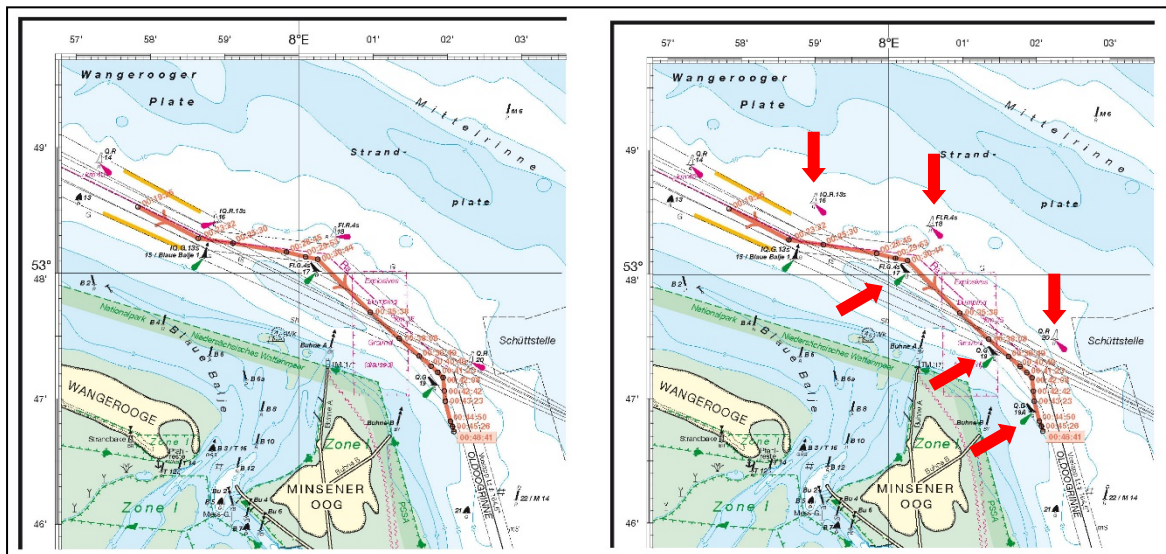


Figure 23: Chart of the now completed buoy relocation

3.3.9 AIS recordings

In addition to the recordings of the S-VDR from aboard the KATJA, AIS recordings from Jade Traffic were available for the investigation (see Figure 24). Due to the large amount of data available, the S-VDR data were used for preparing the course of the KATJA.

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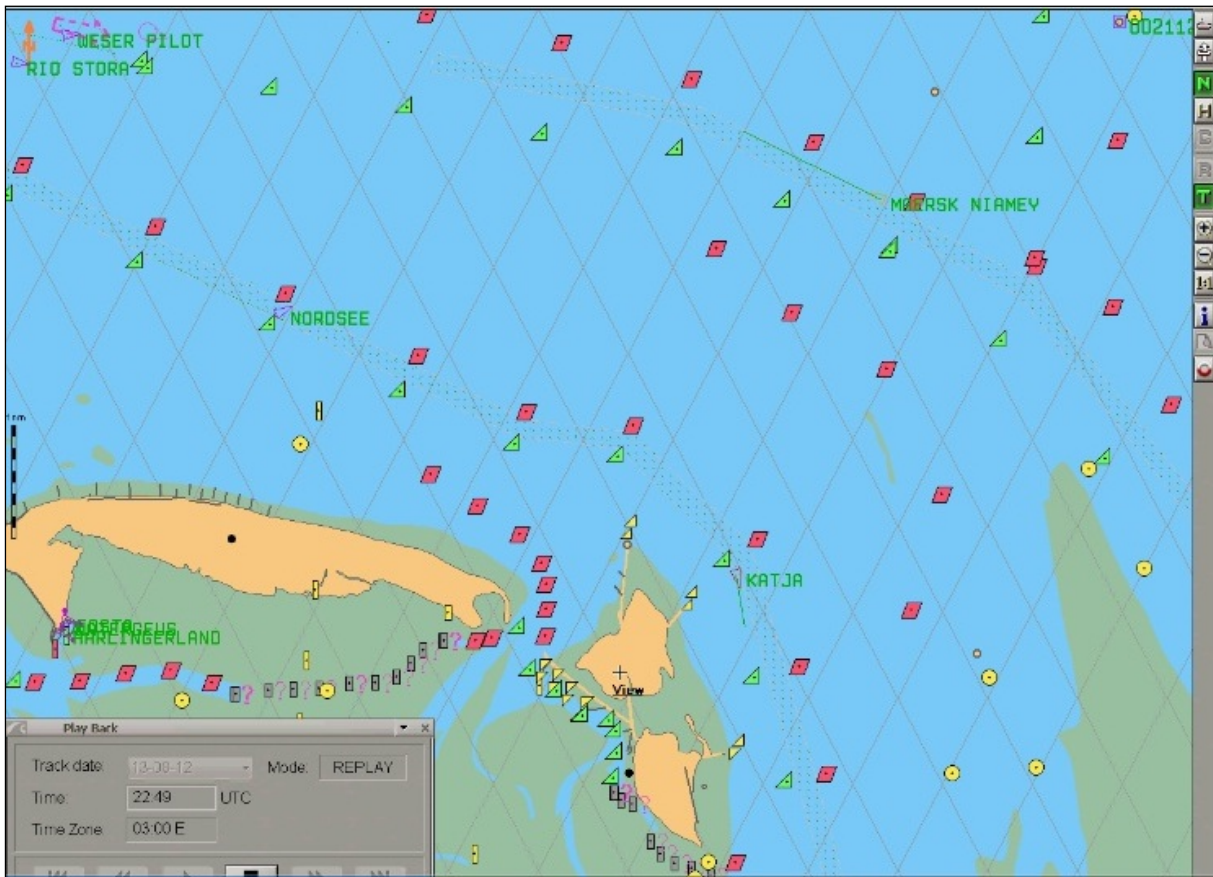


