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

Investigation Report 107/08

Serious Marine Casualty

Engine Failures of HOPE BAY and Collision between HOPE BAY and OCEANIC on 12 March 2008 and Collision between OCEANIC and JOSEF MÖBIUS on the Elbe on 14 March 2008

2 November 2009

www.bsu-bund.de

The investigation was conducted in conformity with the law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law - SUG) of 16 June 2002.

According to this the sole objective of the investigation is to prevent future accidents and malfunctions. The investigation does not serve to ascertain fault, liability or claims.

The present report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to art. 19 para. 4 SUG.

The German text shall prevail in the interpretation of the Investigation Report.

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1 Summary of the marine casualties

The reefer vessel HOPE BAY, sailing under the flag of Netherlands Antilles, left the port of Hamburg with a pilot on board in the morning of 12 March 2008. As she was sailing down the river Elbe, the engine failed in the vicinity of buoy 90, necessitating emergency anchoring. Twenty minutes later the engine was operational again. The vessel command attributed the engine failure to a defect in the automatic control. While weighing the anchor, there was contact with and warping of buoy 90. The vessel then continued its voyage.
At 1020[1], about 10 nm west of the Elbe Buoy, the engine failed again. At this time there was a north-westerly wind of force 6 Bft. There was a storm warning for winds of strength 8 Bft in gusts of up to 10 Bft that were reached in the course of the evening and the night. HOPE BAY drifted in an easterly direction, initially without anchor and subsequently at anchor. The multipurpose vessel MELLUM was in the vicinity of the disabled vessel as of 1150. At about 1815 VTS Wilhelmshaven dispatched the ocean tug OCEANIC to HOPE BAY as standby tug.
When the main engine was running again at about 1900, HOPE BAY intended to follow the vessel operator's instruction and sail to Cuxhaven. For this the vessel was guided by a radar pilot from Elbe Approach East Radar to the estuary of the river Elbe. The vessel passed the Elbe Buoy at 2031. Fourteen minutes later the engine failed again. A tow connection was thereupon to be established by OCEANIC. As a result of the sea state during the subsequent manoeuvres, several persons on board the tug were injured. There was slight contact between the two vessels, the heaving line parted during handing-over of the towing gear, and at 2249 the disabled vessel and the tug collided. The severity of the damage to OCEANIC led to discontinuation of the assignment and to the tug proceeding to Cuxhaven.
Further drifting of HOPE BAY was prevented by means of dropping two anchors.
In the afternoon of 13 March 2008 BUGSIER 3 was able to establish a line connection and take HOPE BAY to Cuxhaven.

On 14 March 2008 OCEANIC was to leave the Amerikahafen in Cuxhaven in order to move to Bremerhaven for repair of the damages caused by the collision. The pilot advice began after casting off. The vessel JOSEF MÖBIUS was dredging close to the entrance to Amerikahafen. She was proceeding up the river Elbe at a speed of 0.8 kts over ground. When OCEANIC passed the entrance in the direction of the Elbe, the vessel was caught by the ebb current. The tug did not succeed in manoeuvring past JOSEF MÖBIUS in the space available so that the two vessels made contact. The port side aft ship of the tug collided with the bow of the dredger.
This did not cause any personal injuries

[1] All times in the report without any particular reference are Central European Time (CET = UTC + 1 h)

2 Scenes of Accidents

2.1 First Scene of Accident

Type of event:	Marine casualty, engine failure and collision with buoy
Date/Time:	12 March 2008/0535
Location:	Elbe, buoy 90
Latitude/Longitude:	φ 53° 43.85'N λ 009° 27.28'E

Section from the Chart 45 (INT 1454), Federal Maritime and Hydrographic Agency (BSH)

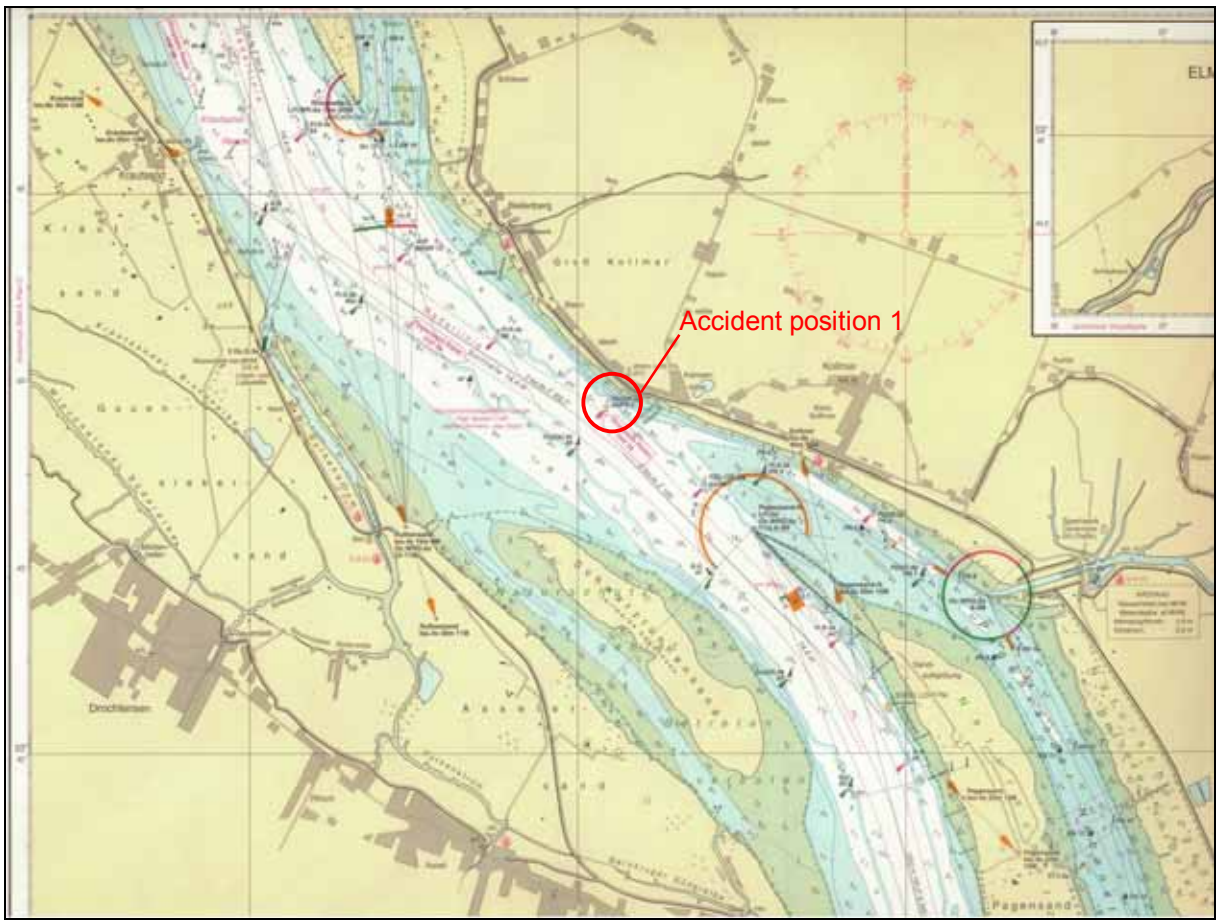

Figure 1: Chart with first accident position

2.2 Second Scene of Accident

Type of event:	Serious marine casualty, engine failures on HOPE BAY and collision between OCEANIC and HOPE BAY, two seriously injured persons on OCEANIC
Date/Time:	12 March 2008/ 2247
Location:	East of Außenelbe Reede
Latitude/Longitude:	φ 54° 02.7'N λ 008° 15.2'E

Section from the Chart 44 (INT 1452), BSH

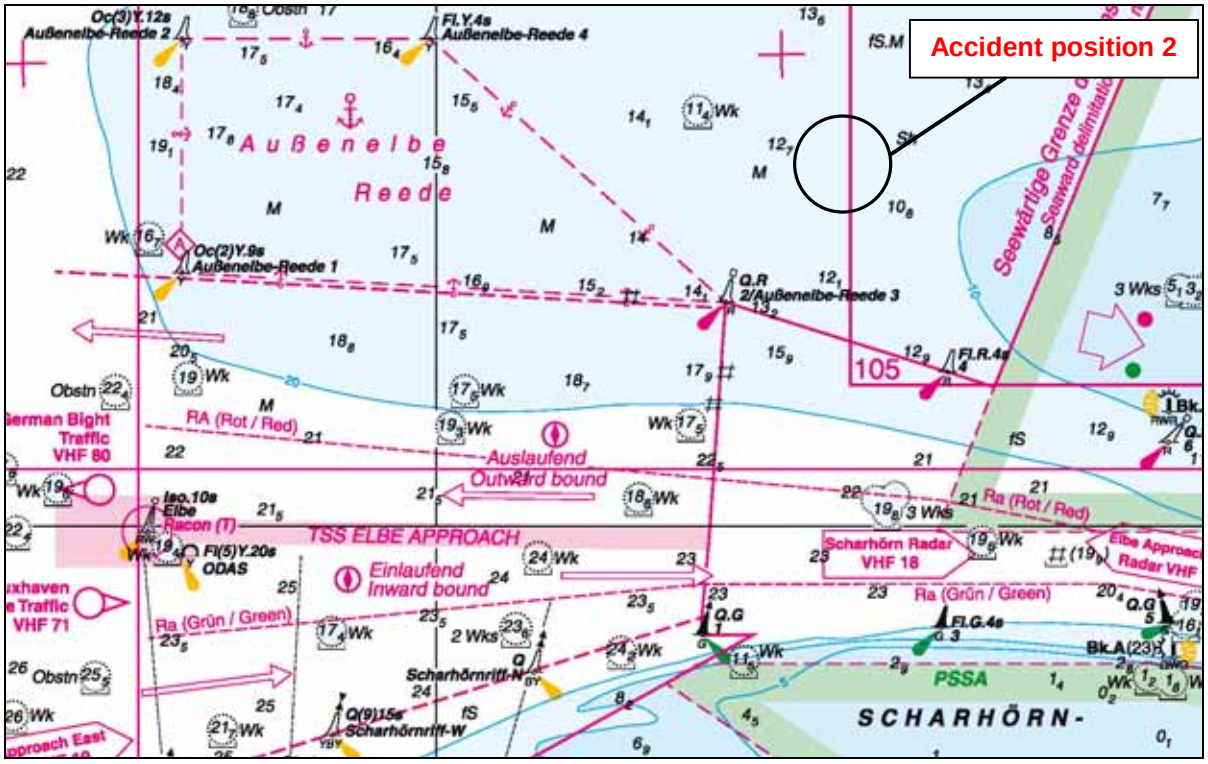

Figure 2: Chart with second accident position

2.3 Third Scene of Accident

Type of events:	Marine casualty, collision between OCEANIC and dredger JOSEF MÖBIUS
Date/Time:	14 March 2008/2057
Location:	Cuxhaven, on the river Elbe off Amerikahafen
Latitude/Longitude:	φ 53° 52.22'N λ 008° 43.22'E

Section from the Chart 44 (INT 1452), BSH

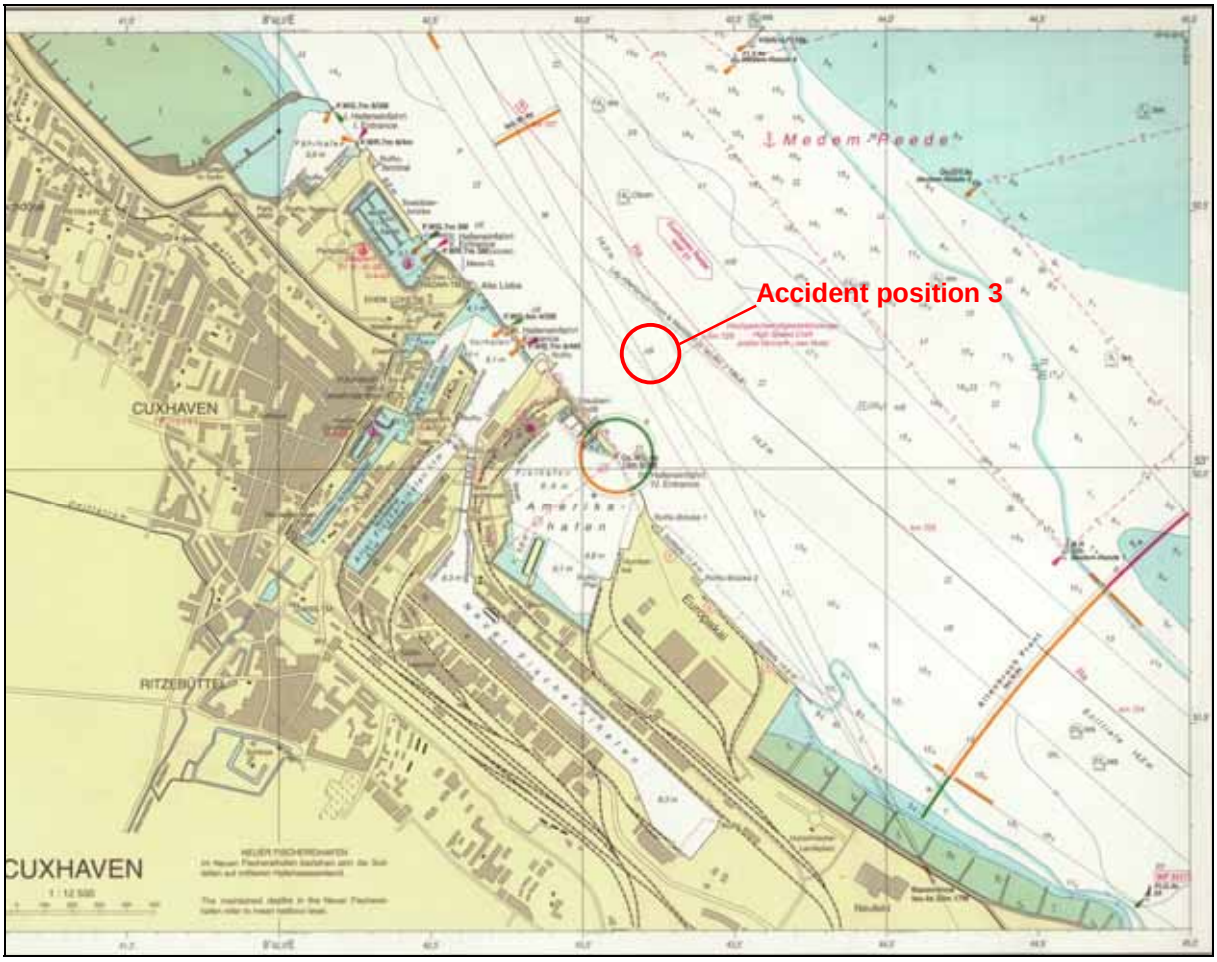

Figure 3: Chart with third accident position

3 Vessel particulars

3.1 HOPE BAY

3.1.1 Photo

Figure 4: Photo of vessel HOPE BAY, 13 March 2008, at portside anchor

3.1.2 Particulars

Name of the vessel:	HOPE BAY
Type of vessel:	Reefer Vessel
Nationality/flag:	Netherlands Antilles
Port of registry:	Wilhelmstad
IMO number:	9135169
Call sign:	PJQK
Owner:	Triton Schifffahrts GmbH, Leer
Vessel operator:	HOPE BAY GmbH & Co. KG
Year built:	1996
Shipyard/yard number:	Kitanihon Shipbuilding Co. Ltd./288
Classification society:	Germanischer Lloyd
Length overall:	143.00 m
Breadth overall:	22.00 m
Draught at time of accident:	6.00 m
Gross tonnage:	8,896
Deadweight:	9,638 t
Engine rating:	9,628 kW
Main engine:	Akasake Diesels Ltd., 7 UBC 50 LS II
(Service) Speed:	21 kts
Hull material:	Steel
Hull design:	Double bottom
Number of crew:	18

3.2 OCEANIC

3.2.1 Photo

Figure 5: Photo of vessel OCEANIC

3.2.2 Particulars

Name of the vessel:	OCEANIC
Type of vessel:	Salvage Tug[2]
Nationality:	Federal Republic of Germany
Port of registry:	Hamburg
IMO number:	6901490
Call sign::	DIAL
Vessel operator:	Bugsier-, Reederei- and Bergungs-GmbH & Co. KG, Hamburg
Year built:	1969
Shipyard/yard number:	F. Schichau GmbH/1744
Classification society:	Germanischer Lloyd
Length overall:	87.58 m
Breadth overall:	14.30 m
Draught at time of accident:	7.20 m (at the time of the collision with HOPE BAY)
Gross tonnage:	2,294
Deadweight:	1,416 t
Engine rating:	2 x 4,853 kW
Main engine:	Klöckner-Humbold-Deutz AG, SBV 12 M 640
(Service) Speed:	17 kts
Hull material:	Steel
Hull design:	Partly double bottom
Number of crew:	27, including 10 trainees

[2] According to the Sailing Permit of the See-Berufsgenossenschaft (See-BG): Special Craft in coastal trade

3.2.3 Ship's propulsion and equipment

The OCEANIC is equipped with two controllable pitch propellers in Kort nozzles. The vessel has three semi-balanced rudders, two of which are mounted behind the propellers and are directly affected by the propeller thrust. The vessel is also equipped with a bow thruster with a rating of 373 kW.

There are two electro-hydraulic towing winches each with 1600 m towing line installed on the vessel. The fore runner used is a 200 m long Dyneema line. The tug can achieve a bollard pull of 179 t[3].

As the tow deck cannot be seen sufficiently from the main bridge, the OCEANIC provides a second bridge located further aft. The vessel is manoeuvred from this second bridge while tow connections are made.

The bridge equipment on the main bridge includes a Racal-Decca Bridge-Master and a radar from SAM Electronics. SAM Electronics installed the S-VDR[4] (Debeg 4300), electronic chart (ECDIS Chartpilot 9330) and AIS (Debeg 3400). The electronic chart system used does not have any ECDIS type approval. There are three permanently installed VHF sets on the main bridge.

The vessel can be manoeuvred independently from the aft bridge. The operating controls located here include those for rudder, controllable pitch propellers and bow thruster. There is also an operable radar repeater of the SAM radar and a permanently installed VHF set.

[3] According to the vessel data sheet (Version 2005): bollard pull 179 t, according to web-site: bugsier.de/fleet: bollard pull 178 t

[4] S-VDR - Simplified-Voyage Data Recorder

3.3 JOSEF MÖBIUS

3.3.1 Photo

Figure 6: Photo of vessel JOSEF MÖBIUS

3.3.2 Particulars

Name of the vessel:	JOSEF MÖBIUS
Type of vessel:	Suction dredger
Nationality:	Federal Republic of Germany
Port of registry:	Hamburg
IMO number:	7360162
Call sign::	DPWT
Vessel operator:	Josef Möbius Bau-Aktiengesellschaft
Year built:	1974
Shipyard/yard number:	Dubigeon-Normandie S.A./140
Classification society:	Germanischer Lloyd
Length overall:	117,50 m
Breadth overall:	19,00 m
Draught at time of accident:	9,00 m
Gross tonnage:	5.939
Deadweight:	6.475,2 t
Engine rating:	2 x 2.400 kW
Main engine:	Caterpillar Motoren GmbH & Co. KG
(Service) Speed:	13 kts
Hull material:	Stahl
Hull design:	Double bottom
Number of crew:	14

4 Course of the accident

During the outbound voyage of HOPE BAY on 12 March 2008 two marine casualties occurred. First of all, following an engine failure, there was contact with and warping of a fairway buoy on the river Elbe. After this, following further engine failures, a tow connection with the ocean tug OCEANIC was to be made. In the course of this the two vessels collided and the tug was so heavily damaged that she had to break off its assignment. A third marine casualty occurred on 14 March 2008 as OCEANIC collided with the dredger JOSEF MÖBIUS on the Elbe during the intended voyage to the repair yard.

4.1 Engine failure and collision with buoy

HOPE BAY left the port of Hamburg at about 0250 on 12 March 2008. The port of destination was Rotterdam. The master was commanding the vessel as she sailed. He was first advised by a port pilot, subsequently by pilots for the Elbe. The wind was blowing from a south-westerly direction at 6 Bft. The tide was running with the vessel at approx. 2.5 kts. The sun was due to rise at 0647.

At 0505, in the vicinity of buoy 90, the revolution indicator reportedly dropped to zero. The engine crew had determined the time needed to restart to be 2 to 3 minutes. 15 minutes later the main engine was still not running again. In the meantime, however, due to the wind and current the vessel had drifted to the northern side of the fairway in the direct vicinity of buoy 90. The master then ordered the port anchor to be dropped at 0520.
At 0522 the engine was run up to "Full ahead" from the engine control room without consultation with the bridge. It had reportedly been immediately stopped by telephone order.
At 0525 the crew had reportedly started to lift the anchor. At 0540 the anchor had been out of the water and HOPE BAY had continued her voyage towards the sea. According to the information supplied by the engine crew, a defect in the automatic control of the main engine had caused the failure. The engine was then operated manually.
During the period up to the change of pilot off Brunsbüttel and final drop of the pilot at buoy 9 in the Außenelbe at about 0930 no further problems with the main engine had occurred.

During the incident the Elbe pilot maintained constant radio contact to the Vessel Traffic Service centre[5] (VTS) Brunsbüttel on the working channel. The VTS did not issue any conditions for the further voyage of HOPE BAY.

During HOPE BAY's manoeuvres there was contact with buoy 90. As a result the buoy was moved 120 m towards the middle of the fairway. The vessel itself was not damaged.

4.2 Emergency anchoring in the German Bight

As a result of the weather situation the Elbe pilot left the vessel already at buoy 9. Subsequently VTS Cuxhaven provided radar advisory service by pilots via the VHF radar advisory channels “Scharhörn Radar” on channel 18, and then subsequently

[5] Vessel Traffic Service centre (VTS) - Verkehrszentrale

"Elbe Approach East Radar" on channel 19, allocated to the relevant river sections. After leaving the area of responsibility of VTS Cuxhaven the vessel was routinely handed over to VTS Wilhelmshaven (call sign: German Bight Traffic (GBT), VHF channel 80), which conducted the further traffic monitoring.

At 1020, about 10 nm west of the Elbe buoy, HOPE BAY reported an engine failure to GBT. As the vessel was drifting quickly eastwards, GBT recommended dropping an anchor. After a repair, HOPE BAY tried to restart the engine at 1202. At 1222 the master of HOPE BAY declared that continuation of the voyage was not possible. Shortly after this he asked whether his ship could anchor at the present position. At 1236 the vessel anchored with 6, then 7 and subsequently 8 lengths in the water. The paying out of the chain reduced the drifting speed to the east from 2.5 kts to 1.5 kts. At 1255 the master of HOPE BAY stated that 4 to 5 hours would be needed to repair the main engine.

