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

# Summary
# Investigation Report 161/09

**Very serious marine casualty**

# Capsizing of the MB QUINTETT with two fatalities on the Lower Elbe on 21 May 2009

1 February 2010

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.

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

Head: Jörg Kaufmann
Phone: +49 40 31908300 Fax: +49 40 31908340
posteingang-bsu@bsh.de www.bsu-bund.de

# Table of Contents

# Table of Figures

# 1 Summary of the marine casualty

On the evening of 21 May 2009, a German married couple was sailing on the River Oste towards the River Elbe on the QUINTETT, a conspicuous self-built motorboat made using aluminium panels. The boat capsized when they reached the Oste estuary in order to enter the Lower Elbe. At about 2015[1], the Elbe pilot of a Panamanian cargo vessel reported a capsized boat with her keel upwards drifting between Elbe fairway buoy numbers 51 and 49. One person was reportedly sighted on the hull of the boat. The message was forwarded on VHF channel 71. A Cypriot tanker, which was sailing from Brunsbüttel lock in the direction of the Elbe pilot station on the Outer Elbe at the same time, reached the distressed vessel first. The tanker's lifeboat was lowered into the water. While on the lifeboat, the Chief Officer reported by radio to the Master that reportedly no person could be seen in the water. The search and rescue services arrived shortly afterwards and took over the search.

It was not possible for rescuers at the scene to see inside the vessel because only about 10 cm of the hull and the propeller protruded from the water. Furthermore, a strong flood stream prevailed. At 2330, the unsuccessful search was discontinued.

The QUINTETT was towed keel upwards into the port of Neuhaus on the Oste and moored at the pier there at about 2340. Divers were deployed that night at 0105; however, they were not able to get inside the vessel. At about 0300, a large opening was made in the cabin's starboard wall. This opening made it possible to ascertain that a body was on board; the body was recovered from the wreck after the deployment of a crane at 0640. The body was that of the wife of the vessel's owner. The body of a dog was also on the wreck.

The body of the vessel's owner was found 10 days later.

[1] All times shown in this report are Central European Summer Time (CEST) = Universal Time Coordinated (UTC) + 2 hours

# 2 Scene of the accident

| | |
|---|---|
| Type of event: | Very serious marine casualty, capsized vessel with two fatalities |
| Date: | 21 May 2009 |
| Location: | Lower Elbe, Oste estuary |
| Latitude/Longitude: | φ 53°51'N λ 009°00'E |

Excerpt from Nautical Chart 46 (INT 1453), Federal Maritime and Hydrographic Agency (BSH)