Figure 24: AIS plot from Jade Traffic; KATJA at the scene of the accident

4 ANALYSIS

4.1 Course of the accident

The prevailing wind and current on the night of the accident gave no indication that piloting the KATJA on the Jade would present a problem. The ship's command and sea pilot discussed the steering characteristics of the KATJA. The following conversation was held on the bridge immediately after the sea pilot arrived:

Pilot	So you already weighed up your anchor.
Master	Yes, we are already moving.
Pilot	So that means she's not so fast.
Master	She's very slow.

Approaching against low tide was discussed after that and a target speed of 8 kts agreed on. Everyone involved was aware that the KATJA, which was unwieldy when manoeuvring, would be exposed to the ebb current during the voyage. This in itself did not present a particular challenge and the voyage progressed accordingly until reaching the point where Minsener Oog was to be passed. Communication on the bridge was confined to helm commands issued by the sea pilot to the helmsman. That helm commands are issued directly by the pilot is consistent with usual practise during pilotage. All the commands were clear, unambiguous, acknowledged by the helmsman, and accurately implemented. The master was still responsible for commanding the ship²¹.

Since the KATJA's draught is 13.45 m, she was not required to remain within the dedicated corridor. Accordingly, the tanker's draught did not preclude her from proceeding on or even beyond the border of the corridor, depending on local conditions.

According to the owner's specifications, the UKC should not be less than 0.90 m (see section 3.3.5.1). The recording of the bridge microphones gives no indication as to whether the bridge team complied with the owner's other specification: to determine squat values, as soon as it was found that the UKC was less than 4 m. In this regard, even though the 4 m was fallen short of regularly after 2236 (see Spreadsheet 1 on p. 25), there was no information from the duty officer, who regularly noted the values, to the master.

Shortly before reaching pair of buoys 3/4 on the Jade, the shore-based radar pilot started his work and gave information to the sea pilot about the current position of the ship and approaching course alteration positions regularly. The KATJA was not

²¹ See Article 23(2) of Germany's Law on sea pilots (Gesetz über das Seelotswesen - SeeLG): The master remains responsible for navigating the ship even if he permits the sea pilot to issue orders relating to navigation of the ship independently.

required to make use of shore-based radar guidance in addition to the guidance by the sea pilot. Rather, the sea pilot ordered this guidance without consulting with the master. It was not possible to establish the reasons for this retrospectively. However, the master did not appear to object to the additional guidance, as he did not comment at all on the KATJA being called regularly on VHF. Having said that, the master was excluded from the flow of information to the extent that communication between the pilots was conducted in German and the sea pilot did not interpret for the bridge team. Ultimately, the sea pilot had another source of information available in addition to the radar image due to the shore-based radar guidance, even though the latter, as with any pilotage assignment, only played an advisory role²². Amongst other things, the advantage for the sea pilot was that he received information on the KATJA's position inside the designated corridor from the shore-based radar pilot. The corridor as such cannot be seen on the shipboard radar.