At 1120 the MELLUM, a federally-owned multipurpose vessel, lying at her storm position 3 nm north-west of buoy E 3, was ordered by GBT towards HOPE BAY. MELLUM reached her position at 1150 and then remained in the direct vicinity.

At 1745 HOPE BAY reported to MELLUM via radio that a further 1 to 2 hours would be needed for the repair.

At about 1800 the drifting HOPE BAY reached the area of the "Außenelbe" roads. She had thus proceeded 10 nm since the failure of the main engine. 5 of these she had drifted with her anchor dropped. The vessel was now in the area of responsibility of VTS Cuxhaven.

The Nautical Supervisor[6] (NvD) of VTS Wilhelmshaven decided at about 1815 to order the OCEANIC as standby tug for HOPE BAY. At this time OCEANIC was 33 nm away.

At 1845 the master of HOPE BAY informed MELLUM and VTS Cuxhaven that the vessel's owner had decided that the vessel should return to Cuxhaven. VTS Cuxhaven thereupon ordered that the vessel must take two assistant tugs as of the Elbe buoy.

Shortly before 1900 the repairs on HOPE BAY were completed and the vessel weighed anchor in order to return to Cuxhaven. MELLUM requested HOPE BAY to first sail at least 5 nm to the west and to wait there until the assistant tugs arrived at the Elbe buoy.

At 1949, HOPE BAY was about 2 nm west of the "Außenelbe" roads and thus in the area of responsibility of VTS Wilhelmshaven; VTS Cuxhaven established contact to HOPE BAY via the radar pilot of Elbe Approach East Radar (EAR) and began to guide the vessel towards the Elbe buoy. VTS Wilhelmshaven and MELLUM, accompanying HOPE BAY, were not informed of this in advance and were thus surprised by the development.

[6] NvD – responsible nautical supervisor in a VTS centre

At about 2031 HOPE BAY passed Elbe buoy at a distance of approx. 0.4 nm abeam to port and sailed into the Elbe at a speed of 7 kts over ground. At this time OCEANIC was about 3 nm north-west of the Elbe buoy.

4.3 Collision HOPE BAY - OCEANIC

At 2045 HOPE BAY reported an renewed engine failure to EAR. OCEANIC was 1.3 nm away. A little later HOPE BAY requested the radar pilot for tug assistance. OCEANIC thereupon began with the approach to establish a tow connection.
As a result of the main engine failure, HOPE BAY turned on a northerly course and thus beam to the sea. After the main engine was running again at about 2103 the master of HOPE BAY tried to delay acceptance of the tug. The radar pilot, however, with the argument of the unstable engine urged him to act and a tow connection was then to be established after all. At 2108 OCEANIC shot a line to the disabled vessel. With this line the messenger line, an auxiliary line, was first drawn to HOPE BAY. During the hand-over manoeuvre the stern of OCEANIC collided slightly with the bow of HOPE BAY. The tug crew had the impression that the disabled vessel suddenly picked up speed and thus reduced the distance between the tug and vessel so quickly that it was not possible to evade.
The messenger line parted at 2113.

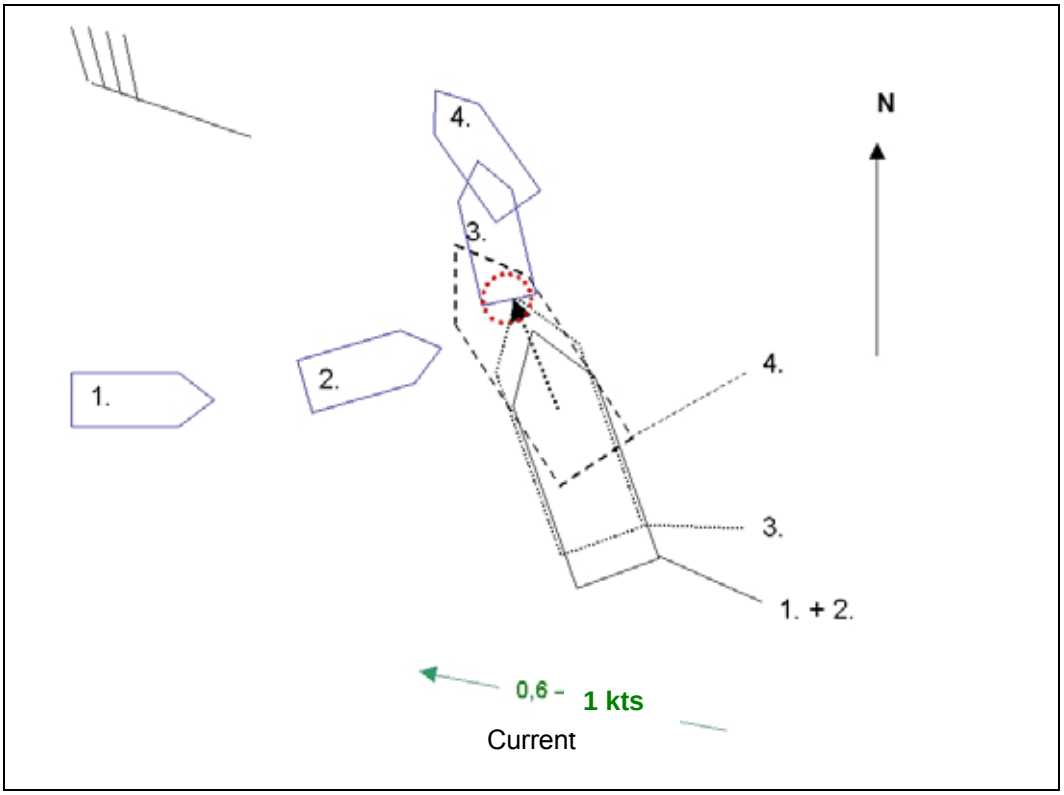

Figure 7: Approach of OCEANIC (blue) to HOPE BAY, with contact; representation corresponds to the statement by the tugs command; position 4: time of rupture of the messenger line

OCEANIC then initially moved away to clear the lines. During the subsequent manoeuvre to approach the disabled vessel two crew members on deck were injured by breaking waves.

Despite the fact that the main engine was running again, the command of HOPE BAY did not subsequently succeed in bringing the vessel back onto an easterly course by turning over port or starboard.

At 2138 HOPE BAY dropped the anchor again and a little later had 7 lengths of the port anchor chain in the water. Despite this the vessel drifted in an east-north-easterly direction at a speed of approx. 2 kts.

At about 2213 OCEANIC made the next approach. However up to 2244 it was not possible for the tug to manoeuvre into a favourable position. While HOPE BAY dropped the second anchor at 2247, the crew on board OCEANIC tried again to establish a line connection. In doing so, the two vessels collided with each other at 2249. OCEANIC was hit by HOPE BAY in the aftship area on the port side.

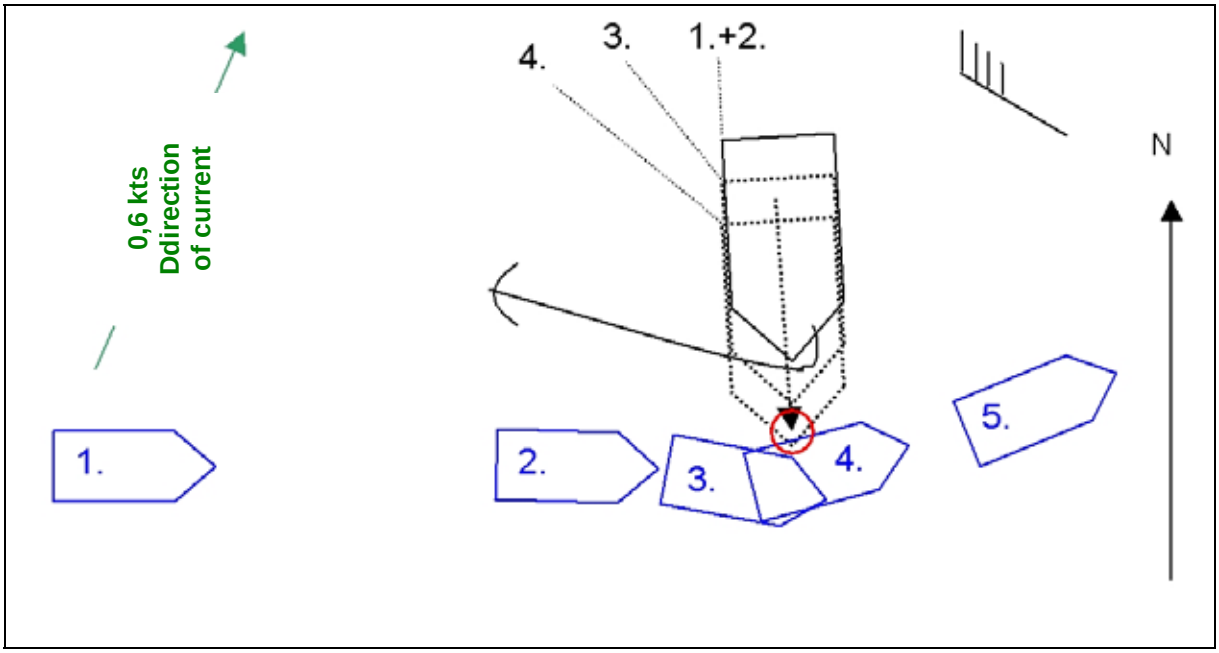

Figure 8: Collision between OCEANIC and HOPE BAY, representation corresponds to the statement by the OCEANIC command

According to the statement by the OCEANIC command, the manoeuvre had been planed with a passing distance of approx. 30 m. However, during the approach the distance had been reduced to such an extent that evasive action by the tug alone could not have prevented the collision. The reduction of distance was attributed to a forward movement of HOPE BAY. This had taken place unexpectedly as the anchor chain of HOPE BAY, on her starboard side, had been standing abeam to slightly aft.

The damages to the tug led to the assignment being abandoned at 2322. OCEANIC returned to Cuxhaven.

4.3.1 Further occurrences

After OCEANIC started proceeding towards HOPE BAY, MELLUM, at about 2015, was ordered into the area of the storm position of OCEANIC. As a response to the unsuccessful attempts to establish a tow connection between the tug and reefer vessel, VTS Cuxhaven then ordered MELLUM and the multipurpose vessel NEUWERK to HOPE BAY shortly before the serious collision. MELLUM reached the

HOPE BAY position at about midnight. In the meantime the dropping of the second anchor had terminated the drifting.

At about 2252 the rescue cruiser HERMANN HELMS arrived at HOPE BAY. She did not play an active role in the further course of events and left the scene again at 0022.

At 2340 the Waterways and Shipping Office[7] (WSA) Cuxhaven applied for the leadership of the operation to be taken over by the German Central Command for Maritime Emergencies (CCME)[8]. CCME took over the leadership of the operation at 0030 on 13 March 2008.

Because of a further disabled vessel, the product tanker NAVKIOS, which was drifting off Norderney, CCME dispatched MELLUM there at 0105.

NEUWERK reached HOPE BAY at 0130 and remained on standby in the vicinity.

The damaged OCEANIC berthed in the Amerikahafen of Cuxhaven at 0140.

The three tugs intended to assist HOPE BAY, and that had reached the “Neuwerk” roads at about 2200 on 12 March 2008, withdrew further upstream the river Elbe after OCEANIC had berthed.

At about 0730 on 13 March 2008 the tug BUGSIER 21 arrived at HOPE BAY. She was relieved at about 1000 on 13 March 2008 by BUGSIER 3. A first attempt by BUGSIER 3 to establish a tow connection was abandoned at about 1012 due to the still prevailing sea state. The weather subsequently improved and BUGSIER 3 was able to establish a line connection at 1253. At 1311 HOPE BAY had weighed anchor and the tug-and-tow combination got underway. NEUWERK escorted them. HOPE BAY made fast at Steubenhöft in Cuxhaven at 1710.

CCME terminated the overall leadership of the operation at 1730 on 13 March 2008.

4.3.2 Consequences of the accident

Breaking waves were the cause of the injuries to the two crew members of OCEANIC. They were hurled over and thrown against fixed parts of the tug. One of the injured crew sustained a laceration above the eye and the other broke a rib.

As a consequence of the collision OCEANIC sustained damage to a fuel tank at frames 21-22 and denting of the bulwark in this area, water ingress into the salvage store and a failure of the self steering gear. Approx. 30 m³ of diesel oil were spilled out through the hole in the tank. After berthing an oil barrier was set out round the tug.

As a result of the collision HOPE BAY sustained a hole in the fore peak tank through which ballast water was spilled. No other damage has been reported to the BSU.

[7] Waterways and Shipping Office - Wasser- und Schifffahrtsamt – local office of the Waterways and Shipping Administration, responsible, inter alia, for the operation of the VTS Cuxhaven
[8] German Central Command for Maritime Emergencies - Havariekommando

Figure 9: Damage to upper deck on the port side of OCEANIC

Figure 10: Damages to HOPE BAY

4.4 Collision OCEANIC – JOSEF MÖBIUS

OCEANIC was to leave the Amerikahafen of Cuxhaven on 14 March 2008 to move to Bremerhaven for repairs of the damages sustained during the collision. The tug was lying starboard side alongside at the Humberkai with the bow facing towards the river Elbe and was thus able to reach the exit without any further manoeuvres. In preparation for the planned docking the draft had been reduced to 6.2 m forward and 6.5 m aft. At the time of sailing, the wind was blowing at a speed of 4 Bft from a north-westerly direction. There was ebb tide on the Elbe running at a speed of

approx. 3.5 kts. Visibility was good and there was no rain. There was no daylight any more.
The master of the tug held a Pilotage Exemption Certificate for the harbour. The river pilot needed for the Elbe came on board at about 2040.

The pilot had been familiarised with the necessary matters by the master. The pilot card with the manoeuvring data of OCEANIC had been lying easily visible on the chart table. The tug bridge had been manned by the master and a nautical officer of the watch[9], a trainee at the helm and a qualified crewmember monitoring the trainee. The mate had been standing in front of the second radar that is located in the second row. From here he had also been able to see the electronic chart used. The pilot and the master had used the radar in the first row. The master had operated the main engine control levers.

A little downstream from the entry to Amerikahafen on the Elbe the dredger JOSEF MÖBIUS was dredging. She was moving in a direction of approx. 140°, proceeding slowly upstream on the Elbe. She was positioned on the right side of the dredged fairway and at a distance of 1.8 cables from the Steubenhöft wharf facility. The bridge of the dredger was manned by the master, the Chief Officer on watch and the dredging foreman. The vessel command was using both radars. They were being operated in the 1.5 and 3 nm range.

The master of OCEANIC had conducted the casting-off manoeuvre independently and after this the pilot began advising. The pilot had also established contact with JOSEF MÖBIUS in order to discuss and agree on the encounter. It had been agreed that OCEANIC would cross the bows of the dredger and then pass portside to portside. The dredger had reported that she was proceeding at a speed of 0.8 kts over ground. It had not been evident for the master of OCEANIC that the pilot reacted to this or wanted to change his manoeuvre plans.

OCEANIC had sounded a long tone with the tyfon prior to leaving Amerikahafen. The dredger had been in sight. It was reportedly evident that the dredger was working, as she was showing the lights of a vessel restricted in her ability to manoeuvre. There had been no other vessels in the area.
When the pilot started advising, OCEANIC had been proceeding at about 5 kts. It had been planned that after passing the mole heads the vessel would first turn against the current to starboard and then sail a little upstream in order to turn to port ahead of the dredger. It had further been planned that the dredger would then be passed in accordance with the rules and OCEANIC would sail to Bremerhaven.
After passing the moles the pilot had recommended putting the helm "hard to starboard" and the engine control to "full ahead". This had been in line with the master's expectations. As the OCEANIC had only turned very slowly due to the influence of the ebb current, the master had set the pitch of the starboard engine to "full astern". As this did not produce any improvement in the turning behaviour to starboard within the next 20 to 30 seconds, the master had suggested putting both engines to "full astern". The pilot continued to recommend "full ahead" for the two engines. The master had then left both engines in their original, counter-revolving setting.

[9] for the rest of the text colloquially referred to as “the mate”.

The pilot stated in his accident report, the advice “hard-a- starboard” had been given by him, when the quay was almost abeam. The engines had already been recommended to “full ahead” before.
Since the desired course change to starboard was not effected despite the rate of speed applied and the full rudder position, he had the rudder position been confirmed by the helmsman. The master had stayed directly in front of the telegraph, so that the rate of speed applied had not been noticeable by the pilot. Hence the pilot had asked the master, if “full ahead” was still applied. Thereupon the master had informed him, that he had set the engine to astern for a short term. Then the advice had been given by the pilot to leave the engine on “full ahead”.

When the master of the dredger had noticed the imminent collision, he had the dredging equipment been heaved on board and set his engine to "full astern".

On crossing the bows of JOSEF MÖBIUS, OCEANIC had been at an angle of 45° to the river. When the two fore ships were on a level with each other the distance between the vessels had been about 20 m. After OCEANIC was one third past the dredger, the master had put both engines to "full ahead" and the helm "hard to port". This was intended to free his stern. However, the aft ship of the tug collided with the bow of the dredger shortly after this.
After the collision the course of the tug was primarily stabilised.

The master stated that he had been told that the pilot, at the time when entering the river but not determined in more detail, had also given the helmsman the instruction "hard to port". But he, the master, had not heard this instruction.

The pilot stated in his accident report, that the helm had been recommended to “hard to port” by him on the approach of JOSEF MÖBIUS and the inevitable collision with her, in order to edge from JOSEF MÖBIUS and reduce the contact. In his statement to the draft report he specified the time for this recommendation on 205608.

In the opinion of the master of the OCEANIC, the dredger had not taken any recognisable measures to prevent the collision. In particular the dredger had neither slowed down nor turned to port.

4.4.1 Further course of events and damages

A first inspection of the damage did not reveal any water ingress. The tug was turned again and waited in the fairway for a relatively long time. Later the NvD at VTS Cuxhaven ordered a detention and OCEANIC returned to her berth.

Shortly after the accident the rescue cruiser HERMANN HELMS reached the scene. Assistance was not necessary.

JOSEF MÖBIUS sustained damage in the bow area. In addition to dents, a hole of approx. 1 m² was sustained above the water line in the fore peak.
The bulwark on the OCEANIC was dented on a length of 10 m at the port aftship.
The BSU was not notified of any personal injuries or spillage of any hazardous substances into the water.

5 Investigation

5.1 Base data

5.1.1 Technical records, statements and activity records

The data available to the BSU for the investigation of the outbound voyage on the Elbe and the collision of HOPE BAY with buoy 90 included the recordings of the VHF working channel and the radar track of VTS Brunsbüttel, as well as the statements by the master and the pilot. About the further course of the voyage down the Elbe, the pilot on board then issued a statement.
The technical report drawn up by the waterway police (WSP) Hamburg was considered to assess the condition of the main engine and the incident leading to the failure of the main engine.
The BSU commissioned an expert opinion on the basis of the facts ascertained in the technical report of the police. The objective was to assess the course of the damage and the subsequent reaction of the crew.

The following base data, inter alia, were used for the evaluation of the period from the renewed failure of the main engine and the drifting up to the “Außenelbe” roads as well as the period of getting underway, collision with OCEANIC and sailing to Cuxhaven:

- the radar plots of VTS Wilhelmshaven,
- the radar plots of VTS Cuxhaven,
- the protocol of the course of events of VTS Wilhelmshaven for the period 12 March 2008, 1020 to 2030,
- a copy of the log pages 82 and 83 of VTS Wilhelmshaven concerning the period 12 March 2008, 1020 to 1930,
- a statement by the NvD of VTS Wilhelmshaven concerning the period 12 March 2008, 1345 to 2030,
- the summary of the chronological course of events of VTS Cuxhaven and WSA Cuxhaven in a table for the period 12 March 2008, 1804 to 13 March 2008, 1730,
- the protocols of the course of events of MELLUM for the period 12 March 2008, 1025 to 13 March 2008, 0100,
- the protocol of the course of events of NEUWERK for the period 12 March 2008, 2256 to 13 March 2008, 1730,
- excerpt from the day protocol "Hope Bay" of the German Joint Situation Centre Sea[10] for the period 12 March 2008, 1050 to 13 March 2008, 1754,
- the assignment log of the waterway police co-ordination centre for the period 12 March 2008, 1021 to 14 March 2008, 1057,
- the accident log of the Maritime Emergencies Reporting and Assessment Centre (MERAC)[11] on the case HOPE BAY for the period 12 March 2008, 0636 to 27 March 2008, 1009,
- the recordings of VHF channel 68 as working channel of VTS Brunsbüttel, VHF channel 71 as working channel of VTS Cuxhaven, VHF channel 19 as working

[10] German Joint Situation Centre Sea, Co-ordination Network German “Coast Guard” - Gemeinsames Lagezentrum See – Koordinierungverbund Küstenwache
[11] Maritime Emergencies Reporting and Assessment Centre in the Central Command for Maritime Emergencies – Maritimes Lagezentrum (MLZ) im Havariekommando (HK)

channel of the radar pilot service Elbe Approach East Radar (EAR) and VHF channel 16 as well as channel 10 for the ship-to-ship communication in the period 12 March 2008, 1808 to 2319,
- the recording of VHF channel 71 by VTS Wilhelmshaven in the period 13 March 2008, 0944 to 1920.

In addition the master's statement of HOPE BAY, the statements of various crew members of OCEANIC and excerpts from the log books of both vessels were evaluated.
VTS Wilhelmshaven was unable to provide recordings of either its VHF working channel or other VHF channels for the period 12 March 2008, 1020 to 1810.
No AIS data of the vessels involved were recorded.
On board OCEANIC the S-VDR data in connection with the assignment or the collision with HOPE BAY were not saved.

The investigation of the collision between JOSEF MÖBIUS and OCEANIC on 14 March 2008 was conducted on the basis of the S-VDR recordings of OCEANIC.

5.1.2 Weather and sea

To assess the weather situation, BSU commissioned Germany's National Meteorological Service (DWD)[12] to provide an expertise about the weather and sea status. The expertise covered the weather development in the German Bight for the period of 12 March 2008, 00:00 to 13 March 2008, 1700. The results, in excerpts, read as follows:

Weather situation
In the morning of 12.03.2008 the low pressure system "Kirsten" was located with its centre over Scotland and in the course of the day moved quickly to Southern Sweden. The associated front system crossed the German Bight from the West in the afternoon. (...)

Summary
On 12. and 13.03.2008 it was cloudy to very cloudy in the Southern German Bight with some rain and hail showers, local thunder storms, with air temperatures between 5 and 8 °C and a water temperature of 6 °C. The horizontal visibility were mainly over 20 km, reduced temporarily during showers to below 5 km.