The approach to the Oldoogrinne began without any particular incidents. The passage of pair of buoys 17/18 went as planned. After the course alteration was completed, the sea pilot gave instructions for the KATJA to proceed on the western border of the corridor with 1°, 2° tendency to the west. At 0037, halfway between buoys 17 and 19, the sea pilot made a private call on his mobile phone, which lasted one minute. The BSU does not believe the sea pilot was distracted by the conversation as the voyage continued. The phone call ended shortly before the shore-based radar pilot's next call on VHF when the KATJA was still 750 m away from the next course alteration position at pair of buoys 19/20.

The KATJA covered the next 250 m on the western border of the corridor, where her tendency changed from 2° to the west to 3° to the east. This was because of the current rather than an adjustment to the course. The ebb current set at 2 kts. The sea pilot gave instructions for a course alteration of 10° and then 15 seconds later 20° for the passage of buoy 19. Due to the course adjustment, the KATJA moved back into the middle of the western corridor at 0040, where the sea pilot arranged for the rudder to be put amidships again. At this point, the KATJA was still 250 m from the next course alteration position. In the absence of oncoming traffic, it would have been easily possible to steer the KATJA even further into the middle of the corridor and pass buoy 19 at a greater distance.

At 004049, the sea pilot ordered a course alteration of 10° and then 15 seconds later 20° to port. He then issued instructions for the rudder to be put back to amidships and gave the usual course for this section of 165°. At that point, the KATJA's speed over ground was 7 kts. Up to there, the voyage had progressed in line with expectations.

At 004225, the shore-based radar pilot informed the sea pilot that after completing the course alteration the KATJA now approached the western border of the corridor with a tendency to the west. The shore-based radar pilot gave no indication of the sandbank incursion found there after the last sounding, which stretched into the

²² See Article 23(1) SeeLG: The sea pilot is required to advise the master in navigating the ship. Advice may also be given from another ship or from a shore-based facility.

corridor. The latest sounding charts are displayed on the wall immediately behind the shore-based radar pilot workstations. By his own admission, the sea pilot on board the KATJA was not aware of the reduced water depth at this point (see section 4.3 below). The master of the KATJA could not have been aware of the position of the sandbank, either. He had to rely on the specific local knowledge of the sea pilot. Although, by his own admission, he was unsettled shortly before the course alteration position at pair of buoys 19/20 because of the low passing distance, the course given by the pilot reassured him. In particular, the course correction to 160° would presumably have been sufficient to return the tanker to the western corridor in the absence of the sandbank. As a result, the fact that the KATJA approached the western border of the corridor was not commented on further between the pilots or the bridge team.

Two minutes before the accident, at 004310, the difference between the steered course and current heading of the KATJA was already 9.9°. The tanker was displaced to starboard. Although the sea pilot corrected the course by only 5°, the new course was still not set and the KATJA continued to proceed at only 7 kts. The shore-based radar pilot pointed out that the KATJA, still with tendency to the west, was already one beam outside the corridor. The sea pilot essentially replied that he had noticed the situation and initiated effective countermeasures ("In progress"). Therefore, he misjudged the situation because the KATJA had already neared the sandbank too much to prevent ground contact when the new course of 160° was finally set at 004339. The course alteration of 5° had taken a total of one minute to complete. In the opinion of the BSU, it is highly unlikely that even a greater course alteration of 10° or 15° would have prevented the ground contact because the KATJA was already too far to the west after passing buoy 19, and the tanker was too slow for effective course alterations over a short distance. Furthermore, the new course of 160° did not counteract the influence of the ebb current.

However, it was still assumed on board and ashore that it would be possible to steer the KATJA back into the dedicated corridor. While the shore-based radar pilot was still sending his report (the KATJA is located only half a beam outside the border of the corridor, now with tendency to the east), the tanker slowly ran aground. The ship hardly vibrated because of the sandy seabed, meaning it was only due to the ship's sharp drop in speed that the accident was evident to everyone involved. All the countermeasures, the so-called fishtailing, in particular, were unsuccessful. Nevertheless, the KATJA was able to refloat with tug assistance after the onset of the next tide and continue the voyage under her own steam.