In the morning of 12.03.2008 the westerly to south-westerly wind was blowing at a force of 6 to 7 Bft on average, up to 9 Bft in gusts. In the afternoon the wind turned to west-north-west, freshened up to 8 Bft on average with gusts of up to 10 Bft and this was continued during the night. Only in the afternoon of 13.03.2008 the mean wind speed dropped to 5 to 6 Bft, there were still gusts of around 8 Bft.
The significant wave heights of the wind sea will have been almost 2.0 m with periods of around 5 s in the morning of 12.03.2008, 3.0 m at noon with periods of 5 to 6 s. In the evening values around 4.0 m were reached with periods of around 7 s. The significant wave heights of the wind sea remained close to 4.0 m with periods of around 7 s during the night to 13.03.2008 too and dropped gradually to values

[12] Germany's National Meteorological Service - Deutscher Wetterdienst DWD

around 2.5 m with periods of around 5 s by the afternoon. On both days there was a westerly swell with significant wave heights around 1.5 m and periods around 7 s.
The wave height data supplied above refer as a matter of principle to the significant wave height. This corresponds to the arithmetic average of the upper third of the wave heights in an observation period. This means that a number of individual waves are higher than the significant wave height. In rare cases individual waves can exceed the significant wave height by 70 to 100 %.

The DWD provided the following forecasts for the German Bight:
- 12 March 2008, 0000 UTC – forecast up to this evening: south-west to west 8, some heavy storm gusts, sea 3 to 4 m; outlook up to tomorrow morning: west to north-west 8,
- 12 March 2008, 0600 UTC – forecast up to midnight: south-west 6 to 7, shower gusts, partly hazy, sea 3 to 5 m; outlook up to tomorrow noon: south-west to west 6 to 7, later increasing 8 to 9,
- 12 March 2008, 1200 UTC – forecast up to tomorrow morning: west to north-west turning increasing 8 to 9 with some hurricane gusts, later reducing to 7, sea 3 to 5 m; outlook up to tomorrow evening: north-west to west 6 to 7, reducing slowly 4 to 5, turning back a little,
- 12 March 2008, 1800 UTC – forecast up to tomorrow noon: west to north-west 8 with heavy shower gusts, reducing slowly to 6, sea 3 to 5 m, dropping slightly.

At 1837 VTS Cuxhaven, call sign Cuxhaven Elbe Traffic (CET), broadcast a weather report within the context of the regular situation report with the content: north-westerly wind 6 Bft, good visibility, storm warning W – NW 8, gusts up to 10 Bft.
The situation report transmitted by CET at 1938 contained the weather report: Elbe approach north-westerly winds 8 Bft, storm warning W-NW 8 Bft, gusts 10 Bft; Cuxhaven W-NW 5 Bft, pilot boat service at buoy 25.
The situation report at 2238 contained the following wind information: Elbe approach 8 Bft from W-NW, Cuxhaven 6 Bft from W-NW, storm warning W-NW 8 Bft in gusts 10 Bft.

The Federal Maritime and Hydrographic Agency (BSH)[13] made the data from a sea measuring buoy located close to the Elbe buoy available. In the period from 1944 to 2344 on 12 March 2008 this recorded a significant wave height of more than 3.8 m. The highest value was measured during the period 2244 to 2314 with 4.21 m.
The average height of the long waves with periods over 10 s (swell) in the first period mentioned was 1.60 to 1.86 m.

5.1.3 Tides

The calculated high water, reference point Cuxhaven, was at the Elbe buoy position at 1514 on 12 March 2008 and at 0333 on 13 March 2008. The low water times were approximately 2204 on 12 March 2008 and 1025 on 13 March 2008.
For Cuxhaven the high water and low water levels published via the situation report were 1.5 m above normal level.
On the basis of the tidal calendar of BSH (reference point Heligoland) the theoretical current strengths and directions were considered. Starting point was the respective position of HOPE BAY. According to this it can be ascertained that from 1100 to 1400

[13] Federal Maritime and Hydrographic Agency – Bundesamt für Seeschifffahrt und Hydrographie BSH

on 12 March 2008 the tidal current was running eastwards at 0.6 to 1.4 kts. From 1700 the current ran at increasing speed (up to 1.4 kts) in a westerly direction and declined again at about 2100. Five hours before high water at Heligoland, i.e.at about 2230, the current had a northerly trend with up to 0.6 kts. From 2330 the tidal current ran eastwards again. By 0130 it had increased up to 1.8 kts. The establishment of the tow connection to BUGSIER 3 and start of the towing operation thus occurred on 13 March 2008 under the conditions of an easterly running current.

5.2 Safety concept for the German coast

The Federal German Waterways and Shipping Administration (WSV)[14] has developed a package of measures[15] to increase the safety on navigable waterways. The sections of this package relevant for this marine casualty investigation are described or quoted, respectively, in the following sections 5.2.1 up to and including 5.2.2.3.

5.2.1 Marine transport safeguards

"Shipping traffic in the German Bight, parts of the Baltic Sea and the approaches to the German seaports are continuously monitored by vessel traffic centres (TC[16]). The TCs are organisational units of the Waterways and Shipping Offices (WSÄ) and are designated internationally as ***Vessel Traffic Service Centres*** *(VTSC). They carry out a large share of the shipping police tasks of the respective WSA.*

For the purpose of
• prevention of collisions and groundings,
• control of traffic flow and
• prevention of dangers emanating from shipping for the marine environment
traffic information and traffic support is offered to shipping. In the case of need shipping traffic is regulated (see also "VT services"). (...)

The process running in a TC is described as a "control cycle":
• collection of information (e.g. fairway, traffic, weather)
• evaluation of the information collected
• taking of decisions and transmitting these to shipping
• monitoring of results.

The TCs are manned round the clock with qualified nautical officers (Nautical Supervisor on Duty - NvD / Nautical Assistant - NA). On recognising dangers the NvD acts directly on shipping traffic and force, within the framework of averting damage, the vessel command concerned to take, to tolerate or to refrain from specific action. Every command of a ship equipped with VHF radio telephone system is, while following the traffic regulations, obliged to listen to the traffic information and support issued by a TC and must take these into account promptly. The measures ordered within the framework of traffic regulations can be enforced by legal means.

The tasks of the traffic centre comprise:

[14] Federal German Waterways and Shipping Administration – Wasser- und Schifffahrtsverwaltung des Bundes WSV
[15] Safety Concept German Coast, BMVBS and WSD Nordwest, 02/2006 respectively Traffic Safety Concept for the German Coast, WSD Nord, 07/2005
[16] Abbreviated since 2007 according to VV-WSV 1103, Part 1 Point 1.2.2 = VTS.

• Monitoring the area of responsibility
- *Monitoring the function of shipping signals (including position checks)*
- *Wind, water levels and visibility*
- *Condition of the waterway as a traffic route*

• Monitoring of vessel traffic and flow of traffic
- *Reception and processing of messages from shipping*
- *Monitoring observance of traffic regulations*
- *Promoting efficient traffic procedures*
- *Issuing permits and exemptions*
- *Monitoring observation of conditions and constraints*
- *Ascertaining and documenting offences and where applicable initiating further investigations*

• Providing support to shipping traffic to ensure safety and ease of shipping traffic
- *Information on traffic situation, special incidents, faults in navigation marks etc.*
- *Issuing traffic information*
- *Issuing navigation support*
- *Regulating shipping traffic*

• Emergency management
- *(see consecutive number 3.10)*

The following services are offered to shipping within the framework of the Marine Traffic Safeguards (cf. § 2 (1) No. 22 ff SeeSchStrO - German Traffic Regulations for Navigable Waterways):

Information service
The information service is provided at fixed times (situation reports) or on request by individual traffic participants. It comprises information on the traffic situation and the fairway, weather and tide conditions. The TC simply broadcasts this information, shipping generally does not acknowledge receipt.

Traffic support service
The traffic support service is divided into the following segments:
1) Information and warning by the TC (Nautical Supervisor on Duty - NvD) and
2) Recommendations by pilots as per the Marine Pilot Act.
Information and warnings are issued by the NvD if the news broadcast within the framework of the traffic information service alone is not sufficient for safe flow of traffic.
If certain conditions prevail (e.g. in the case of fog, ice, or if the pilot boats are located at a remote position due to bad weather) the TCs are additionally staffed with radar pilots. These generally advise the pilots on board or from case to case the master on safe vessel command. The advisory services by pilots comprise in particular positions, passing times, courses, speeds and certain manoeuvres.

Traffic regulating service
The traffic regulating service is reserved exclusively for the NvD and comprises all sovereign and sovereign-operated measures to maintain safety and ease of shipping. Within the framework of the traffic regulating service for instance target-oriented stipulations concerning
• right of way rules
• and overtaking or encounters of vessels

are taken in accordance with the actual requirements. The action, toleration or omission required of the vessel command can be enforced by means of shipping police orders and using "coercive means". However it should be noted that the TC only issues orders when the "weaker forms of intervention" (information and navigation support services) are not promising with regard to the targeted objective."[17]

5.2.2 Emergency towing, access to tugs and emergency management

5.2.2.1 Emergency towing

""Emergency towing" in this sense is the assistance of a towing vessel (emergency tug) provided by the Federal German Government for a vessel not under command, and drifting at sea in order to avert imminent dangers (e.g. stranding). The emergency tug is to establish a tow connection with the disabled vessel and keep it at sea or tow it ("controlled drifting") until manoeuvrability of the disabled vessel is restored, commercial salvage tugs can take over the disabled vessel safely, or the danger can be averted in some other way. Controlled drifting in this connection means that the disabled vessel is held as far as possible against current, wind and sea in such a way that it does not move backwards over ground.

Due to the decline in the frequency of accidents in the 1970s and 1980s the provision of commercial salvage capacities at exposed stations was no longer profitable for tug boat operators. The Federal Government, developing the multipurpose vessel "Mellum" (year built: 1984, bollard pull 110 t), thereupon decided to provide the vessel with an emergency towing component. The concept of multiple-use proved to be tolerable especially as regards financial aspects too. This was continued in the year 1998 with the commissioning of "Neuwerk" which also has a bollard pull capacity of 110 t. In addition to the Federal state-owned vessels, in 1996 the high-sea tug "Oceanic" (bollard pull capacity 186 t)[18] *was chartered and positioned on a standby position off Heligoland.*

Within the framework of the evaluation of the marine casualty "Pallas" and the resulting recommendations of the "Grobecker Commission" a cross-departmental project to improve marine emergency preparedness was initialised. Within the framework of a sub-project (TPG 1) the complete emergency towing concept was revised with a view to ensuring a bollard pull capacity appropriate to the risk potential in the North and Baltic Sea and to optimise the equipment of the emergency tugs. The equipment and bollard pull capacity of the emergency tugs was dimensioned on the basis of selected "design vessels" in the respective area. The planned positions or berths, respectively, are oriented to the potentially critical traffic hotspots in the North and Baltic Sea.

For the North Sea area it is still possible to rely on three emergency tugs, whereby the Federal state-owned vessels continue to form the backbone of the concept.

In the long term a further (strong) tug will be additionally chartered which is to be permanently stationed at a sea position north of the island of Norderney (...). The "Mellum" and the "Neuwerk" take up standby positions in the area of Heligoland and off the coast of Schleswig Holstein (near Süderoogsand) as of wind force 8. Furthermore, there is an agreement between the Federal Republic of Germany and the Netherlands on mutual aid in the field of emergency towing capacities that

[17] Safety Concept German Coast, BMVBS and WSD Nordwest, 02/2006
[18] See footnote 3, page 12, bollard pull acc. to Bugsier = 178 t

regulates bilateral support and complementing in the area of emergency towing (e.g. in the event of failure of an emergency tug). (...)

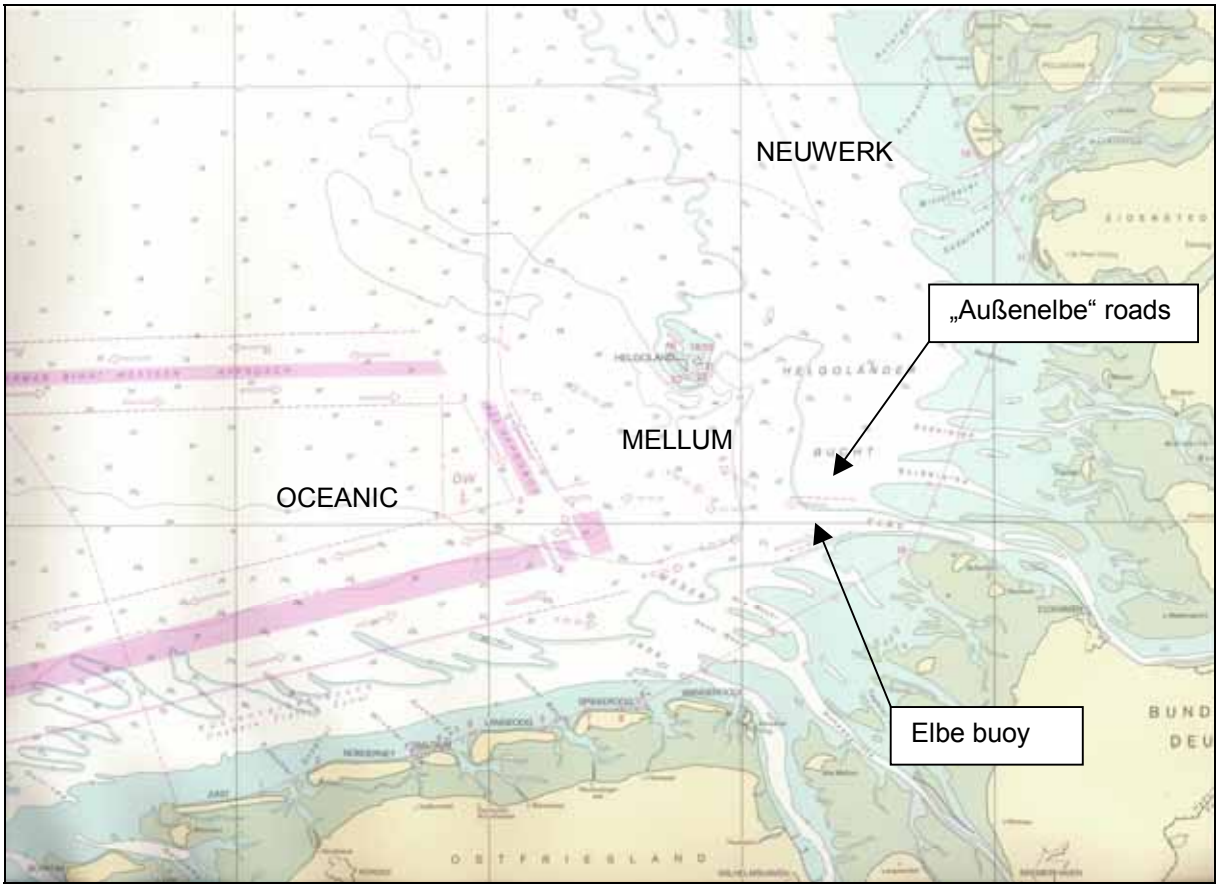

Figure 11: Storm positions of the emergency tugs today

In this context it should further be noted that the success of a towing or salvage operation depends largely on the prevailing circumstances of the individual case. In particular the establishment of a tow connection to a vessel not under command and drifting at sea can be problematic. The manoeuvring characteristics of the tug used, the hydrological and meteorological frameworks and the condition of the disabled vessel and its crew play a crucial role here. Boarding teams are therefore available for such assignments, in cases of need, that may be lowered onto the disabled vessel by helicopter. One of those teams is on board the "Oceanic" for the North Sea area (...)."

The tugs available for the North Sea within the framework of the emergency towing concept have proved their value in many assignments and exercises. This applies in particular for the vessels of the WSV. The Marine Board of Inquiry[19] at Kiel ascertained in this context[20]: "The quality of the vessel did not provide "Oceanic" with any crucial advantage for this manoeuvre either. On the contrary, the manoeuvring capabilities of the authority's vessels "Neuwerk" and "Mellum" allow highly controlled manoeuvring close to the stranded vessel as was demonstrated particularly during the assignment of "Mellum"."[21]

[19] Marine Board of Inquiry = Seeamt
[20] From the grounds given for the decision by Seeamt Kiel on 21 August 1999 on the marine casualty MV “Pallas”
[21] Safety Concept German Coast, BMVBS and WSD Nordwest, 02/2006

In a further paper[22], (annex 1 to German experience with emergency towing concept) it is stated:

- Emergency towing exercise TESEO, 1996, emergency tugs: GV MELLUM and MV OCEANIC, "emergency towing properties of both vessels very good, better manoeuvring charactieristics of MELLUM";
- Emergency towing exercise BERGINA, 1998, emergency tugs: GV MELLUM, MV OCEANIC, GV NEUWERK, westerly winds 7 in gusts 8, sea 4 – 5 m, "all three towing vessels have proved their value under difficult weather conditions."
- and
- Emergency towing exercise KAPITAN PUTLIN, 2000, emergency tugs: GV MELLUM, MV OCEANIC, weather: SSE 7 – 8, "both vessels could control the tow, OCEANIC achieved better course stability of the tow, MELLUM could manoeuvre better and more tightly."

5.2.2.2 Access to tugs

"In order to have access to sufficient tug capacities at any time when accidents occur, if this is necessary under shipping police aspects (to avert danger), the Federal German Waterways and Shipping Administration (WSV) has concluded a corresponding agreement with German towing operators.
The agreement on co-operation in marine casualties is to ensure that in cases of need, i.e. when safety and ease of shipping traffic or the environment are exposed to specific dangers, it is possible for the responsible WSA to access tugs without time-consuming negotiations between salvage operator and disabled vessel.

Within the framework of emergency preparedness the contracting parties agreed, for instance,

- *to exchange information on all tugs and equipment that can be used in the event of a marine casualty,*
- *to draw up reporting and point-of-contact plans, and*
- *to carry out joint scheduled exercises.*

The agreement provides for the salvage operators to first attempt to enter into a towing contract with the disabled vessel on a voluntary basis. The responsible WSA shall support the salvage operator in this to the best of its knowledge.
If the disabled vessel declines to sign a corresponding contract, the responsible waterways and shipping police authority must review in accordance with its dutiful discretion whether a shipping police order must be issued to accept a tow. The prerequisite for this is that there must be direct and imminent danger or elimination of a disturbance that has already occurred.

A further constituent part of the agreement is the treatment of the question of costs in the form of the "double proviso". According to this the conclusion of an open towing contract is provided for subject to the reservation that negotiations on the reason and amount of the towing pay will only be negotiated subsequently and in the event of dispute a decision by the German Maritime Arbitration Court in Hamburg will be requested.

[22] Adjustment of the performance criteria required of emergency towing capacities in the North and Baltic Seas with special consideration given to proposed long-term charters as of 2006, Central Command for Maritime Emergencies (CCME), FB 2, 05/2006

Through the agreement the WSV can access about 60 private tugs that are joined together in a pool. The contact partner for the vessel operators who have joined the pool is Bugsier-Reederei in Hamburg. The bollard pulling capacities of the vessels mainly used as port and assistance tugs lie between 25 and 70 t." [23]

5.2.2.3 Emergency management

"Within the framework of the evaluation of the "Pallas" accident in 1998 the emergency management in Germany was optimised.
One deficit identified in particular was that on occurrence of an event a large number of different public authorities and institutions become active that must be better co-ordinated. Furthermore, the assisting forces participating should be subjected to a uniform management structure.
The tackling of complex emergency situations at sea, that used to fall within the sphere of competence of the respective local WSA (or in particularly serious cases of the Disaster Team North Sea/Baltic Sea), has been managed since 1 January 2003 by the German Central Command for Maritime Emergencies. In the above cases the Central Command for Maritime Emergencies assumes the central operational command and pools the available competencies of the Federal Government and the German coastal states.

According to the definition provided in the treaty between the Federal Government and the German coastal states, a complex damage situation at sea exists if in the case of an incident a large number of human lives, property items of substantial value, the environment or the safety and ease of shipping are jeopardised, or if these goods to be protected have already been disturbed and the means and forces of daily operation are no longer sufficient to eliminate this danger situation, or uniform management of several task providers is required.

This comprises in particular:

- *Ship accidents (without leisure craft accidents) with loss of human life or threat of imminent danger for human life and limb (occupational accidents on individual ships are excepted from this) and it does not appear possible that the occurrence can be managed by the WSV and DGzRS*[24] *or private salvage companies alone.*
- *Accidents with passenger vessels when a reasonable assessment of the situation makes evacuation measures necessary or, at least, likely.*
- *Accidents of ships with restricted manoeuvrability (drifting not under command and/or indicating future development of further dangers for traffic safety or the maritime environment) and that evidently cannot be handled by the local Waterways and Shipping Office (WSA) with its area-specific access measures.*
- *Ship accidents with spillage of pollutants or imminent spillage of pollutants above the "ELG-threshold" or other dangerous goods according to the IMDG Code that represent or can represent a danger for traffic safety or the marine environment.*
- *Capsizing and foundering of vessels (except where small vessels only are involved).*
- *Fires on ships requiring the deployment of external fire brigade staff.*

[23] Safety Concept German Coast, BMVBS and WSD Nordwest, 02/2006
[24] DGzRS – German Maritime Search and Rescue Service

- *Substantial damage to the sea bed and to facilities located in the catchment area of federal navigable waterways if danger for the population or the environment is to be feared.*
- *Furthermore, such a situation can prevail if an accident involves the local competency of several WSAs.*

In each case special "public interest" must be taken into account too.

*The **Maritime Emergencies Reporting and Assessment Centre (MERAC)** within the Central Command for Maritime Emergencies draws up and updates a comprehensive situation analysis in 24-hour operation that provides the **Head of the Central Command for Maritime Emergencies** the basis for assessing the situation. The Head of CCME has a "right to take action of his own accord" and can declare himself responsible beyond the above cases of assignment.*

The MERAC is staffed with one staff member each from the Waterways and Shipping Administration and the waterway polices of the German coastal states (cf.: waterway polices command centre) and performs the following tasks:

- *Deputise for the Head of CCME outside office hours*
- *Collecting, evaluating and processing information*
- *Maintaining the situation analysis*
- *Taking immediate measures*
- *Central reporting point (tasks of the former ZMK)*
- *Central reporting point for the transport of dangerous and environmentally harmful goods at sea (ZMGS) - formerly ZMS.*

The CCME is a Centre of Competence with the following sections:

- *MERAC*
- *Marine Pollution Response – High Sea and Salvage Section*
- *Marine Pollution Response – Coastal Section*
- *Fire Fighting and Medical Response*
- *Public Relations (PR) Section*

The Head of CCME leads the everyday operations of the Centre of Competence.