4.2 Human factors

Both the bridge team and the pilots involved were well qualified to meet the requirements for navigating the oil tanker safely. The safety investigation by the BSU revealed no evidence to suggest any individual involved was neither fatigued nor other circumstances that could have affected the safe navigation of the KATJA.

Contrary to press reports claiming the opposite, everyone involved in the accident cooperated with the competent authorities both immediately after the accident and during the subsequent review.

4.3 Voyage preparation

It was not possible to clarify why the sea pilot was not aware of the current sounding chart retrospectively. Indeed, it is normal for several days to pass before sounding data are translated into a chart and provided to the pilots, among others, after verification. However, GDWS Outstation North West indicated that in the present case the chart of 8 August 2012 was available to the pilot stations in Wilhelmshaven and Bremerhaven by email as a PDF file on 10 August 2012 and on paper in printed form by no later than 13 August 2012. The BSU believes that the period between sounding, preparing the chart, and distribution is sufficiently short to ensure optimum preparation for sea pilots. Electronic distribution is of particular importance here because it makes it easy for the pilot stations to forward the data to the sea pilot user group. Although the data do not necessarily map the actual conditions even on the day the chart is created because of the continued shifting of sediment after sounding, the information received in the charts are relevant and necessary for adequate voyage preparation. After all, sediment deposits found close to or in the fairway do not recede to any significant extent without dredging. The sounding chart created after the accident (dated 4 September 2012) illustrates for the area of the accident, in particular, that even after dredging sandbank incursions still stretch into the corridor (see Figures 21 and 22). Therefore, the latest sounding charts should be used for the selection of a safe route before any pilotage assignment. On no account is relying on chart courses sufficient.

It remains unclear why distribution of the latest sounding chart to the KATJA's sea pilot ultimately failed. Adequate voyage preparation by the sea pilot was not possible without the chart.

The BSU assumes the shore-based radar pilot was aware of the sandbank in the area of the accident and might have supposed this also applied to the sea pilot.

4.4 Course and maintenance of the fairway

The course of the dedicated corridor close to Minsener Oog, as it was on the night of the accident, is considered demanding by the BSU because of the strong currents that prevail there and the associated, varying influx in the area of the fairway, which can stretch into the corridor, in particular. The difficulty of the pilotage assignment on the KATJA did not stem from the size of the oil tanker but was the result of a combination of the tide/current and the KATJA's stiff manoeuvrability on the night of the accident. Had the KATJA passed buoy 19 at a greater distance and closer to the radar reference line, which would have been easily possible because there was no oncoming traffic, then it is highly probable that the ground contact on the sandbank could have been avoided. However, those involved in the accident must be credited

with the fact that there is usually very little time to make proper navigational decisions in the course of events leading up to and during an accident (four minutes between starting to pass buoy 19 and running aground), while subsequent consideration can be made with no time constraints and the inclusion of every source of information.

Therefore, the BSU takes the view that the accident involving the KATJA was not the result of the defined corridor being generally too narrow, but rather of several contributing factors coinciding. This view is not inconsistent with the unfavourable experiences certain sea pilots have had at the approach to the Oldoogrinne addressed to the BSU. From the perspective of the BSU, the adjustment to the fairway now made in connection with the opening of the JadeWeserPort has increased navigational safety for every vessel in this area and not just large ones.

The BSU sees no reason to question the soundings of the 300-m-wide fairway corridor in the area of the accident made each month and additionally in response to specific situations. Even a more frequent inspection would not guarantee the presence of the charted water depths for 365 days a year. Depending on the swell and prevailing currents, the conditions on the seabed can change considerably from one day to the next. Consequently, sediment incursions cannot be ruled out. However, the inspection cycle chosen does guarantee that dredging normally removes the incursions to the extent that safe navigation of the corridor is possible, even though the courses usually navigated need to be adjusted in places.

4.5 Events following the accident

Immediately after the accident, Jade Traffic set effective action to ascertain and mitigate damage in motion by ordering tugs to proceed to the distressed vessel and notifying the CCME, as well as the multipurpose and water pollution control vessel MELLUM of the accident. Communication with the sea pilot on the KATJA also ran smoothly and quickly delivered the crucial information that no oil had escaped.