*In case of a complex emergency situation the staff is being alerted and called for to co-ordinate immediate action of all necessary forces under the auspices of the German Federal Government and the German Coastal States. Personnel from CCME forms this "Central Casualty Command" and the Head of CCME takes the captaincy. In these cases of a complex emergency situation the CCME makes use of the authorities of the Federal Government and the German coastal states in the form of **mission-type tactics**.*
Handling ship accidents below the complex emergency situation is still the responsibility of the authorities of the Federal Government or the German Coastal States. The local WSA perform this task for the area of the Federal Government."[25]

[25] Safety Concept German Coast, BMVBS and WSD Nordwest, 02/2006

5.3 Vessels deployed

After the failure of the main engine of HOPE BAY at 1020, GBT first dispatched the **MELLUM** to the disabled vessel. In organisational terms the MELLUM belongs to the WSA Wilhelmshaven. The vessel designated as a "water pollution control" vessel (German acronym GS) is for multifunctional use. The vessel particulars are as follows:

Year built:	1984, converted several times
Length overall:	80.45 m
Breadth overall:	15.11 m
Draught max:	5.80 m
Gross tonnage:	2,546
Engine rating:	4 x 1,655 kW
Speed:	15.6 kts
Bollard pull:	96 t[26]

Two controllable pitch propellers in Kort nozzles, two fin rudders, one bow thruster.

The **NEUWERK,** assigned later and belonging to the WSA Cuxhaven, is also a multi purpose vessel and has the following particulars:

Year built:	1998
Length overall:	78.91 m
Breadth overall:	18.63 m
Draught max:	5.79 m
Gross tonnage:	3,422
Engine rating:	3 x 1,000 kW
Speed:	15.0 kts
Bollard pull:	113 t[27]

The Neuwerk is equipped with two rudder propellers in Kort nozzles and a Pumpjet.

The other tugs at the scene were:

BUGSIER 12 and **BUGSIER 14**

Length overall:	27.00 m
Breadth overall:	8.80 m
Draught max:	2.80 m
Engine rating:	1,280 kW
Bollard pull:	30 t

TAUCHER OTTO WULF 3

Length overall:	28.30 m
Breadth overall:	8.40 m
Draught max:	4.10 m
Engine rating:	1,600 kW
Bollard pull:	20 t

[26] According to CCME (see footnote 15) bollard pull: 96 t, according to web-site wsa-wilhelmshaven.de bollard pull: 1000 kN.
[27] See also footnote 19: bollard pull 113 t, according to web-site wsa-cuxhaven.de bollard pull: 1130 kN

BUGSIER 21

Length overall:	30.60 m
Breadth overall:	11.00 m
Draught max:	3.00 m
Engine rating:	3,530 kW
Bollard pull:	51 t

BUGSIER 3

Length overall:	32.80 m
Breadth overall:	11.70 m
Draught max:	6.40 m
Engine rating:	5,500 kW
Bollard pull:	63 t

5.4 HOPE BAY - Engine failure and collision with buoy

At the time of the accident the vessel was not equipped with a Voyage Data Recorder. However she was not yet obligated to at that time.
One fixed pitch propeller is used for the propulsion.

The vessel command of HOPE BAY cited a defect in the automatic control as cause of the failure of the main engine on the Elbe.
The expert opinion drawn up by the expert Prof. Dipl.-Ing. Diederichs on the basis of the technical report of the waterways police describes the following chronology of the damage:
"During the downward movement of the piston the bottom-most piston ring of cylinder 3 broke just as it was passing the air inlet slits in the cylinder bushing (primary damage). One fragment of the ring projected into the slit with a tip, with the consequence that due to large, spot axial forces, the ring webs of the upper piston ring grooves were mechanically deformed, the respective piston rings were jammed in the groove and broke too. In the subsequent upward movement of the piston the lower flank of the bottom piston ring groove was deformed in the same way by a broken piece of the broken piston ring.
The primary damage with the following secondary damage occurred during one engine revolution and can generally not be heard acoustically by the engine crew even if the engine room is manned.
As a result of the radial relief after the fracture, the fragments are flung to and from axially between the upper and the lower groove flank through the piston acceleration within the groove and as a result of the brittle fracture inclination of the piston ring material are crushed until they "disintegrate" through the impact forces in the further course of the engine operation.

As a result of the piston ring fractures the volume of leakage gas flowing past the piston rings towards the scavenging air receiver during the compression and ignition at the piston rings increased. Through this the temperature on the bottom side of the piston in scavenging air box 3 rose, first triggered the temperature alarm and after the temperature rose further and exceeded the limit value, activated the safety system – reduction of engine rating (SLD)[28] or switch of the engines (SHD)[29]."

[28] Slow down
[29] Shut down

5.5 Emergency anchoring German Bight

5.5.1 Engine failure

The incidents on board could not be reconstructed from the documents handed over by the crew of HOPE BAY or rather there were no indications of the problems in the engine. Insofar reference is made to the presentation of the further course of events up to the renewed engine failure in the above mentioned expert opinion:
"After the engine was started up again and operated at reduced power, although the scavenging air temperature and the component temperatures rose again, they definitely remained below the limit value for the safety system, as otherwise the engine could not have been operated further or only through actuating of the emergency switch on the bridge or the engine control room through which in an emergency the engine can still be run for a certain time even with the safety system activated in order to avert greater peril until it stops due to physical failure."

Manual operation at full power would also have been possible by bypassing or switching off the safety system. This would mean to operating the main engine in a safety jeopardising state. In the further course of the expert opinion, however, the first assumption is adopted.
"As a result of the higher "blow by" during engine operation below the activation limit of the safety system both the scavenging air before the cylinder and the piston rod and the piston rod gasket warmed up, with the consequence that the sealing function was reduced in the course of operation, hot scavenging air mixed with combustion gases could penetrate into the drive chamber and lead to a rise of the oil mist and after exceeding the critical oil mist concentration and the ignition temperature (approx. 220 – 240°C) triggered a detonation."
In the technical report by the waterway police it is ascertained that the crew changed the stuffing box of the piston-rod while the ship anchored on the roads As the vessel was at anchor for a relatively long period after the second collision with the OCEANIC, this repair can also have been carried out then.

5.5.2 Measures by WSV and communication with HOPE BAY

The legal basis for the operation of the Vessel Traffic Services is the federal administrative regulation about the "Operation of the Vessel Traffic Services[17] together with the administrative regulations issued by the Waterways and Shipping Directorates North and Northwest for their relevant Vessel Traffic Services[18]. This administrative regulations comprehensively describe the tasks of a Vessel Traffic Service and the activities of their employees, including the radar pilots assigned there.

As ascertained under section 5.1, the BSU has no records of the VHF communication between HOPE BAY and German Bight Traffic for the period before 1808 on 12 March 2008. The evaluation is therefore based on the activity records and statements. Information, agreements, instructions and the like exchanged on other channels of communication could, naturally, only be reconstructed on the basis

[17] Administrative regulation of the Waterways and Shipping Administration of the Federal Government (VV-WSV 2408)
[18] Exemplary the administrative regulation of the Waterways and Shipping Directorate North (VV-WSD Nord 24-1) about the operation of the Vessel Traffic Services Cuxhaven and Brunsbüttel

of the activity records. The activity records varied in quality. The investigators find the documentation provided by the accident log of the Maritime Emergencies Reporting and Assessment Centre to be very good thanks to its detail.

BSU evaluated the communication of the shore stations and the vessels deployed with HOPE BAY for this phase of the occurrences under the aspect of gathering information by the vessel command of HOPE BAY and the keywords traffic monitoring, support and regulation.

According to the records VTS Wilhelmshaven, i.e. German Bight Traffic (GBT), advised HOPE BAY to anchor at about 1115. The vessel command followed this recommendation at 1236, when it was ascertained after a test run of the engine that the vessel could not proceed with the voyage. By then the vessel had drifted about 6 nm eastwards. The anchor position was within the 30-metre depth contour. The maximum water depth in the way of the drift distance was about 35 m. After dropping the anchor HOPE BAY continued to drift at approx. 1.5 kts. The vessel command of HOPE BAY had first quoted a repair duration of 4 to 5 hours at 1255, i.e. a drift distance of a further 7.5 nm was first to be expected. Although the tidal current set against the direction of drift, the wind was expected to get stronger. Keeping the drift speed of 1.5 kts, the vessel would have been about 2 nm west of the 10-metre depth contour of Großer Vogelsand at 1800. Actually the drift speed slowed down.

After evaluating the activity records no evidence was found of exchange of information between the participants, i.e. vessel command HOPE BAY and WSV shore stations, about the cause of the engine failures of HOPE BAY. Insofar it was not possible to appraise the vessel command’s statement about duration of repair.

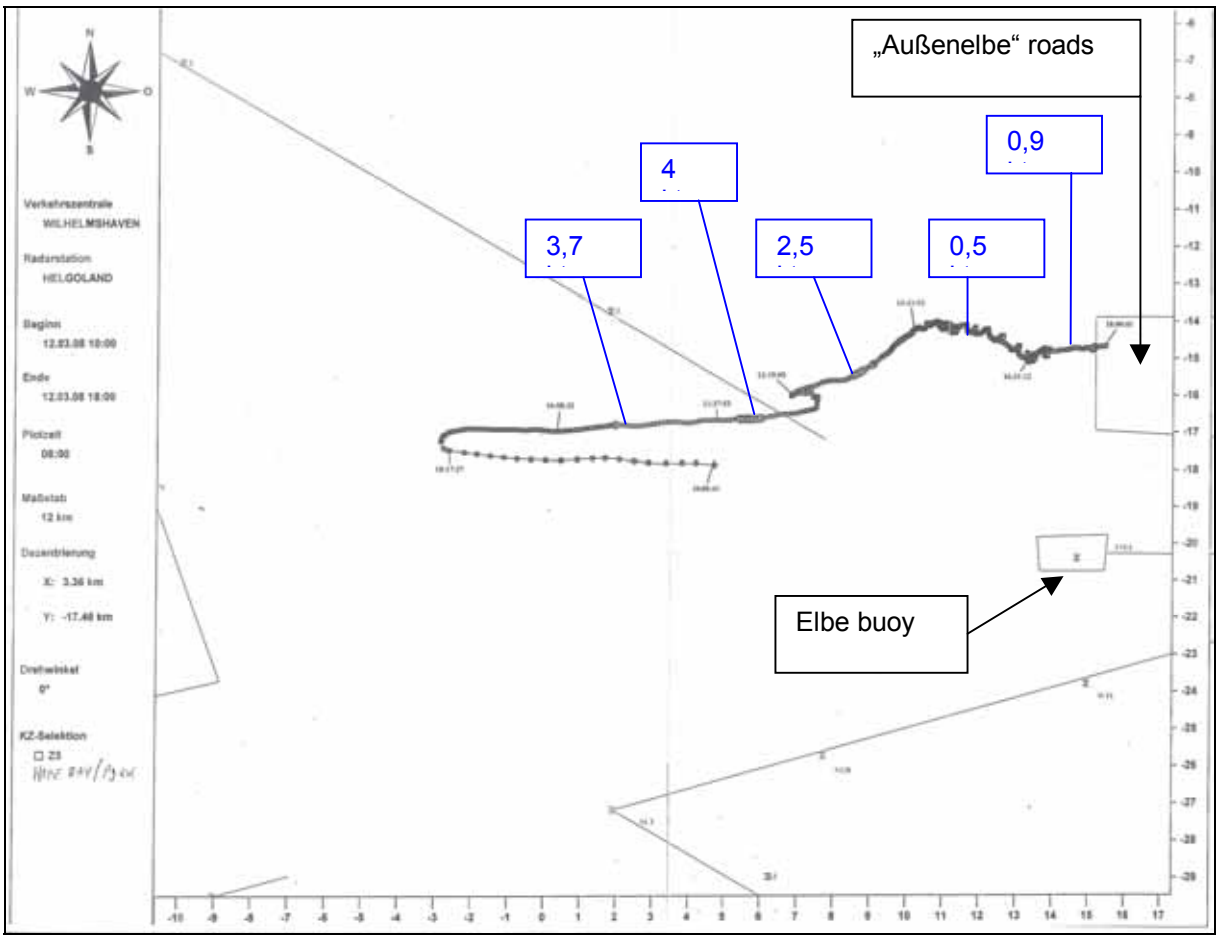

Figure 12: Radar plot HOPE BAY of VTS Wilhelmshaven, drift speed inserted by BSU

At 1745 HOPE BAY announced to MELLUM that the repair would take a further one to two hours. MELLUM relayed this information to GBT adding that the disabled vessel was drifting eastwards at 1 kt. Maintaining this speed HOPE BAY would have been approx. 3 nm off the 10-metre depth contour of Großer Vogelsand at 2000. A westerly tidal current was to be expected up to 2200. This reduced the drift speed, but at the same time worsened sea conditions as the current was then running against the wind.

At about 1800 HOPE BAY drifting at anchor crossed the western boundary of “Außenelbe” roads (longitude 008° 07.0‘ E) and thus the competence boundary between WSA Wilhelmshaven (WSD North-West) and WSA Cuxhaven (WSD North) or their respective Vessel Traffic Services. There was friction between the Nautical Supervisors on watch (NvD) of the two VTS on handing over the vessel, as the NvD of VTS Cuxhaven was surprised by the situation. Ultimately the vessel was first handled further by VTS Wilhelmshaven. The Maritime Emergencies Reporting and Assessment Centre was informed continuously about the situation as of 1037. The relaying of information by MERAC within the Central Command for Maritime Emergencies was also documented.

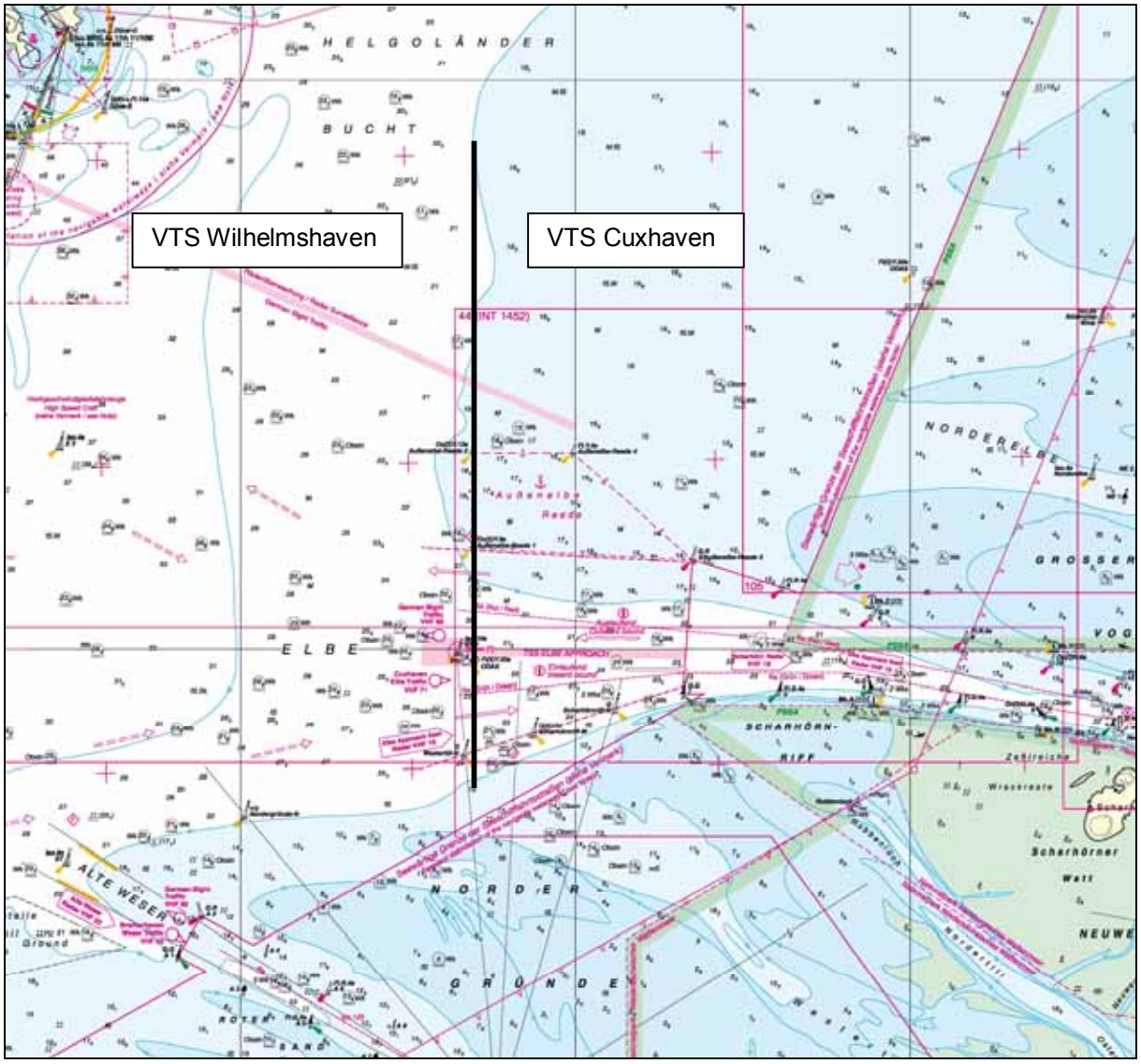

Figure 13: Competence boundary between VTS Wilhelmshaven and Cuxhaven in the area of the Elbe approach and “Außenelbe” roads

In the further course of events the NvD of VTS Wilhelmshaven, after consultation with MERAC, decided to withdraw the OCEANIC from her position and dispatch her to HOPE BAY as stand-by tug.
In one of the protocols available this decision was attributed to the Joint Situation Centre Sea (GLZ).
The vessel command of OCEANIC estimated 2.5 hours for the voyage.
In the statement of the WSA Cuxhaven and in the activity record of VTS Cuxhaven (1812) it is noted that there was a shipping police order by VTS Wilhelmshaven according to which HOPE BAY was to complete the repairs by 1900 or else a tow connection would be ordered. This remark is also in the day log (1810) of the GLZ. There is no corresponding entry in particular in the documents of VTS Wilhelmshaven, or in those of MERAC. The VHF discussion reproduced below shows no indication of this either.
At 1820 the following exchange was conducted on VHF channel 10 between HOPE BAY (HB) and MELLUM (M) lying close by:
(...)

M (*...) As you can see, you still dragging around 1 mile per hour to the east and in about 5 miles distance you will reached the shallow waters. So in my opinion you should urgently call standby the assistant tug now.*

HB *Yes, I received information from my chief engineer that 1900 should be start my engine.*

M *That you told me already 6 hours ago.*

HB *Yes, I understand, but this information from chief engineer only. But anyway, I don't know, I must wait before 1900. If 1900 not start my engine I call assistance.*

M *Ja, because assistance tug from, let's say Brunsbüttel, will take at least three hours to reach your position. So I would prefer if at least at 1900 your engine is not running you should order the tug.*

HB *Yes, I well understood*.

(...)

At 1841 in return HOPE BAY contacted MELLUM:

(...)

HB (*...) I am received information from my owner, that 1900, if I start my engine, I must proceed in port of Cuxhaven. But anyway, if I am not start my engine, I must call shore assistance for tug. I will keep you informed*.

M *Ja, anyway, even if you can start your engine at 1900, if you want to proceed to Cuxhaven, you will need at least two assistance tugs anyway. You can not proceed to Cuxhaven with your engine problems without an assistance tug.*

HB *Yea ... I must inform the elbe pilot, channel 71?*

M *Ja, Cuxhaven Elbe Traffic on channel 71.*

(...)

At 1845 VTS Cuxhaven (call sign: Cuxhaven Elbe Traffic – CET) called on its working channel 71 :

(...)

HB (*...) I am received information from my owner that I must proceed to Cuxhaven port to repair my engine. Now I will try to start my engine for testing. Over.*

CET (*...) Yes, well understood. You will start your engine for testing and you will come back to Cuxhaven. That's right?*

HB *Yes it's right. I got the information from my owner. I must proceed to Cuxhaven to repair my engine.*

CET *Yes, ok. When you enter the river or when everything is ok, your engine is running well, then you have to take two assistance tugs from outside the Elbe Racon to Cuxhaven.*

(...)

Actually, VTS Cuxhaven knew the intentions of the disabled vessel already since 1830, as the agent of HOPE BAY had ordered the tugs BUGSIER 14, BUGSIER 12 and TAUCHER OTTO WULF 3 to tow the vessel in to Cuxhaven. In the record of VTS Cuxhaven the VHF exchange reproduced above (see 1845) is noted for 1910. According to the entry the required line pulling capacities of the tugs were notified to the vessel (45 and 30 t). In fact these were not given to the vessel.

At 1859 MELLUM called HOPE BAY:

(...)

M *Ja, so that means you can proceed with your engine only "dead slow" or you can you go increase your speed later?*
HB *I think so, I can increase the speed later*.
M *Ja ok. At the time your anchor is up, please do me a favour and proceed right with a westerly course, with a westerly course to the open sea first, until your assistance tugs arrived at Elbe pilot position.*
HB *Ok, roger Sir.*
(...)

The reason for this instruction was the fact that the OCEANIC approaching at a speed of 14 kts was still 25 nm away.

The NvD of VTS Wilhelmshaven stated in his statement and also noted in the log that he had issued an order to HOPE BAY to run 5 nm westward and to wait there. The tape recording did not confirm this; only the request by MELLUM reproduced above was documented. The VTS Cuxhaven, MERAC and the GLZ were informed about the order/request to HOPE BAY.

In the opinion of the WSA Cuxhaven the hand-over of the leadership to VTS Cuxhaven took place at 1901 with completion of the repair on board HOPE BAY. There are no notes or indications of this in the records.

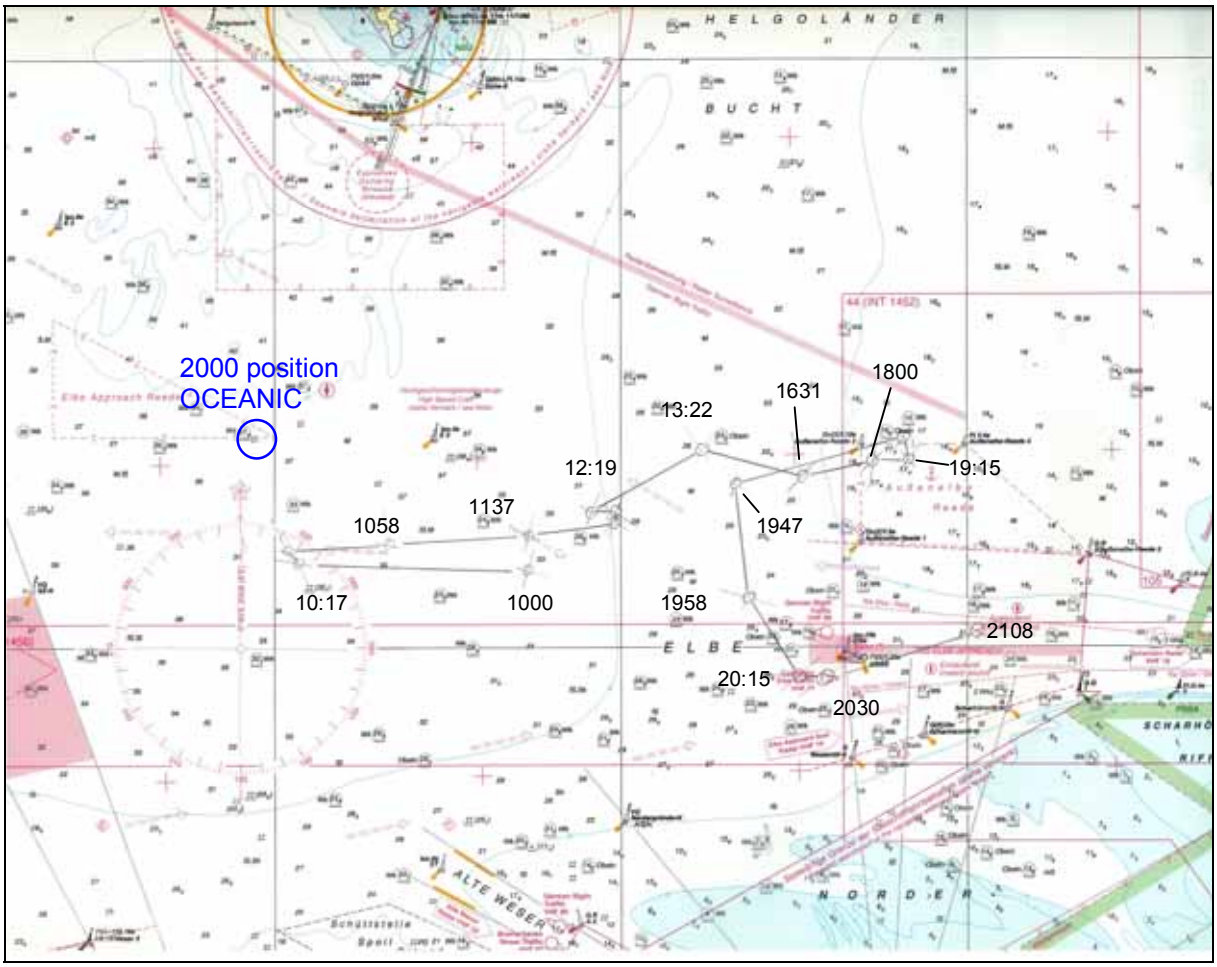

Figure 14: Track of HOPE BAY from 1000 to 2108

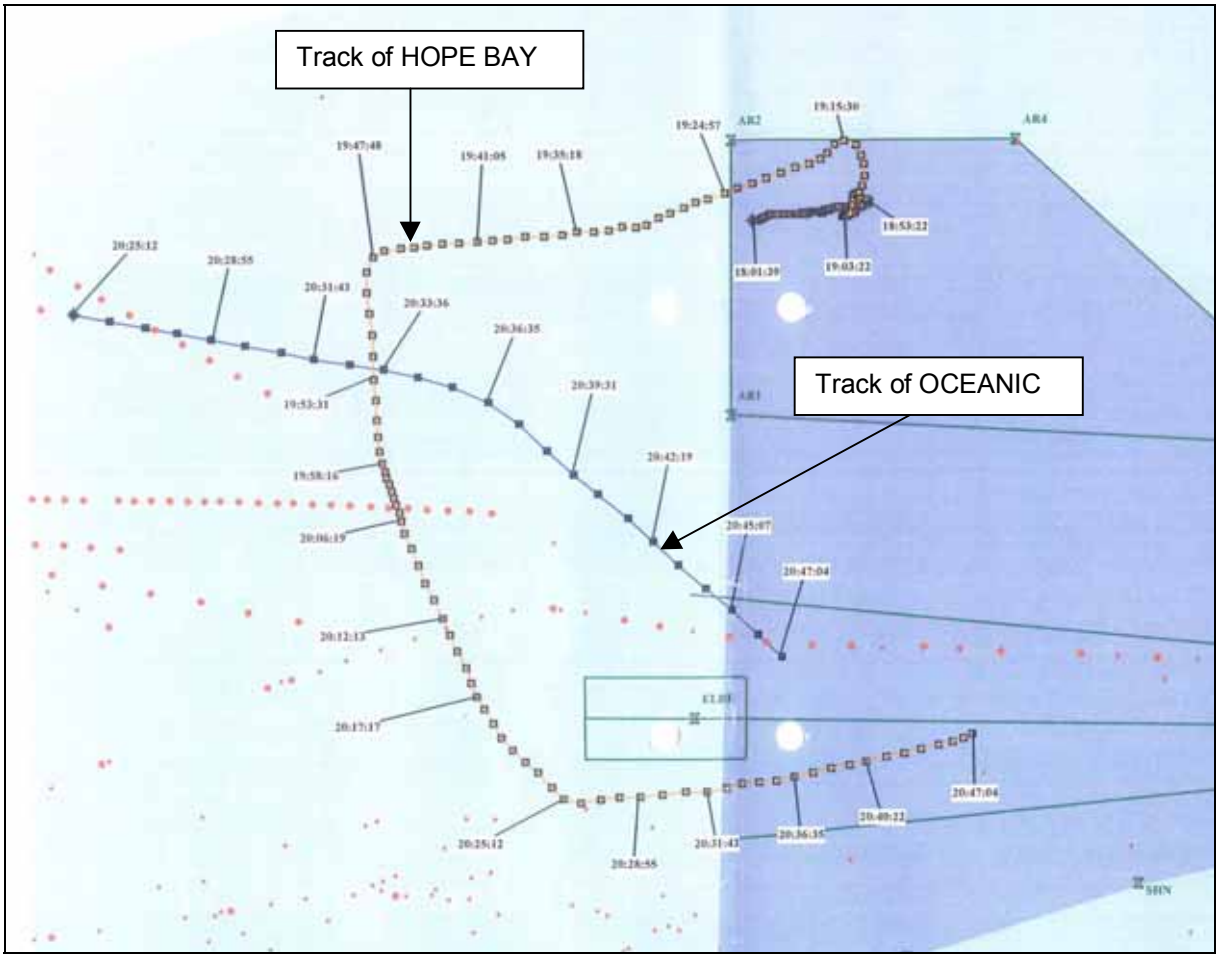

Figure 15: Radar plot HOPE BAY and OCEANIC of VTS Cuxhaven

At 1912 MELLUM contacted HOPE BAY again:

(...)

M (*...) You are on the way now?*

HB *Yes, I am on the way. Altering the course to port side for 270 and keep position 5 miles from anchorage awaiting for ship assistance.*

M *Ja, that's fine. Keep at least distance 5 miles not less. You can also proceed more to the west if you want to. And we will stay astern of you, or right (cannot be understood) close to you.*

(...)

The investigation revealed no explanation for the fact that HOPE BAY changed to a southern course already at 1946, thus just 2.5 nm after leaving "Außenelbe" roads.

At 1949 the radar pilot from Elbe Approach East Radar (EAR), i.e. the westernmost area of VTS Cuxhaven, called HOPE BAY on VHF channel 19, the radar pilot channel:

(...)

EAR (*...) we got information about your situation. You will now proceed more inside the river. I heard your maximum manoeuvre revolutions is "Half Ahead". Correct?*

HB *Yes, is correct. Now I will try give full manoeuvring speed.*

EAR *Yes, and for the moment keep your present course, southerly course. You have to round the Elbe Racon Buoy westward*.

HB *Roger Sir. Now I will keep course 180.*
(...)

As GBT and MELLUM were not listening on channel 19, they were surprised by the southern course of HOPE BAY; in particular because the reefer vessel was in the area of responsibility of VTS Wilhelmshaven. After contacting VTS Cuxhaven by telephone, VTS Wilhelmshaven terminated the assistance of HOPE BAY.

The first assistant tug for HOPE BAY, the BUGSIER 14 (B14), reported to CET at 1953. She was on her way on the Elbe near buoy 40 and thus 30 nm away. A further assistant tug, the BUGSIER 12, was passing buoy 54. TAUCHER OTTO WULF 3 was intended as third assistant tug. The master of BUGSIER 14 stated in response to a respective request that he would be at buoy 13 at about 2210. The distance from there to the Elbe buoy is approx. 13 nm. It was, however, evidently planned that the tugs should establish a tow connection to the reefer vessel at buoy 13.
(...)
CET (*...) At present it is planned for you to run up to Buoy 13 in order to meet her. Though I must say that the engine of this HOPE BAY is apparently rather unreliable.*
B14 *Yes, we gathered that or so. I must notify you that we certainly won't be able to moor at Buoy 13. So we can't do anything before Cuxhaven, the gear would rip away and that would be that. But we can ride as escort. And as I said, I think we can pick her up on a level with Cuxhaven, once we are round the corner or so.*
CET *Yes, then we'll have to look at this again.*
B14 *Yes, if anything happens and you change things round at all and decide that we shouldn't go out so far to meet her as we would only be rocking about in any case, then please be kind enough to inform us, yes?*
(...)

In the meantime EAR piloted HOPE BAY further to the south and closer to the Elbe buoy. MELLUM was nearby up to 2015 and was then dispatched to the storm position of OCEANIC.

At 2020 OCEANIC contacted CET:
(...)
O (*...) We wanted to ask about HOPE BAY, what's happening there. We can just see here that they are on a southern course and now making for the approach buoy.*
CET *Yes, then you had best go to German Bight Traffic. She will certainly be on channel 80.*
O *Ah, I have just called German Bight Traffic. They say I should ask you.*
CET *Then go to channel 19, she is being advised there.*
(...)

Before OCEANIC could contact EAR, MELLUM contacted her:
(...)
M (...) *Yes, I was listening in and just heard that you are trying to find out what HOPE BAY is doing. Perhaps I can help you. We had actually arranged with German Bight Traffic that she go 5 miles west of Außenelbe Reede and then*

wait you. Vessel Traffic Service Cuxhaven wanted to bring her in already now. Apparently she is getting tugs. Thy are still on the way from Cuxhaven. Despite this you should accompany her to Cuxhaven.

O *OK yes, that was our question, whether we should escort her or what we should do now. Now we know what's what. We'll run after her.*

M *Yes, if necessary clarify with MERAC. But it was from them that I heard that you should escort her to Cuxhaven.*

(...)

The following entry on an exchange with VTS Cuxhaven was also found in the activity record of MERAC for 2020: "*VTS has had contact with the master of HOPE BAY who confirms that he can proceed at max. half speed with his main engine. That is why the VTS has decided to let the vessel run slowly in the direction of Cuxhaven. OCEANIC should escort the vessel up to the hand-over to the tugs at Neuwerk Roads. Three tugs were ordered to Neuwerk Roads in consultation with the master and the operator. ETA Neuwerk for the tugs is reportedly 2230."* The confirmation relates to the exchange with HOPE BAY at 1949.
At 1953 the master informed EAR that he could only run at "half speed ahead". Later EAR asked whether 10 kts were possible to take over the pilot.

At 2030 EAR asked HOPE BAY to go to the slowest possible manoeuvring speed. This was to give OCEANIC a chance to catch up.

5.6 Collision HOPE BAY – OCEANIC

5.6.1 Data

The data on the actual collision available for the investigation was, apart from the radar plots of the VTS Cuxhaven, not very informative. There are no records in the log of HOPE BAY about headings or speeds. The bridge log of OCEANIC contains no records for the period 2130 to 2247.

In view of her size the OCEANIC is not obliged to carry a VDR or S-VDR. However, probably in implementation of a recommendation[30], in 2005 the vessel was equipped with an S-VDR to record and save data.

After berthing on 13 March 2008 the vessel command of OCEANIC indicated to the investigating officer of the waterway police that there was no VDR on board and the electronic chart could not be read out. In a later download attempt the chart data were no longer useful, as they were in the meantime only present in the long term recording and the data are only filed there at long intervals.

According to the statement by the legal representative of the vessel operator the data of the S-VDR were not saved in time after the accident, i.e. no emergency backup was made, so that the data were automatically over-written again. The vessel operator had not issued any instruction on how to proceed in general after special

[30] Improvement of marine emergency precautions and emergency management on the basis of the recommendations of the independent commission of experts "Havarie Pallas", Sub-project 1 – Emergency Towing, Point 4.2.2 – Improvement of equipment of existing and future emergency tugs

occurrences. The operator referred to the fundamental responsibility of the officers for the equipment and handling thereof.

5.6.2 Course of the accident

At 2045 the vessel command of HOPE BAY reported the failure of the main engine.

At 2051 HOPE BAY called the radar pilot EAR:
(...)
HB *Much better if you arrange tug assistance because I am afraid that my engine now in not working condition.*
EAR *Yes it's ok, I try.*
(...)
EAR *OCEANIC, the master requests tug assistance. His engine won't start any more.*
O *Yes, we have understood. Then we'll see that we get close*.
EAR *HOPE BAY, HOPE BAY the tug boat OCEANIC will try to come close to you to have later on a big tow from the tug boat to your ship.*
HB *Ok, thank you.*
(...)

First EAR arranged a communication channel (channel 10) between the tug and the reefer vessel. Then there was the first direct exchange between the two. The tug command explained that the tug would come to the bow of the disabled vessel and shoot a line across. HOPE BAY was to have suitable staff ready there. At 2103 the main engine was running again and HOPE BAY, now lying beam to the sea with her bow pointing north, tried to pick up speed and turn to starboard.

At 2103 OCEANIC called HOPE BAY to clarify the situation:
(...)
O *What is your engine? Is it already started now or is it a problem now?*
HB *Now I am on the way try to altering course to starboard, please wait.*
O *Yes, for us is much better to make fast anyway so, because you going out of your course*.
HB *Yes, ok ok.*
O *So we will go to your bow and then we will make fast the towing line*.
HB *Ok.*

The contradiction in the above exchange that HOPE BAY wanted to alter course and asked the other to wait, while OCEANIC wanted to establish a line connection and needed a stable course of HOPE BAY for this, was not solved. Although everything was "OK" for the master of the disabled vessel, it remained unclear whether he was really going to give up his intention and support the tug manoeuvre instead, and the vessel command of the tug did not ask about this.

A little later HOPE BAY reported that she was now running at 3.2 kts, proceeding northwards at this speed. OCEANIC in turn said she would try to get a line over.
Despite this, the vessel command of OCEANIC was evidently unsure, for they contacted EAR at 2106. The investigators assume that the vessel was already being operated from the aft bridge at this time and trying to reach a favourable position:
(...)

O *Yes, we now have radio contact with (...) the vessel and they have got their engine running again. But we are now already almost abeam ahead. Should we tie up despite this or should we now simply escort?*
EAR *Yes, I don't know whether it will break down again. It might break down again.*
O *We would prefer to tie up. We have the same opinion.*
EAR *HOPE BAY, HOPE BAY – Radar Control*
HB *Radar Control – HOPE BAY reply*
EAR *Captain, as we know, I think it's better we will contact with the tug boat that's...connection with the big tow because nobody knows what's happened with your engine in the next five or ten minutes captain.*
HB *Yes, roger. I am ready have contact with tug boat and received heaving line.*
EAR *Ok, than it's better you have some people there that you get the tow line and tug line and that you fasten the tug line on your bow.*
(...)
EAR *OCEANIC, yes we think this would be better, otherwise this could happen again five times.*

At 210722 Cuxhaven Elbe Traffic then called on VHF channel 10:
CET *OCEANIC, OCEANIC – Cuxhaven Elbe Traffic*
O *Here bridge, listening.*
O *Yes, we hear.*
CET *Yes OCEANIC, here is Cuxhaven Elbe Traffic, the NvD (Name). So, now I have taken over this mess here and assume that the tugs that are underway BUGSIER and WULF, cannot take over anything out there, can they?*
O *Yes, ok.*

210753 on VHF channel 19
O *Elbe Approach – OCEANIC, we are tying up.*
We are now abeam to shoot. We are now trying to shoot a line over.
EAR *OK OCEANIC, you are trying to shoot a line over*.

OCEANIC approached HOPE BAY from the port side of HOPE BAY and turned to port ahead of the bow of the disabled vessel. The tug thus also had the wind and the sea from the side.

While the line connection was being made to HOPE BAY the disabled vessel and the tug collided slightly. The incident was not reported further over the radio.

The data contained in figures 16 to 18 (s. also figure 20 as graphical description) show, that the engine of HOPE BAY apparently ran again since 2101, because the speed increased from this time on.
OCEANIC approached and thereby had a nearly constant course and an almost constant speed from 2105 to 2109. On the contrary the speed of HOPE BAY increased up to 2108, then decreased and remained unsteady in its course. The speed fluctuated from 2121 up to 2134 from 3,2 kts as lowest value to 6,2 kts as highest value.

Datum	Zeit	KZ	X [km]	Y [km]	Kurs [°]	Geschwindigkeit [kn]
12.03.2008	20:55:50	K9	+ 1.3538	+ 15.2550	87	9.9
		S5	+ 2.4563	+ 15.1013	82	1.6
12.03.2008	20:56:48	K9	+ 1.6500	+ 15.2663	87	10.4
		S5	+ 2.5013	+ 15.0825	114	1.8
12.03.2008	20:57:43	K9	+ 1.8975	+ 15.2963	83	8.9
		S5	+ 2.5688	+ 15.0338	123	2.7
12.03.2008	20:58:38	K9	+ 2.1225	+ 15.3113	87	8.2
12.03.2008	20:59:40	S5	+ 2.6700	+ 15.1313	70	2.5
		K9	+ 2.3175	+ 15.3188	86	6.3
12.03.2008	21:00:39	S5	+ 2.7188	+ 15.1275	82	1.8
		K9	+ 2.4563	+ 15.3075	96	4.5
12.03.2008	21:01:37	S5	+ 2.7713	+ 15.1950	37	3.3
		K9	+ 2.5425	+ 15.3225	83	3.1
12.03.2008	21:02:32	S5	+ 2.8125	+ 15.2775	29	3.3
		K9	+ 2.6250	+ 15.3338	81	3.2
12.03.2008	21:03:31	S5	+ 2.8538	+ 15.3488	29	2.9
		K9	+ 2.7113	+ 15.3713	65	3.3

Figure 16: Radarplot VTS Cuxhaven from 2055 to 2103, S5 = HOPE BAY, K9 = OCEANIC[20]

[20] Regarding HOPE BAY, course indicated here and in the following radar plots does not mean course applied or heading respectively but instead drift direction

Datum	Zeit	KZ	X [km]	Y [km]	Kurs [°]	Geschwindigkeit [kn]
12.03.2008	21:04:25	S5	+ 2.8913	+ 15.4125	26	3.0
		K9	+ 2.7938	+ 15.4275	58	3.5
12.03.2008	21:05:24	S5	+ 2.9138	+ 15.5100	17	3.5
		K9	+ 2.8875	+ 15.5325	51	4.3
12.03.2008	21:06:19	S5	+ 2.9400	+ 15.5963	17	3.4
		K9	+ 2.9663	+ 15.6000	49	4.2
12.03.2008	21:07:21	S5	+ 2.9400	+ 15.7500	11	4.0
		K9	+ 3.0375	+ 15.6938	47	4.1
12.03.2008	21:08:19	S5	+ 2.9888	+ 15.8888	21	4.7
		K9	+ 3.1238	+ 15.7763	47	4.1
12.03.2008	21:09:18	K9	+ 3.2063	+ 15.8550	47	4.1
		S5	+ 3.0338	+ 15.9938	25	4.0
12.03.2008	21:10:22	S5	+ 3.1013	+ 16.0913	43	4.2
12.03.2008	21:11:21	S5	+ 3.1538	+ 16.1625	25	3.1
12.03.2008	21:12:20	S5	+ 3.1688	+ 16.2525	9	3.3

Figure 17: Radarplot VTS Cuxhaven from 2104 to 2112, S5 = HOPE BAY, K9 = OCEANIC

Datum	Zeit	KZ	X [km]	Y [km]	Kurs [°]	Geschwindigkeit [kn]
12.03.2008	21:13:21	S5	+ 3.1725	+ 16.4213	12	5.0
12.03.2008	21:14:20	S5	+ 3.2250	+ 16.5038	37	3.3
12.03.2008	21:15:19	K9	+ 3.4275	+ 16.3913	7	5.8
		S5	+ 3.2738	+ 16.5975	25	3.8
12.03.2008	21:16:21	K9	+ 3.4500	+ 16.5788	7	6.1
		S5	+ 3.3338	+ 16.7063	28	4.1
12.03.2008	21:17:19	K9	+ 3.4988	+ 16.7250	16	5.5
		S5	+ 3.3788	+ 16.8113	22	3.8
12.03.2008	21:18:25	S5	+ 3.4088	+ 16.9275	15	4.1
12.03.2008	21:19:24	K9	+ 3.6975	+ 16.6125	119	1.3
		S5	+ 3.4350	+ 17.0288	18	3.5
12.03.2008	21:20:22	K9	+ 3.7313	+ 16.5713	144	2.6
		S5	+ 3.4875	+ 17.1450	23	5.1
12.03.2008	21:21:14	K9	+ 3.7538	+ 16.4288	175	5.9
		S5	+ 3.5325	+ 17.2913	16	5.7

Figure 18: Radarplot VTS Cuxhaven from 2113 to 2121, S5 = HOPE BAY, K9 = OCEANIC

At 2113 the line shot over parted during the transfer of the messenger line. Both vessels thereupon moved apart. According to the radar plot OCEANIC first turned to starboard. At about 2125 two of the crew members working on deck were thrown over and against ship components by an overcoming sea and were injured, but this did not initially lead to them being unable to work. As of 2130 the tug proceeded on a more westerly heading to lie a little more calmly and to prepare the vessel for the next approach (see Fig. 17).

HOPE BAY continued northwards under engine power dead slow ahead. As the main engine provided only little power and the containers on deck presented a great wind pressure surface, the vessel was unable to turn to starboard or port.
EAR recommended dropping anchor already at 2122 after a longish discussion on the engine speed and the difficulties in steering the vessel:

EAR (...) *Otherwise we have to drop one anchor to keep it a little bit. That there is one anchor chain length to keep it. Otherwise you are drifting to the north, like hell.*

(...)

At 2134 EAR repeated the recommendation.

At 2136, VHF channel 19, EAR to HOPE BAY:

EAR *Captain, I think it's better if you drop one anchor and keep engine running*.

HB *I will try because on "Dead Slow Ahead" my engine working unstable.*

At 2138:

(...)

EAR *You drop your anchor already?*

HB *Yes, already drop the anchor. Now four shackles in the water. I am slack for six.*

EAR *Yes, it's a minimum six shackles captain, minimum six shackles. And keep your engine running because still you are drifting.*

At 2144 the vessel command of HOPE BAY reported renewed engine failure. In the meantime the vessel had dropped seven lengths of the port anchor chain into the water. EAR again recommended using the main engine, as the drift speed was approx. 2 kts.