The likelihood of damage with oil spillage was low because of the u-shaped arrangement of the ballast tanks around the cargo tanks, as well as the double bottom and the sandy seabed. Nevertheless, it was appropriate to use all options for preventing marine pollution or reducing the potential consequences due to the proximity to the Wadden Sea National Park, in particular. Against this backdrop, assumption of overall control of the operation by the CCME despite a manageable damage scenario and continuing good weather conditions at the scene of the accident was important for successful coordination of the individual measures. Preparing drift calculations, keeping emergency tugs and water pollution control vessels on standby, as well as expanding the crisis management team by a representative of the NLWKN were crucial prerequisites for effective handling of the worst-case scenario: oil spillage in close proximity to the Wadden Sea – fortunately, this did not happen. During the follow-up of the action taken after the accident, the Frisia administrative district criticised the fact that notification of the accident was reportedly given only after a delay of several hours. Since the CCME notifies using a distribution list agreed with the coastal States and agreed channels of communication, the CCME was not responsible for sending the message to the Frisia administrative district. Rather, notification to the administrative district was delayed

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because of the channel of communication within the Lower Saxony ministries and the Administration, which has now been improved.

From the perspective of the BSU, the measures taken after the accident did not merit any criticism.

5 CONCLUSIONS

The accident involving the oil tanker KATJA occurred essentially due to the fact that the sea pilot advising the ship's command passed buoy 19 at too slight a distance, causing the KATJA to be too close to the western border of the dedicated corridor within the fairway after the course alteration. Due to the conditions that prevailed on the night of the accident (2 kts ebb current, reduced water depth in the western corridor because of sandbank) and the unwieldiness of the tanker when manoeuvring, the accident was unavoidable after buoy 19 was passed.

Although the tanker was almost fully laden, there was no real danger of marine pollution due to oil spillage at any point in time. Nevertheless, the competent bodies set in motion a number of effective and appropriate measures immediately after the accident to prevent damage and pollution.

5.1 Advice by the sea pilot

The sea pilot advising on the KATJA did not examine the latest sounding chart for the Jade fairway before the pilotage assignment. Therefore, although the chart course he selected on entering the Oldoogrinne was usually appropriate, this was not the case on the night of the accident. Moreover, the selected course and a subsequent correction thereto did not account sufficiently for the slow speed, which hampered sudden manoeuvres significantly. In addition, with regard to offsetting the influence of the ebb current that displaced the KATJA to the west, the course correction of 5° was inadequate.

Such accidents could be avoided if it was ensured that sea pilots always have access to current sounding data. This could be achieved by means of so-called portable pilot units (PPUs). Ideally, sounding data could be made retrievable on such devices not only in portable data format, but also in converted data format, thus enabling their display on an electronic chart.

5.2 Communication

The BSU believes that communication between the pilots themselves and between the sea pilot and bridge team on the KATJA was open to improvement. Although the master checked the ship's position regularly and followed events on the radar (as did the duty officer) he did not ask the sea pilot for information about the communication with the shore-based radar pilot. Further enquiries were not made when concerns arose regarding the choice of course, either.

The sea pilot consciously left the bridge team in uncertainty as to the exchange of information with the shore-based radar pilot because he did not translate the content into English. Although the BSU sees no need to translate every single distance report, it would have been appropriate to share information about proceeding along the border of the corridor or intended course corrections, at least. Even the communication conducted in German with the shore-based radar pilot was reduced to the essentials. As a result, there was no mention of the sandbank that stretched well into the corridor.

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 Pilot Station Wilhelmshaven

The Federal Bureau of Maritime Casualty Investigation recommends that Pilot Station Wilhelmshaven use appropriate means to ensure that sea pilots engaged in the pilotage area have access to the latest sounding charts at all times.

6.2 Ship's management of Motor Tanker KATJA

The Federal Bureau of Maritime Casualty Investigation recommends that the ship's management of Motor Tanker KATJA urge its ship's commands to include advising pilots in communication for the duration of the voyage by way of effective bridge team management. If information is not made available in the language used on board, then this should be actively requested.

7 SOURCES

- Investigations by the waterway police
- Written statements by the parties involved
- Ship and voyage documents of the owner
- Witness accounts
- Recordings of the S-VDR
- Accident log and notifications of the CCME
- Nautical chart and drift model from the BSH
- AIS and radio recordings of Jade Traffic