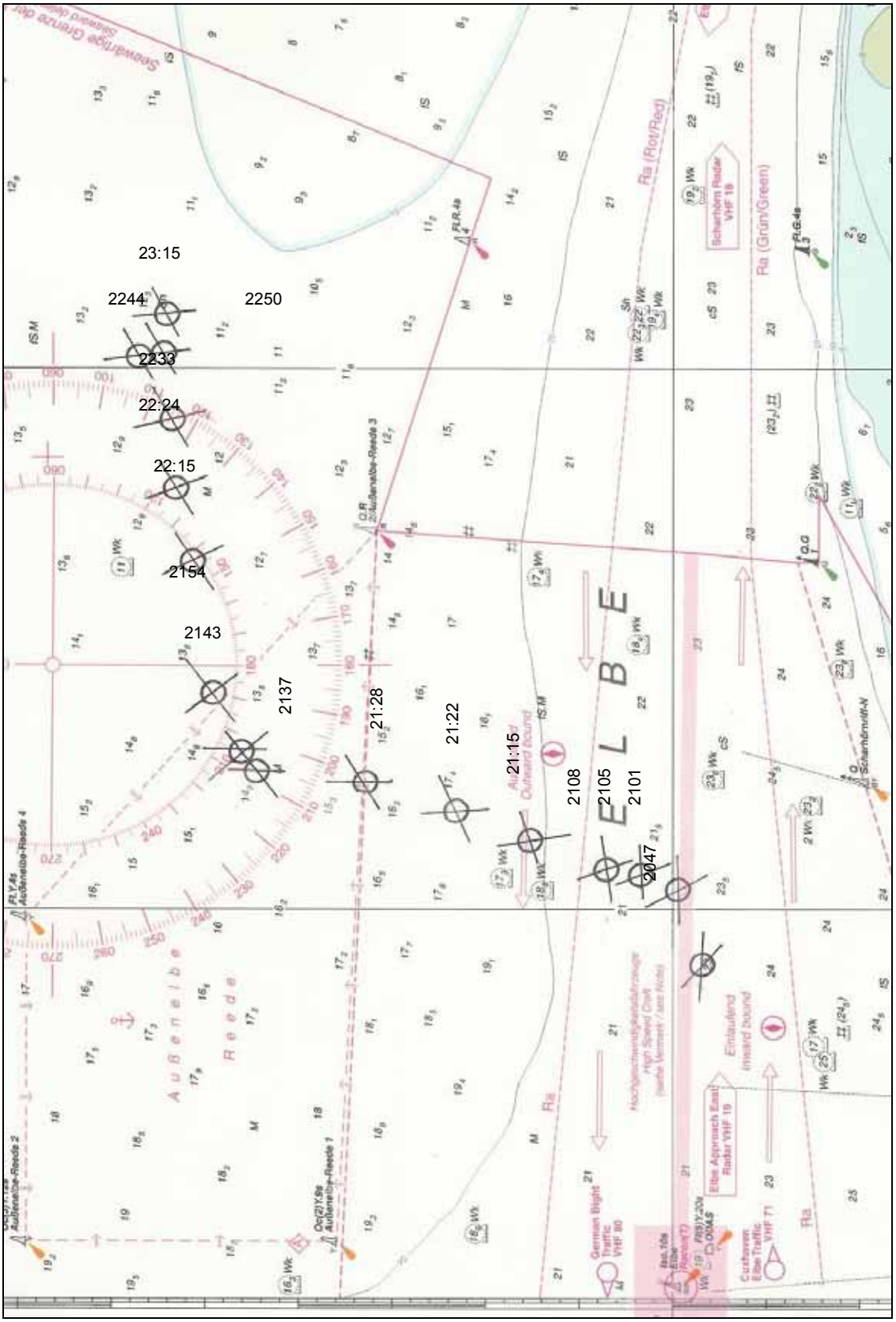

Figure 19: Track of HOPE BAY from 2047 to 2315

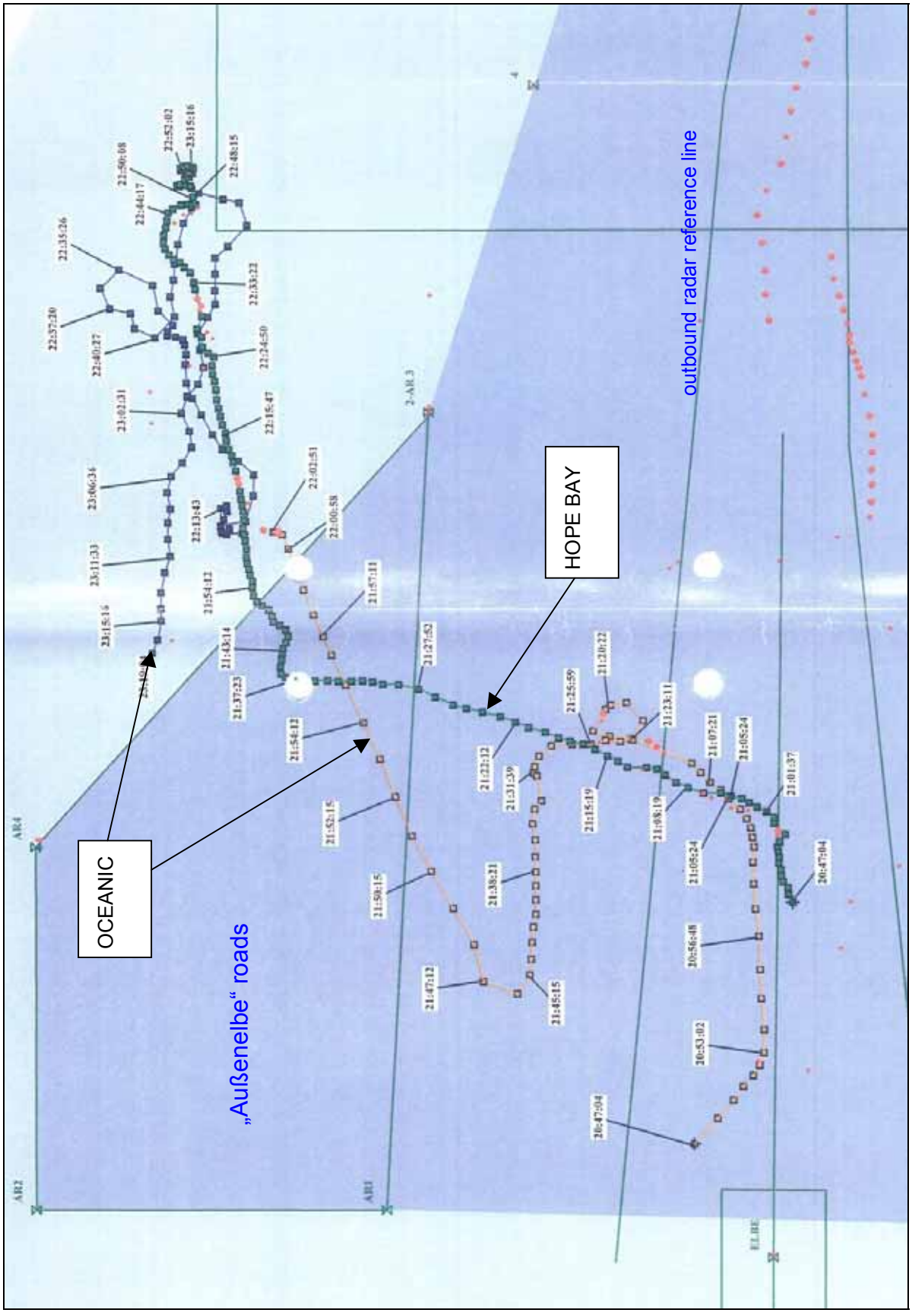

Figure 20: Radar plot HOPE BAY and OCEANIC of VTS Cuxhaven

At 2152 OCEANIC reported to EAR to announce a second approach. A little later HOPE BAY informed OCEANIC that she now had the port anchor in the water with 7 lengths and the chain was tight at about 8 or 9 o'clock. The heading was 340° and the vessel was drifting eastwards at a speed of about 2 kts.

At 2213 there was brief radio contact between OCEANIC and EAR. The situation on site and the remaining distance of 2 nm to the 10-m depth contour were discussed.

At 2236 OCEANIC and EAR discussed on VHF channel 19 the possibility of HOPE BAY dropping the second anchor. At this time the vessel was drifting in a more northerly direction, i.e. towards Norderelbe. According to the vessel command of OCEANIC, HOPE BAY had turned at anchor at an undefined time and was now lying with the bow pointing south. Thus the port anchor chain ran round the bow.

The following exchange occurred after a renewed approach by OCEANIC failed at 2240:

O *Yes, we have the second approach. We can't get close up. It will still take some time here.*
EAR *Yes, shall I have the second anchor dropped?*
O *Yes, naturally we cannot decide that from here, but in any case it will still take some time, so if she doesn't drop the second anchor now, then (never?).*
EAR *Yes then she is away afterwards .*

EAR *HOPE BAY, HOPE BAY, Captain*.
HB *Yes, HOPE BAY replay.*
EAR *Captain, please drop the starboard anchor too.*
HB *OK, I will drop starboard anchor.*
EAR (...)

At 2241 the vessel command of the disabled vessel notified the tug on VHF channel 10 about the instruction received to drop anchor.

HB *Tug boat, tug boat – HOPE BAY.*
O *Yes, HOPE BAY.*
HB *Accordingly instructions I received from Radar Control I must drop second anchor, because my drift very high.*
O *Yes, ok, drop your second anchor.*

At 224656, channel 10:

HB *Tug boat, tug boat – HOPE BAY*
O *HOPE BAY – OCEANIC*
HB *OCEANIC, be careful now. I let go the starboard anchor*.
O *Drop starboard anchor, yes.*
HB *Yes, be careful because now I will start drop anchor*.
(...)

At 224732, channel 19:

EAR *Second, starboard, anchor goes to the water. Thank you very much*.

At 224734, channel 10:

O *HOPE BAY, look for the line!*

At 224920, channel 19:

(...)

HB *Please be informed that by tug boat damaged my bulb and now have hole and water from my forepeak coming outside*.

The data in the following figures 21 to 23 clarify the collision situation.

Datum	Zeit	KZ	X [km]	Y [km]	Kurs [°]	Geschwindigkeit [kn]
12.03.2008	22:32:31	S5	+ 7.4888	+ 20.2238	76	3.2
		C9	+ 7.1663	+ 20.4225	129	2.4
12.03.2008	22:33:22	S5	+ 7.5488	+ 20.2350	75	2.5
		C9	+ 7.2975	+ 20.5500	49	8.1
12.03.2008	22:34:24	S5	+ 7.6388	+ 20.2650	66	3.2
		C9	+ 7.5263	+ 20.5988	80	8.2
12.03.2008	22:35:26	S5	+ 7.6875	+ 20.3175	42	2.3
		C9	+ 7.6650	+ 20.8950	2	12.0
12.03.2008	22:36:21	S5	+ 7.7288	+ 20.3550	49	2.2
		C9	+ 7.5000	+ 21.0600	299	8.6
12.03.2008	22:37:20	S5	+ 7.7588	+ 20.4113	30	2.4
		C9	+ 7.3163	+ 20.9775	231	7.2
12.03.2008	22:38:18	S5	+ 7.8000	+ 20.4525	48	2.1
		C9	+ 7.2750	+ 20.7938	197	5.4
12.03.2008	22:39:21	S5	+ 7.8525	+ 20.4863	59	2.1
		C9	+ 7.1400	+ 20.7600	257	5.2
12.03.2008	22:40:27	S5	+ 7.9050	+ 20.5013	78	1.9
		C9	+ 7.0538	+ 20.5800	185	6.9

Figure 21: Radarplot VTS Cuxhaven from 2232 to 2240, S5 = HOPE BAY, C9 = OCEANIC

Datum	Zeit	KZ	X [km]	Y [km]	Kurs [°]	Geschwindigkeit [kn]
12.03.2008	22:41:25	S5	+ 7.9725	+ 20.4975	85	2.4
		C9	+ 7.2450	+ 20.4075	126	7.9
12.03.2008	22:42:24	C9	+ 7.4250	+ 20.4450	89	6.2
		S5	+ 8.0400	+ 20.4825	104	2.2
12.03.2008	22:43:19	C9	+ 7.5750	+ 20.4150	101	5.5
		S5	+ 8.1038	+ 20.4713	95	2.7
12.03.2008	22:44:17	C9	+ 7.7175	+ 20.4038	95	5.2
		S5	+ 8.1788	+ 20.4600	103	2.5
12.03.2008	22:45:23	C9	+ 7.8938	+ 20.3738	101	5.7
		S5	+ 8.2125	+ 20.4188	146	1.8
12.03.2008	22:46:25	C9	+ 8.0850	+ 20.3250	105	6.3
		S5	+ 8.2463	+ 20.3475	150	2.5
12.03.2008	22:47:20	C9	+ 8.2238	+ 20.2538	109	6.1
		S5	+ 8.2538	+ 20.2875	158	2.4
12.03.2008	22:48:15	C9	+ 8.3588	+ 20.1938	111	5.9
		S5	+ 8.2500	+ 20.2463	168	2.0
12.03.2008	22:49:10	C9	+ 8.2988	+ 19.9763	193	8.4
		S5	+ 8.2500	+ 20.2163	158	0.2

Figure 22: Radarplot VTS Cuxhaven from 2241 to 2249, S5 = HOPE BAY, C9 = OCEANIC

Datum	Zeit	KZ	X [km]	Y [km]	Kurs [°]	Geschwindigkeit [kn]
12.03.2008	22:50:08	C9	+ 8.2688	+ 19.8338	194	4.3
		S5	+ 8.3175	+ 20.2425	77	2.9
12.03.2008	22:51:03	C9	+ 8.0625	+ 19.7663	260	9.2
		S5	+ 8.4038	+ 20.2538	84	3.0
12.03.2008	22:52:02	C9	+ 7.8750	+ 19.9350	327	8.2
		S5	+ 8.4263	+ 20.2650	25	1.1
12.03.2008	22:53:00	C9	+ 7.7738	+ 20.0475	307	4.7
		S5	+ 8.4300	+ 20.3138	7	2.0
12.03.2008	22:54:02	C9	+ 7.6275	+ 20.0475	270	4.9
		S5	+ 8.4225	+ 20.3700	356	1.7
12.03.2008	22:54:57	C9	+ 7.4775	+ 20.0513	272	5.4
		S5	+ 8.4300	+ 20.3813	35	0.6
12.03.2008	22:55:48	C9	+ 7.3575	+ 20.0475	270	4.6
		S5	+ 8.4413	+ 20.3550		0.0
12.03.2008	22:56:50	C9	+ 7.2375	+ 20.1150	308	5.2
		S5	+ 8.4863	+ 20.3138		0.0
12.03.2008	22:57:46	C9	+ 7.0950	+ 20.2013	298	6.1
		S5	+ 8.5050	+ 20.2763		0.0

Figure 23: Radarplot VTS Cuxhaven from 2250 to 2257, S5 = HOPE BAY, C9 = OCEANIC

From 2232 up to 2242 HOPE BAY drifted in north easterly direction. Her average speed in this time was 2,4 kts. At 2242 OCEANIC swung on an approaching course of approximately 103° and easily picked up speed. However, exactly at this time the drift direction of HOPE BAY changed. She started to drift in south easterly direction and thereby approached OCEANIC. Thereby the speed of HOPE BAY was almost constant. Due to the fact, that no course information of HOPE BAY was available to the BSU the situation is difficult to assess. Possibly HOPE BAY turned towards OCEANIC. The ship may also have maintained her position and only the drift direction changed. The latter would have complicated the assessment of the situation by the vessels command of OCEANIC.

HOPE BAY then dropped the starboard anchor at 2252.

EAR received initial information about the situation from the rescue cruiser HERMANN HELMS which was now at the scene. Later the reefer vessel reported that the hole in the fore peak of HOPE BAY was about 3.5 m above the water line.

In response to the unsuccessful attempts by OCEANIC, VTS Cuxhaven ordered MELLUM and NEUWERK to the “Außenelbe” roads shortly before the collision.

5.6.3 Further occurrences

At 2304 MELLUM called OCEANIC on VHF channel 10 and asked for information about the situation. Apparently it only now became known to one of the operation participants from the shipping administration that OCEANIC had been damaged by the collision too and was leaking diesel fuel oil. OCEANIC had only discussed this before with HERMANN HELMS, also on channel 10.
At this time MELLUM still needed an hour to the “Außenelbe” roads.

In view of the exchange of information between HERMANN HELMS and OCEANIC, although no urgency or special distress was formulated, the master of tug BUGSIER 14 decided at 2303 to proceed to OCEANIC together with the other two assistant tugs to help if necessary. They left their position at buoy 9 for this. The skipper of the rescue cruise considered this critically in view of the seas of 4 to 5 m. Also, the assistant tugs declared it unfeasible to tow HOPE BAY.

As drifting of the vessel could be stopped by dropping the second anchor, MELLUM did not establish any towing connection. HOPE BAY kept her anchoring position up to the start of towing by BUGSIER 3 the next day.

5.7 OCEANIC

OCEANIC was first inspected by a staff member of BSU on 13 March 2008. A further survey was held on 18 March 2009. The equipment and the towing gear were inspected too.
The ocean tug OCEANIC was built for operating independently and towing voyages lasting several days. The tug has two towing winches, each with about 1600 m towing wire. First a 200 m long, 3.5 cm thick polypropylene line is attached to the line of the line shooting device. This is used to transfer the towing gear to the vessel to be towed with the aid of a winch. On OCEANIC a 200 m long Dyneema line is used as fore runner of the towing wire.
The German Federal Waterways and Shipping Administration has had the OCEANIC on charter as an emergency tug since 1996. The permanent sea position is north of the island of Norderney. The charter rate is independent of use of the tug.

The tug has a forward and an aft bridge. The aft bridge is used when establishing a towing connection. The master manoeuvres the tug close to the disabled vessel and proceeds to the aft bridge to manoeuvre the direct approach from there. The door to door distance to the aft bridge is approx. 21 m.

5.7.1 Manoeuvre stations

With the start of the manoeuvre at 2051 on 12 March 2008 the master took over the command and proceeded to the aft bridge together with one of the two Chief

Engineers. The Officer on watch remained on the forward bridge. This division was retained for the first approach. The master operated the helm and engine control lever and the internal communications on the aft bridge. The engineer was to operate the winches.

Figure 24: OCEANIC, looking aft to the aft bridge

The view to the towing deck is greatly restricted by the deck crane in its stowage position.
The port tow wire was to be used for the HOPE BAY operation. The engineer had taken up position for this on the port side of the winch control console. Thus only the master had direct access to the VHF radio set installed on the starboard side.

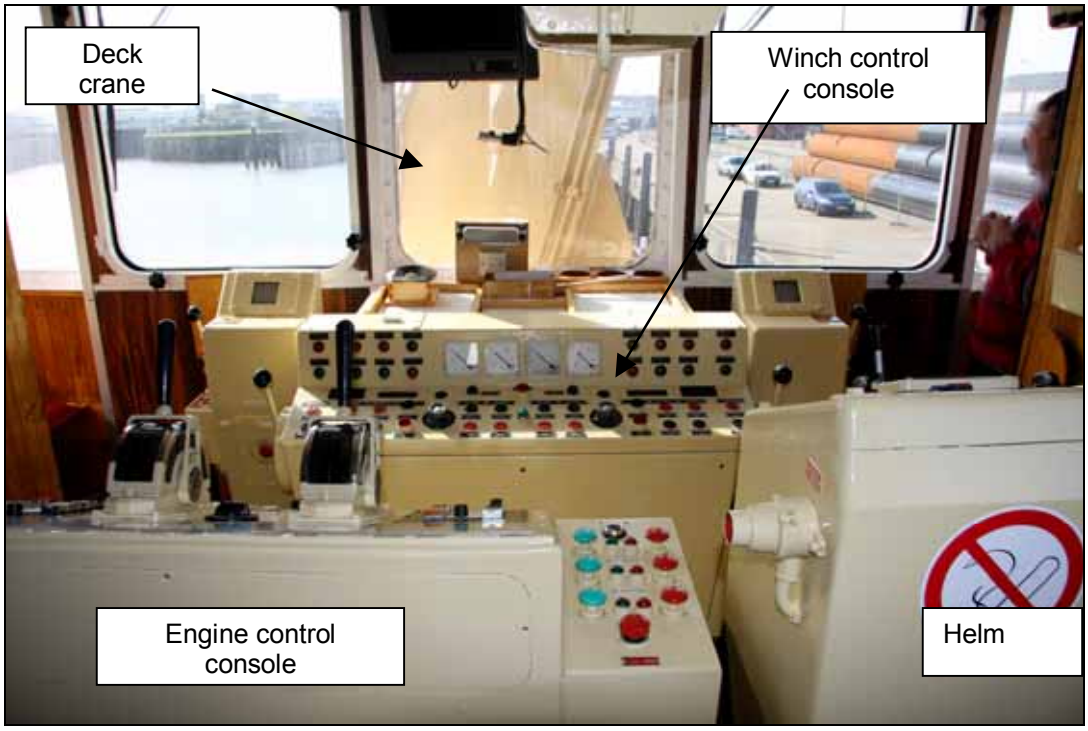

Figure 25: OCEANIC, looking aft in the aft bridge

Figure 26: Aft bridge; looking aft from the conning position

Nine crew members were assigned on the tow deck. They were under the command of one officer. During the approach of the tug to the disabled vessel the deck crew sought protection in the winch house. They also repeatedly withdrew here during periods between operation.

The deck crew was equipped with immersion/anti-exposure suits. As they had pulled on the attached hoods during the operation they were not wearing protective helmets. Only the responsible officer was wearing a helmet, as his helmet was equipped with a talk-listen set. Separate safety belts were worn over the suits.

Figure 27: Immersion/anti-exposure suit

Figure 28: Protective helmet with talk-listen set

After the first approach the Officer on watch on the forward bridge was relieved by another officer and also proceeded to the aft bridge where he took over the helm.

The officer on the forward bridge was responsible for communications between the tug and others. He also operated the search light on the respective approach side using a remote control. He was to mark the position of the anchor chain in this way.

5.7.2 Communication of the tug with others

The communication with others only took place from the forward bridge. The officer had three VHF sets available for this. VHF channel 10 was used for agreements with HOPE BAY, channel 19 for communication with Elbe Approach East Radar and channel 71 for the communication with Cuxhaven Elbe Traffic. The VHF sets used are relatively far apart from each other. The set marked number 3 in figure 23 is awkward to reach as it is mounted in such a way that it is available to the user of radar no. 2. Radar no. 2 is not to be observed from the wheelhouse of the forward bridge and the electronic chart is only restrictedly to be observed (see figure 24). The actual access to the two is via the chart room.

There is only one fixed installed VHF set on the aft bridge.

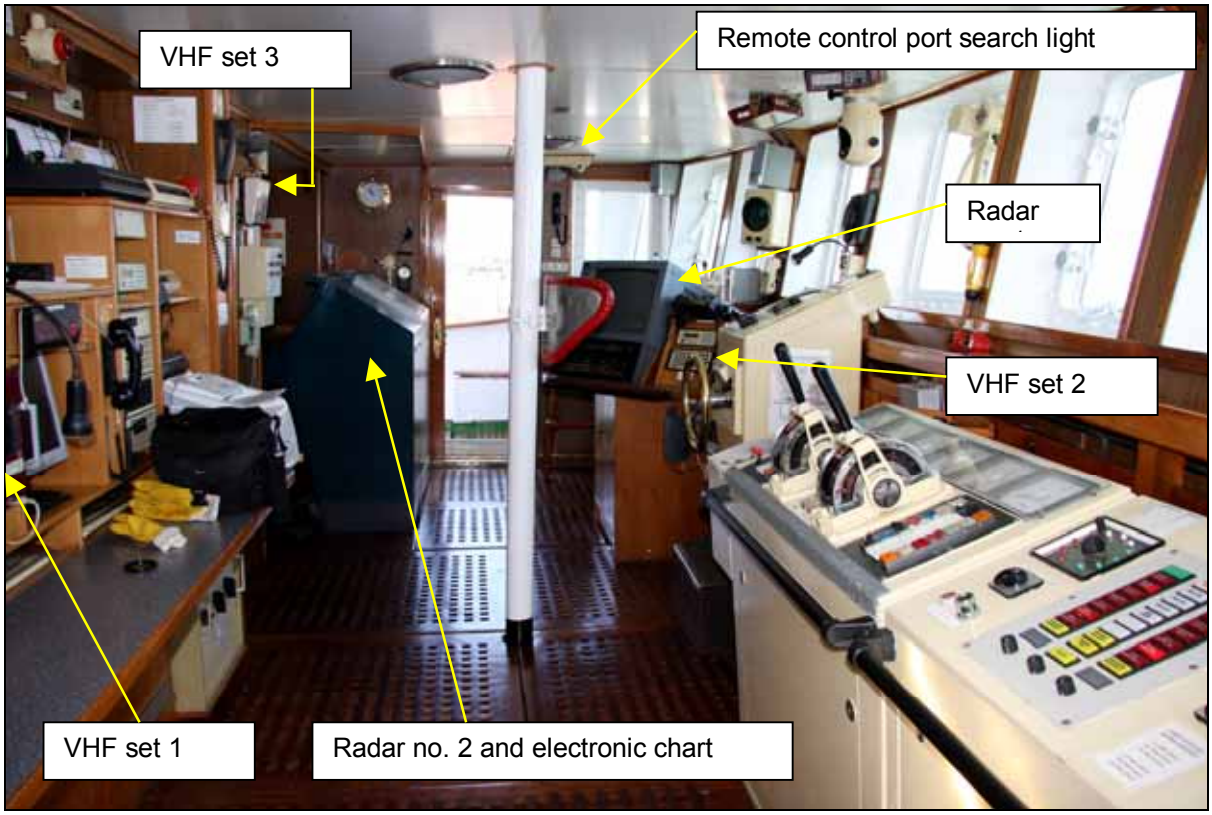

Figure 29: Forward bridge of OCEANIC

Figure 30: Radar no. 2 and electronic chart

5.7.3 Communication on board the tug

The communication among the tug crew was carried out on VHF channel 10, mainly with portable equipment. Ship's telephone and intercom system were also available for exchanges between forward and aft bridge. No statements were made about how far this equipment was used. Apparently VHF channel 10 was also mainly used for the agreements between forward and aft bridge.

5.7.4 Training

Thanks to the encouraging circumstance that there have been only few real operations on the German North Sea coast in recent years, the crew of OCEANIC has to rely on the exercises/drills organised by the Central Command for Maritime Emergencies. The vessel and crew have performed well in these. Owing to the costs and the need for an operator to make an exercise vessel available, on average only one exercise a year takes place.

5.8 Collision OCEANIC – JOSEF MÖBIUS

5.8.1 JOSEF MÖBIUS

The two main engines of the suction dredger work each
with a controllable pitch propeller. The bridge was equipped with usual instruments and equipment.

5.8.2 Manoeuvre data of OCEANIC

The manoeuvre data were available for the investigation in the form of the wheelhouse poster. However, they were only partially useful as they referred to manoeuvres at full speed, but up to the collision with JOSEF MÖBIUS the OCEANIC was only proceeding at a speed of at most 7.5 kts over ground. Furthermore the weehlhouse poster compares the turning circles for the control lever setting both "Full Ahead" with the control lever setting port "Full Ahead" and starboard "Stop". At the relevant time the starboard propulsion was set to "Full Astern".

5.8.3 VDR evaluation

After the collision with JOSEF MÖBIUS an emergency backup was carried out on board OCEANIC. The data were subsequently saved by a technician of the manufacturer and made available to the BSU. The data for the period from 2045 to 2059 were handed over.
It should be noted that the unit is a Simplified Voyage Data Recorder. The specification therefore contains no obligation to record engine and rudder data.

The pilot was already on board at the time when the recording period made available to the BSU starts.
To ensure legibility the rudder commands, response and confirmation of execution, rate of turn, speed of the tug and distance from JOSEF MÖBIUS are reproduced in expedient order below. The distinction between the actors was difficult in places. The abbreviations used have the following meanings:

- O – OCEANIC,
- JM – JOSEF MÖBIUS,
- K – Master,
- L – Pilot,

R – Helmsman,
SoG – Speed over ground of OCEANIC in [kts],
ROT – Rate of Turn of OCEANIC [°/min], where "+" = to starboard,
d – Distance from JOSEF MÖBIUS in [nm]

204613	O	K	*"Cast one off!"*
204652	O	L	"*JOSEF MÖBIUS – OCEANIC"*
	JM		"*Hearing you, good evening."*
	O	L	*"Yes, good evening. ... We want to leave Amerikahafen now for the sea. How far upstream are you going to travel?*"
	JM		*"In principle I am staying in my position. I am dredging. I am working*."
	O	L	"*OK. Good*. *Ok. Then afterwards I'll leave her free on port. (cannot be understood) outside then, ok. All clear. Thanks. Good watch."*
204815	O	K	"*(...) can put everything away up to the aft spring!*"

After this the pilot goes to the master, who is evidently in the wing, and informs him of his exchange with JOSEF MÖBIUS.

2050 The pilot of OCEANIC agrees with the pilot of JANA that the OCEANIC will leave Amerikahafen first and JANA will then come in.

O K "*All away!"*

2051 The pilot informs the master of OCEANIC about his agreement with JANA.

2052 The master informs Cuxhaven Port about the tug casting off.

205319	O	L	"*I just (cannot be understood) the dredger. A second. That doesn't get us anywhere."*
			"*Dredger MÖBIUS. You are now moving further upstream, aren't you?"*
	JM		"*Yes. I'm staying in position. Have a speed of 0.8 kts. Staying in position*."

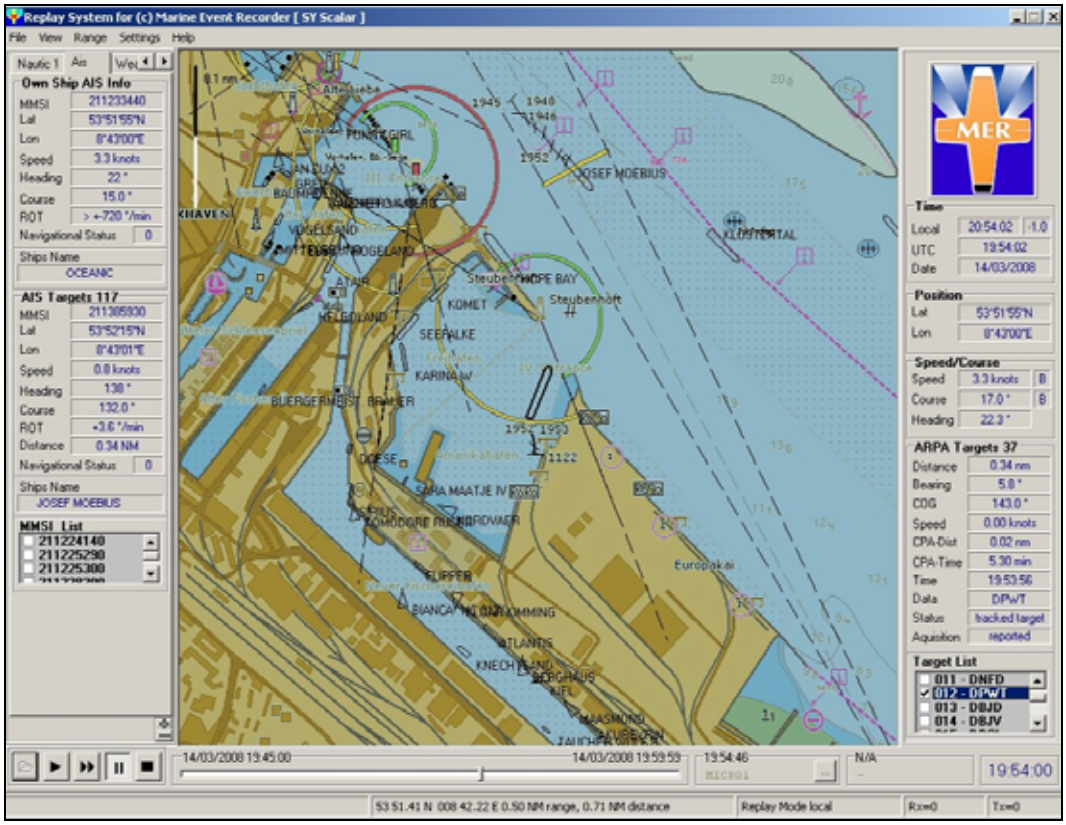

Figure 31: Image from VDR replay of OCEANIC, time 205402

205417 Agreement between master and pilot about speed set. The pilot recommends going from ”Slow ahead” to “Half ahead”.

205425	O	L	“*Starboard 10!*” ROT: +0.5 SoG: 3.4 ROT: +1.5 (max. value after previous command)
205435	O	L	“*Starboard 20!*” ROT: +5.0
205442	O	R	*“Rudder is at starboard 20.”*
205444			ROT. +14.7 (max. value after previous command)
205445	O	L	*“Midship!”* ROT: +18.5 SoG: 4.9
205452			ROT: +26.6 (max. value after previous command)
205453	O	R	*“Rudder is at midship.”*
205500	O	K	“*Well, she’s coming closer to us here.”* ROT: +7.4 SoG: 5.7
		L	*“Starboard 20!”*
		L	*“Let’s go full.”*

205504 O L *"Starboard 20!"*
ROT: -18.7 SoG: 6.0

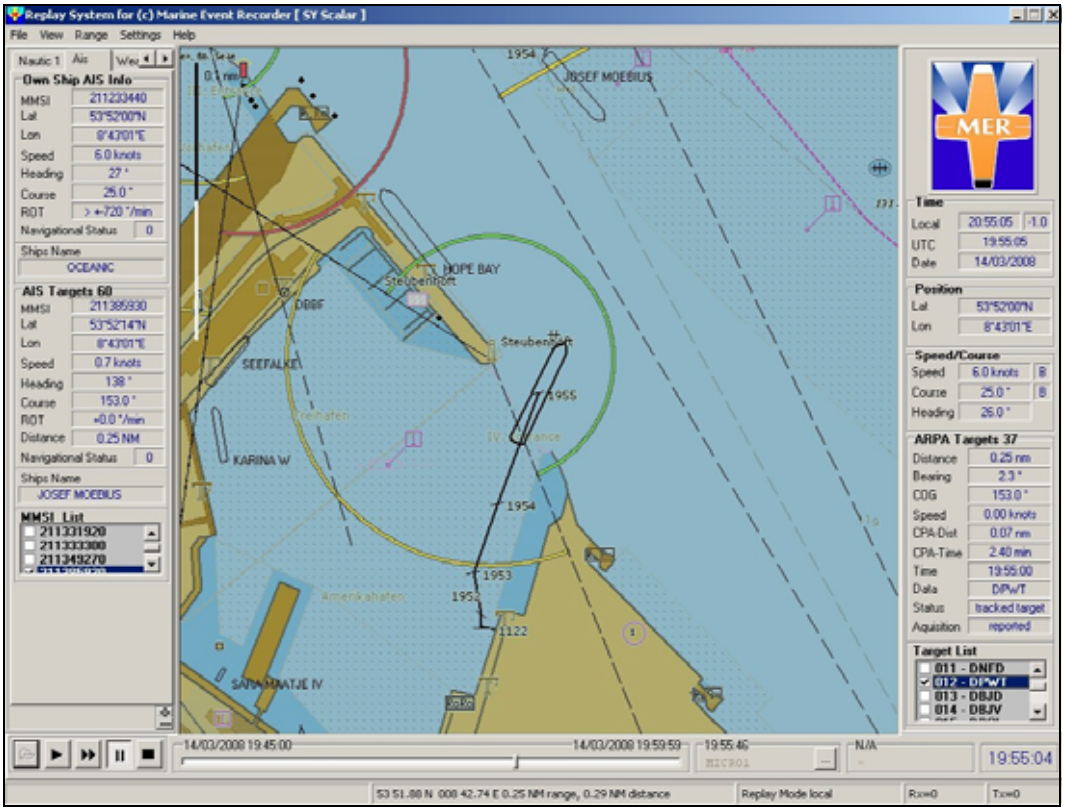

Figure 32: Image from VDR replay of OCEANIC, time 205505

205506 O K *"Shall we go round in front of her?"*
R *"Rudder is starboard 20."*
ROT: -30.0

205510 O K *"Do you want to round in front of her?"*
ROT: -33.0 SoG: 6.5
K *"Isn't that right?"*

205512 O L "*Yes, we can do too. No. But OK, then we'll go round in front of her."*
ROT: -30.2 SoG. 6.6 d: 0.24

205514 O L *"Hard to Port!"*
ROT: -15.3 SoG: 6.9
L (?) *"Although that's now not (cannot be understood)."*
K *"I'm going astern now."*
L *"No, midship!"*
R *"Midship"*
ROT: +14.7 SoG: 7.3 d: 0.22

205525 O R *"Rudder is midship."*

205526	O	L	*"I had first thought we were going. Hard to starboard!"*
		R	*"Hard to Starboard."*
			ROT: +19.9 SoG: 7.3 d: 0.21
		L	*"Full ahead"*
			ROT: +22.3 SoG: 7.4
205534	O	K	"*Is the (colloquial) free on the side?"*
			ROT: +15,0 SoG: 7,4 d: 0,17
		?	*"Yes, she is free."*
205540	O	R	*"Rudder is hard to starboard"*
			ROT: +15.3 SoG: 7.2
		L	*"Yes, good. Full ahead."*
			ROT: +15.6
205547	O	K	*"She's turning incredibly slowly here."*
			ROT: +24.6 SoG: 7.5 d: 0.16
205549	O	L	*"(cannot be understood). But is Ok, we are coming, there's nothing in the way there."*
			ROT: +36.8 SoG: 7.3 d: 0.14

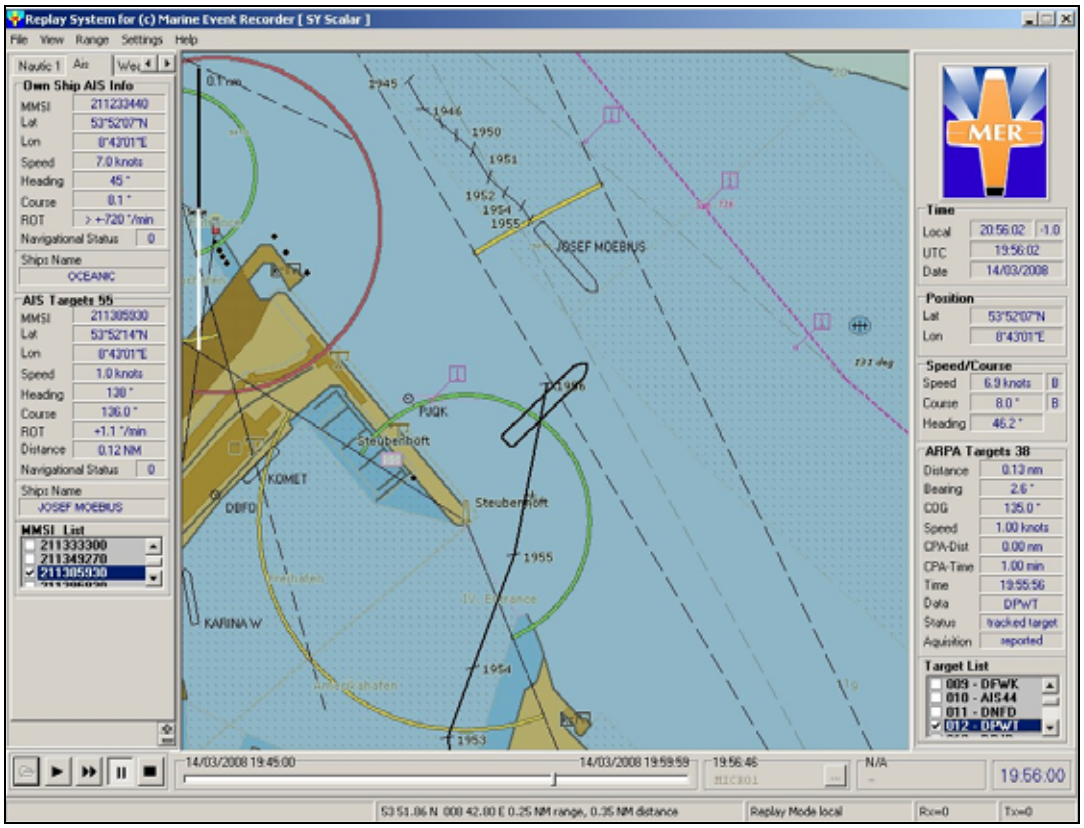

Figure 33: Image from VDR replay of OCEANIC, time 205602

205602	O	L	*"No, go Full. Full, Full."*
			ROT: +53.3 SoG: 6.9 d. 0.13
205604	O	L	*"Midship!"*

205608	O	L	*"Hard to port!""*
			ROT: +55.4 SoG: 6.8 d: 0.12
		R	*"Hard to port."*
			ROT: +57.7
205617			ROT: +60.5 (max. value after previous command)
205622	O	R	*"Rudder lies hard to port."*
		K	*"Yes."*
			ROT: +50.6 SoG: 6.0 d: 0.09
205626	JM		*"What the (colloquial) is happening?"*
			ROT: +39.0 SoG: 5.9
205630	O	K	*"Midship!"*
			ROT: +17.2 SoG: 5.8
205640	O	K	*"Hard to port!"*
			ROT: +31.9 SoG: 6.1 d: 0.06

20.5649 Collision of the two vessels, course of JOSEF MÖBIUS =144°; Course over ground of OCEANIC = 35°, Heading = 57.5°

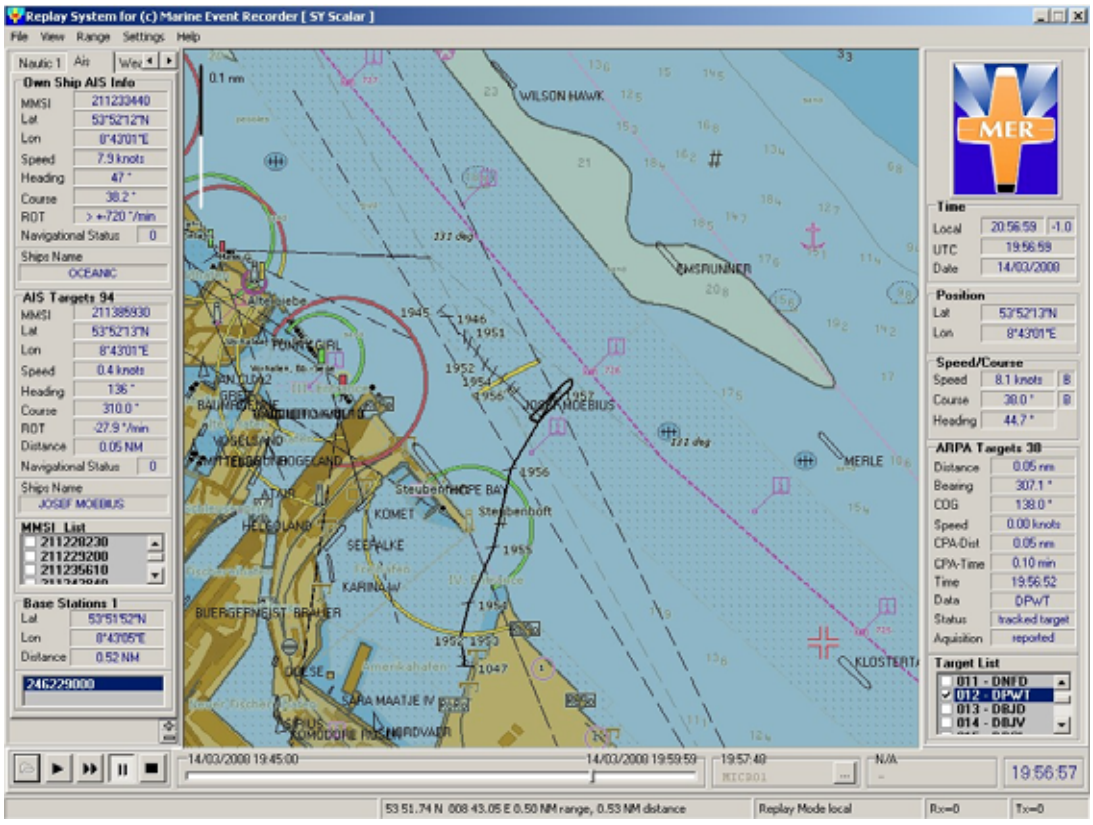

Figure 34: Image from VDR replay of OCEANIC, time 205659

205707 JOSEF MÖBIUS reports the collision to Cuxhaven Elbe Traffic.

6 Analysis

6.1 Engine failure and collision with buoy 90

The engine failure on the Elbe was unforeseeable for the crew of HOPE BAY. When the vessel command and the pilot recognised that some time would pass before the main engine was available again, they anchored. They had no influence on the selection of the anchoring position close to buoy 90 as in the meantime the vessel had drifted to the vicinity of the buoy. In the opinion of the BSU the anchoring position was thus forced on them and was then also the cause of the contact with and warping of buoy 90.

Two aspects of the collision are, however, considerable. On the one hand the unexpected speeding up of the main engine to “full ahead” after the repair, on the other hand the statement by the vessel command that the cause of the failure of the main engine was a fault in the automatic control.

The fact that it was not a fault in the automatic control was discussed already under section 5.4.
In the expert opinion commissioned by the BSU also the following conclusions are drawn from the damage ascertained:
“In the present case the vessel would not necessarily have had to discontinue the voyage, but instead to interrupt it and carry out one of the following measures described in the manuals:

1. *Continuation of the emergency anchoring, removal of the piston and assembly of the reserve drive consisting of piston with piston rings and cylinder bushing, or*
2. *dismantling of the connecting rod bearing and placing of the piston on a stopper that is to be inserted for this purpose in a corresponding opening in the slide way of the cross-head and stops the disabled piston near the upper dead point position and switching off of the injection pump using the facility pre-installed for this.*

After performing the measures listed under 1., the engine would have been available again with unrestricted performance and availability (manoeuvrability). However, after performance of the measures described under 2. only restricted operation with reduced engine rating and availability would have been possible.

Under no circumstances should the vessel have continued the voyage without carrying out one of the two measures described.”

The expert describes the structure and mode of operation of the alarm and safety system on each main engine. According to the corresponding regulation[31] *“(...) an automatic intervention in the ship or engine operation is to be displayed acoustically and optically on the bridge and the staff on watch on the bridge are to be informed of the change in the operating mode of the vessel and restricted availability of the engine system,(...)”*

[31] Classification rules and guidelines of Germanischer Lloyd I Part 1 Chapters 2 and 4

The various alarms and urgency statuses can be seen on the alarm panel and thus offer the vessel command the opportunity to act accordingly.

About 20 minutes after the stoppage of the main engine, after a certain cooling phase the engine was available again and the anchor was hoisted. The fact that evidently none of the measures described above were carried out in this period, as there would not have been sufficient time for this, is obvious from the following paragraph in the expert opinion:
"*It is described in detail in all operating manuals what measures are to be taken after the safety system is triggered. These include in particular opening the engine after the temperature has cooled down including an additional safety margin in time (generally 15 to 20 minutes) and subsequent checking of the pistons affected through the inspection flaps provided at the forward edge of the engine, where applicable also via the scavenging air receiver. It is warned expressly against*

- *opening the engine too early because of the danger of ignitable gas mixtures forming through the outer air infiltrating and ignition on hot machine parts,*
- *starting up the engine again without checking and where applicable eliminating the fault."*

If the vessel command would had decided on a repair, then the following matters should have been considered in co-operation with pilot and Vessel Traffic Service:

- Duration of the repair in the case of a provisional or final repair,
- Possibility of continuing the emergency anchoring at the same place,
- Use of a tug to keep the vessel in line with the fairway there,
- Shifting of the vessel to another anchorage or roads,
- Voyage there under own power or with tug assistance.

However, none of the possibilities listed were discussed with the pilot, but instead the vessel continued her voyage.

The further operation not only risked a total failure of the main engine. In addition a considerable risk for the vessel was accepted, as she was still on the Elbe for a long time and thus in waters that were navigationally demanding. In view of the weather to be expected on the North Sea the risk would not have been reduced after leaving the Elbe.

However, an increased risk was even accepted for the engine crew:
"Both a high temperature in the scavenging air receiver as a consequence of blow by and a high oil mist concentration in the crankcase represent a high danger for the vessel's operation since as a result violent oil fires that are difficult to control can be caused in the scavenging air receiver or detonations in the crankcase with explosive release of high energy."

There was no reason for VTS Brunsbüttel to doubt the statement regarding the cause of the engine failure issued by the vessel command of HOPE BAY. The vessel started up again after a relatively short period and passed through its area of responsibility without further irregularities.
At least no irregular course of the voyage is evident from the radar recordings handed over.

6.2 Emergency anchoring German Bight

6.2.1 Measures by WSV

The renewed failure of the main engine of HOPE BAY on 12 March 2008 at about 1020 occurred in the area of responsibility of VTS Wilhelmshaven. Due to the high drift speed the VTS recommended dropping an anchor to adjust to the situation. This initially proved to be an effective measure.

The investigators were unable to ascertain from the documents handed over whether the officers on watch at VTS had taken into account the considerations on the effects of wind direction and strength and current direction and strength on the possible drift speed and direction of the vessel as set out by the BSU under section 5.5.2 and whether certain measures such as informing others or the specification of limits of action resulted from this.

When HOPE BAY reached the “Außenelbe” roads at about 1800 , however, a certain alert level was evidently reached. First of all the distance to the 10 m depth contour was now only 5.5 nm, secondly the disabled vessel was leaving the area of responsibility, and thirdly the vessel command of HOPE BAY had just before announced that a further one to two hours could pass before the repair was completed. Admittedly the master subsequently said that work would be completed by 1900 . However, the vessel command did not state the reason for the repair and VTS did not ask about this.

The MELLUM was still in the direct vicinity of the disabled vessel, but despite this VTS Wilhelmshaven decided at this time to call for the tug OCEANIC.
Several aspects may be mentioned to assess this decision:

- At the time of the request the OCEANIC was 33 nm away. She would have reached the 1800 position of the disabled vessel at about 2021 .
- From 1631 to 1800 the disabled vessel drifted at a speed of approx. 0.9 kts. Assuming a constant speed HOPE BAY would have been approx. 3 nm away from the 10 m depth contour of Großer Vogelsand at 2100. Then OCEANIC would have reached her too.
- On the one hand the tidal current was to run further to the west with constant strength up to 2100, but on the other hand the wind from W-NW was continuing to increase. This did not rule out the drift speed of HOPE BAY being maintained.

If OCEANIC was to be assigned instead of MELLUM, then the consideration of the points listed allows the conclusion that OCEANIC was apparently called for too late. In particular if firstly it is assumed that HOPE BAY might not have had the main engine running again at 1900 and secondly the weather conditions were to deteriorate in the course of the evening.

Not least the assignment of OCEANIC cannot be understood in itself at first by the investigators. With MELLUM a vessel that was also to be used as an emergency tug and that had already proved its suitability (see point 5.2.2.1) had been in the direct vicinity of the disabled vessel since 1150. Moreover, the most westerly storm position then remained unmanned for a long time. When in the course of the night of 12 to 13 March 2008 NAVKIOS represented a further disabled vessel in German waters, off

Norderney and thus in the most westerly storm position area, the emergency towing capacity planned for there had been called away.

The argument of redundancy, in other words calling for a second tug for safeguarding, does not hold as on the one hand at the time of arrival of OCEANIC MELLUM had been dispatched to its storm position, and on the other hand NEUWERK would have had a much shorter way than the OCEANIC, and thirdly the situation was in fact not yet so dangerous as HOPE BAY had not yet dropped her second anchor in order to slow down or even stop the drifting.

In the statement to the draft report the shipping administration claimed that tactical considerations led to the decision. Amongst others it was quoted that OCEANIC was more suitable for assignments in shallow water areas because of her sturdy design. Those areas pose a risk of running aground in ground seas. This reasoning was comprehensible in the opinion of the investigators.

The BSU considers the request to the vessel command of HOPE BAY to proceed to the west first after hoisting the anchor as positive. This made it possible to enlarge the distance from the shallows of the Elbe estuary.

However, it is not possible to completely understand the decision to allow HOPE BAY to enter with assistance tug. In particular not under the condition that a tow connection was in fact to be established at the Elbe buoy, i.e. that the assistant tugs were not simply to run alongside. Admittedly VTS Cuxhaven had still reported 6 Bft at the Elbe approach in its situation report at 1837 , but already one hour later 8 Bft were reported and the pilot boat position had been withdrawn to buoy 25 because of the prevailing wind and sea conditions, so that this was approx. 20 nm further upstream on the Elbe. The wind and sea conditions would have made it impossible for the assistant tugs ordered to establish any line connection in the vicinity of the Elbe buoy (see point 5.5.2, 1953 – discussion between VTS Cuxhaven and the tug BUGSIER 14).
However, if VTS had not intended a tow connection to be actually established at Elbe buoy, then HOPE BAY would have had to sail very far into the Elbe with simple tug escort in order to allow the assistant tugs to work safely. In the opinion of the BSU this would have represented a risk under the given circumstances, as the manoeuvring area for the assistant tugs was reduced upstream on the Elbe to approx. 1 nm between the 10-m depth contours at the buoys 13/14 and 0.5 nm at the buoys 15/NL 4. In addition this would have suspended the shipping police order to accept tugs at Elbe buoy issued at 1845 without any comment and without any obvious change in the situation as far as the investigators could see.

Given the two assumptions made above, in other words establishing a tow connection, yes or no, the timing of measures by Vessel Traffic Services is also to be considered critically. HOPE BAY had Elbe buoy abeam on the port side at about 2030 and sailed into the Elbe. At this time the meeting with the assistant tugs was to take place. However, the tugs could only reach “Neuwerk” roads at the earliest at about 2210. From there it is approx. 13 nm to the Elbe buoy, i.e. the assistant tugs would have been able to reach the meeting point Elbe buoy at about 2400. However, this time was not notified to the vessel command of HOPE BAY in order to give them the opportunity to adjust their behaviour to this, nor did VTS Cuxhaven react, as it did

not interrupt proceeding towards the Elbe buoy. Like this it appears as if the further course was not completely clear at the time when the instruction were given by the Vessel Traffic Service.
If HOPE BAY had continued to sail without assistant tugs, then at an assumed speed of 7 kts, she would have met the tugs at “Neuwerk” roads at about 2230 .

With regard to the environmental conditions, establishing a tow connection at the Elbe buoy would in fact only have been possible for a large salvage tug. However, no such commercial salvage tug, acceptance of which could have been enforced by a shipping police order within the framework of averting danger, was available. The shipping administration could thus only rely on one of the emergency tugs. According to the statement of the shipping administration “emergency towing” allows for accompanying a damaged ship with a towing connection loosely established as well as the active towing into a safe port. However, in the case investigated it was refrained from establishing a line connection.
This led to the situation that OCEANIC only escorted HOPE BAY and had to trust in the vessel’s engine not to fail.
This escort operation too is to be considered under the aspect that because of the narrowing of the fairway upstream in the Elbe OCEANIC would have had to react particularly quickly in the event of engine failure on HOPE BAY with ever decreasing available space for manoeuvring.

Thus there were two alternatives for the shipping administration. On the one hand it could have refused the entering for reasons of averting danger, as the main engine of HOPE BAY was not running in stable manner up to the repair. If HOPE BAY had then drifted at anchor at “Außenelbe” roads, one of the emergency tugs could have been assigned as the conditions for emergency towing would then have existed. Or even an emergency tug might have established a line connection without drifting of HOPE BAY, as a preventive measure, due to the weather development. On the other hand, it would have been possible to allow HOPE BAY to enter on the assumption that the vessel would reach her destination Cuxhaven without problems or that the escorting OCEANIC could master any problems arising. Both alternatives would have required corresponding procurement of information as a basis for a decision.

There is neither any indication of enquiries about the cause of the engine failure on HOPE BAY nor any consideration of the statement by the vessel command in the records handed over by the Vessel Traffic Services Wilhelmshaven and Cuxhaven. Nor is there any indication of enquiries made of the vessel command of HOPE BAY about the degree of probability with which they assumed stable operation of the main engine when the vessel continued her voyage after repair at about 1900. Insofar it must be assumed that the original statement by the vessel command about a problem with the automatic control was accepted unchecked and thus led to the situation being rendered more harmless. The faulty statement by the vessel command ultimately led to an unfavourable reaction by the responsible bodies on shore.

The transfer of responsibility, that in the opinion of VTS Cuxhaven occurred at 1901, is not documented in any activity record. The transfer was not expressed to the vessel and could only be suspected by the vessel command when Elbe Approach East Radar began to guide the vessel into the Elbe estuary at 1949.

6.2.2 Communication

6.2.2.1 Communication with HOPE BAY

During entering the Elbe, communication with HOPE BAY was carried out almost exclusively by the radar pilots of Elbe Approach East Radar. The vessel command of HOPE BAY followed the recommendations of the radar pilot unrestrictedly. Guiding the vessel by a single contact partner was certainly a suitable procedure of a long period. From a certain point, which in the opinion of the investigators occurred at the latest at the time the second anchor was dropped at 2240 , the VTS centre should have taken over the leadership in the discussions with HOPE BAY. Even then the graduated possibilities of traffic support and traffic regulation would have been available. The fact that the master no longer considered these to be recommendations of a pilot is shown by the quotation from 2241 in which the master speaks of an “instruction received”.

It was noticed altogether during the investigation that the communication with the vessel deviated strongly from the recommendations of the IMO standard phrases, in particular when specific behaviour by the vessel command of HOPE BAY was to be achieved.

It is possible that movement tendencies of HOPE BAY were only difficult for the radar pilot to realise due to the low speed of the disabled vessel, as OCEANIC was asked about this, though the vessel itself was still at a relatively long distance away at this time. Evidently the radar pilot did not have any AIS information of HOPE BAY available at his workplace as he would have been able to easily read out the heading and speed from this.

6.2.2.2 Communication within the WSV and the vessel deployed

Communication between the Vessel Traffic Services and the vessels deployed was partly insufficient in the case investigated and did not comply with the regulations. Thus, the inadequate exchange of information obtained and intentions between the Vessel Traffic Services led to the problems and discrepancies described. Moreover, also the exchange of information with the vessels deployed was partly insufficient. For instance the discussion between OCEANIC and VTS Cuxhaven conducted at 2020[32] indicates that the tug had been sent off on an assignment, but was evidently only insufficiently informed about what this was. It cannot be understood that CET, after VTS Cuxhaven had assumed command for the operation for more than an hour, first referred the tug to VTS Wilhelmshaven. The overall impression is not improved by the hint that information should then be obtained from the radar pilot. In the opinion of the investigators, in fact, that specifically was the task of the VTS. MELLUM eventually joined in to assist.

The vessel command of MELLUM was convincing in another situation too. At 2252 it was clear to the vessel command of OCEANIC that the collision with HOPE BAY had caused a water ingress to the tug. However, OCEANIC did not report this circumstance to the operation command, nor did VTS ask about this. Thus although MELLUM was still approx. one hour away at this time, it was her who asked for a situation report at 2304 and thus responded to the radio traffic between OCEANIC

[32] section 5.5.2

and HERMANN HELMS that started after the collision and in which the damage to the tug was a topic.

6.2.2.3 Communication on the OCEANIC

The necessary division of the vessel command between the forward and aft bridge required by the construction of OCEANIC resulted in transmission losses in the view of the BSU. In particular when the master was on the aft bridge, which is always the case when approaching to establish a tow connection, he apparently did not always have all information available. Thus the investigators had the impression that the call of the radar pilot to HOPE BAY, sent after dropping the first anchor, that she should keep the main engine running was not noted. Only through this could OCEANIC have been surprised that HOPE BAY moved forward during the approach manoeuvre to hand over the tow line and subsequently collided with OCEANIC. And the investigators also attribute the next approach manoeuvre, taking place while the second anchor was being dropped, to this. The master of HOPE BAY tried several times to draw the attention of OCEANIC to his intention to drop an anchor. However, this did not lead to the approach being discontinued by OCEANIC. The anchor was then only dropped after the collision.

Insofar the situation was evidently partially unclear for the officer responsible for the communication. Thus for example at 2122 EAR discussed the further action to be taken with HOPE BAY and two minutes later OCEANIC asked EAR once again on the same VHF channel what intentions the disabled vessel now had. This was caused by excessive strain on the officer, as in addition to maintaining communications he was also operating the moveable search lights.

6.3 Collision HOPE BAY - OCEANIC

The collision between the two vessels occurred under extremely difficult wind and sea conditions. To establish the tow connection the tug had to be manoeuvred in the direct vicinity of the disabled vessel. The fact that in such manoeuvres, in particular under these circumstances, contact can happen between two vessels is part of the existing risk.

The vessel command of OCEANIC observed an unforeseeable forward movement of HOPE BAY before the severe collision. As there are no engine data of HOPE BAY available, it is not possible to make any statements on the constancy of operation. The drift speeds taken from the radar plot do not give any further information for the time of the severe collision. It is more likely that the change in the drift direction of HOPE BAY was observed as an approach by OCEANIC.

The head injury sustained by one of the crew members on OCEANIC could have been avoided if all crew members working on the tow deck had worn helmets. In this context reference is made to the BSU Investigation Report 637/06[33].

6.4 Collision OCEANIC – JOSEF MÖBIUS

The vessel command and pilot of OCEANIC had seen the dredging JOSEF MÖBIUS clearly. There was an agreement with the dredger that OCEANIC would leave JOSEF MÖBIUS on here port side. The dredger did not deviate from the announced

[33] www.bsu-bund.de, AZ.: 637/06 – CAP EGMONT

behaviour and as agreed moved upstream on the Elbe at a speed of 0.8 kts. However, in the opinion of BSU the information supplied by the master of the dredger ("I will remain in position. Have a speed of 0.*8 kts*[34].") was contradictory in this situation. From the time of communication with OCEANIC up to the collision that occurred 9 minutes later the dredger made approx. 1.3 cables and thus reduced the in any case scarce room for manoeuvre for OCEANIC. At the time of passing the exit from Amerikahafen the bow of the dredger was still approx. 0.8 cables downstream of the southern boundary of Steubenhöft, so that the exit was not blocked by the dredger. The side distance between the dredger and the Steubenhöft wharf facility was approx. 1.7 cables.

OCEANIC had to give way to JOSEF MÖBIUS as
a) according to Rule 18 a) COLREG[35] she had to give way to a vessel with restricted manoeuvrability and
b) according to § 25 Para. 2 German Traffic Regulations for Navigable Waterways[36], as a vessel entering the fairway, she had to give way to a vessel following the course of the fairway.

Although the master and pilot reportedly discussed the necessary manoeuvres and the pilot subsequently informed the master of OCEANIC about his agreement with JOSEF MÖBIUS, in the course of leaving the port there was evidently a deviation in the appraisal of the situation and the resulting further procedure. The master expected an alteration of course to starboard as agreed after passing the exit. The pilot evidently now wanted to leave the dredger on the starboard side, in other words to turn to port. The reason for this could have been the approaching dredger, but also the behaviour of the tug deviating from expectations, as under the influence of the possibly underestimated ebb current she did not turn to starboard as intended. This is confirmed on the one hand by his statement, but on the other hand can also be read off on the contradictory recommendations regarding the rudder to be applied. No understanding was reached about the new appraisal of the situation.
In the opinion of the BSU it would have been necessary to turn hard to starboard already in the exit but this was not achieved with the rudder command "starboard 20" and at 205445 was even rendered impossible with the rudder command "rudder amidship". The OCEANIC herself was caught completely by the ebb current during the exit and despite the initial rudder command "starboard 20" she turned to port. The very fast turn to starboard that would have been necessary at 205512 after clarifying the misunderstanding was prevented by the "hard to port" recommendation first issued by the pilot. The actually necessary turning at a rate of turn of at least 90°/min after passing the exit was thus never achieved.

There were evidently differences of opinion about the pitch to be applied for the two variable pitch propellers. The pilot always recommended the speeds for both propellers at the same time. The master deviated from this, but did not inform the pilot. To what extent the position of the control levers preferred by the master (port

[34] Speed over ground
[35] Convention on the International Regulations for Preventing Collisions at Sea
[36] German Traffic Regulations for Navigable Waterways – Seeschifffahrtsstraßen-Ordnung (SeeSchStrO)

"full ahead", starboard "full astern") did in fact lead to improvement of the turning behaviour could not be examined during the investigation.

It remains unanswered why the vessel command, on recognising the slow turning of OCEANIC, did not use the bow thruster as support; which, according to the bridge poster, at least would have been possible.

To summarise it can be established that during the exit of the OCEANIC from Amerikahafen the co-operation within the bridge team, the co-ordination between master and pilot, was inadequate. Intentions and activities were not mutually exchanged to a sufficient extent. Thus the OCEANIC manoeuvred into a position that could only have been solved by a straight "full astern" manoeuvre. The master of the tug started this but not to full extent.

The hoisting of the dredging gear and initiating of a "full astern" manoeuvre by JOSEF MÖBIUS realising the risk of collision was in line with the possibilities and was appropriate. However, the measures did not achieve to prevent the collision.

The incident highlights that, although it can be assumed that OCEANIC as a tug manoeuvres quite well, she does not have the manoeuvring characteristics of a modern tug counteracting current effects at a slow speed. This is due to her original intended purpose as ocean tug for transfer voyages. This circumstance is, however, important in the consideration of the collision between HOPE BAY and OCEANIC. The approaches to establish a towing connection always have to be made as slow speed. In the case under consideration here the tug was heavily influenced by current and wind. It must be derived from this that when OCEANIC is assigned as an emergency tug and the weather is set to deteriorate, this tug should always be deployed at a particularly early stage.

7 Action Taken

In their joint statement, the Waterways and Shipping Directorates North and Northwest informed that in the course of the implementation of the AIS operation concept the documentation facilities will be further developed to a predominantly automated system.
Furthermore they pointed out that the new technical options of the maritime traffic engineering system, which amongst others include the introduction of the coast wide standardised electronic log book, will result in the harmonisation of the documentation.

8 Safety recommendations

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

8.1 Operators and vessels commands

The Federal Bureau of Maritime Casualty Investigation recommends to operators of sea-going vessels and their vessels commands that the actual causes of operational disturbances or findings obtained in the course of repairs and risks recognised be notified to the Vessel Traffic Service centres, as only in this way appropriate risk assessments can be made.

8.2 Pilots and vessels commands

The Federal Bureau of Maritime Casualty Investigation recommends that pilots in German navigable waterways and vessels commands should provide situation reports adapted to the prevailing environmental or traffic conditions and arrange for clear manoeuvre agreements that ideally should also include possible alternatives.

8.3 Vessels command

The Federal Bureau of Maritime Casualty Investigation recommends that the vessel command of OCEANIC should revise the bridge organisation during establishment of a tow connection with special consideration given to the communication with the participants on board and outside the tug.

8.4 Shipping administration

The Federal Bureau of Maritime Casualty Investigation recommends that the officer responsible for deploying emergency tugs in the shipping administration should particularly consider the manoeuvring characteristics of the vessels deployed and the environmental conditions. Under certain circumstances this can mean establishing a tow connection before an emergency has occurred if necessary. Furthermore it is recommended to exemplify this marine casualty for training reasons.

8.5 Waterways and Shipping Directorates North and Northwest

The Federal Bureau of Maritime Casualty Investigation recommends the WSD North and WSD Northwest

1. to improve the gathering and exchange of information and co-operation between the Vessel Traffic Service centres, in particular in the case of occurrences that contain special danger potential.
2. to inform the staff of the Vessel Traffic Service centres again about the capabilities and characteristics of the emergency and assistant tugs and their crews so that this knowledge can contribute to the situation assessment in the case of special occurrences.

9 Sources

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- Activity records MELLUM and NEUWERK,
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  - Maritimes Situation Centre at Central Command for Maritime Emergencies,
  - Joint Situation Centre Sea (Joint Operations Centre (GLZ)) – Coordination Centre Coast Guard,
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