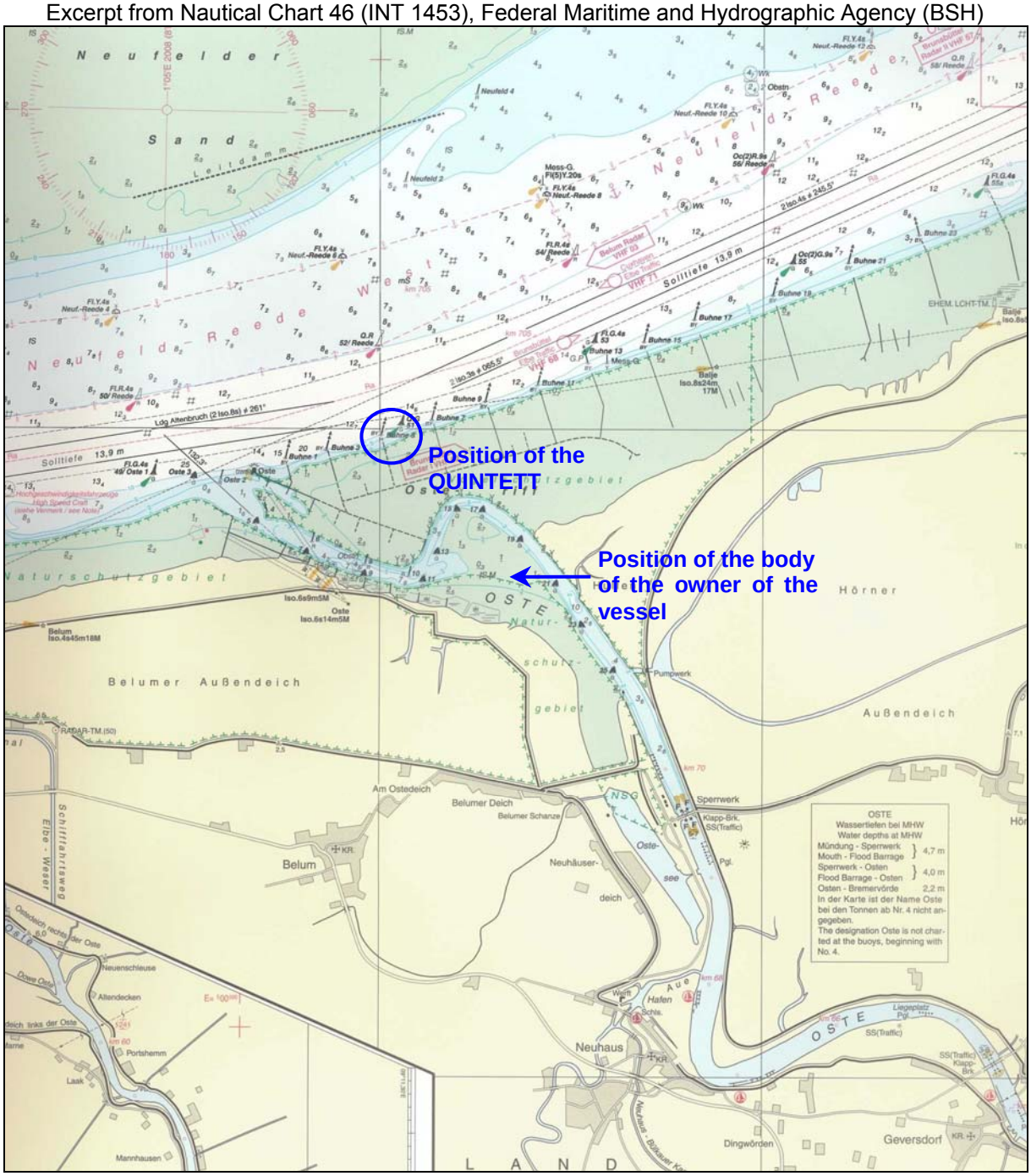


Figure 1: Nautical chart

# 3 Ship particulars

## 3.1 Photo

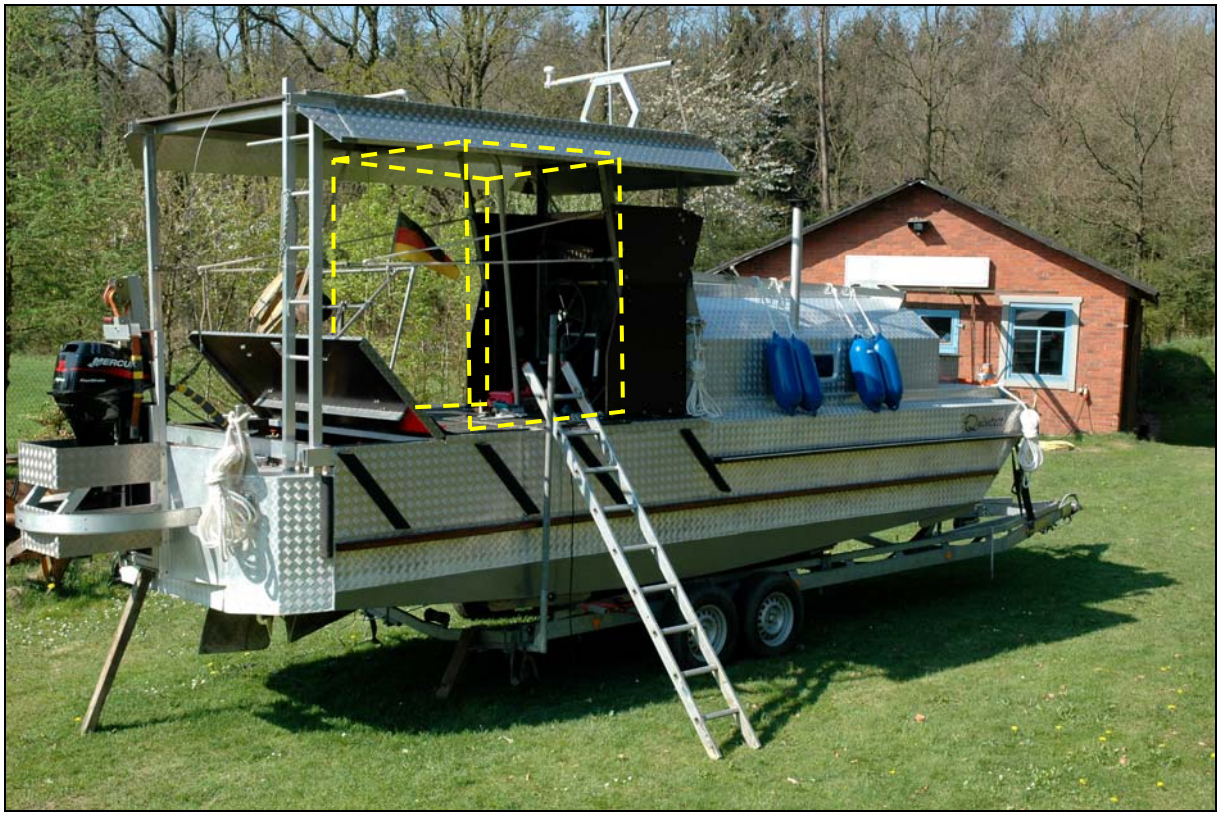



Figure 2: Photo taken in May 2006

(The marked area represents the subsequent position of the wheelhouse, which was enclosed in aluminium panels.)

## 3.2 Particulars

| | |
|---|---|
| Name of the vessel: | QUINTETT |
| Type of vessel: | Pleasure craft, self-built |
| Nationality/flag: | Federal Republic of Germany |
| Port of registry: | Oberndorf |
| Year built: | 2006 |
| Length overall: | 8.50 m |
| Breadth overall: | 2.02 m |
| Height overall: | 2.95 m |
| Draught at time of accident: | 0.40 m |
| Installed engine: | HATZ, type 2L30C, 3,000 RPM, 18 kW |
| Outboard engine: | Mercury 4-stroke engine, 11.2 kW |
| Hull material: | Aluminium |
| Number of crew: | 2 |

# 4 Course of the accident and investigation

## 4.1 Course of the accident

The QUINTETT sailed out of her port of registry, Oberndorf, on 21 May 2009 at about 1600. The German owner, who built the boat according to his own plans, his wife and a dog were on board. Presumably, they planned to sail to Brunsbüttel and possibly continue through the Kiel Canal (NOK). The distance from Oberndorf to the Oste estuary in the Lower Elbe is 10 nm (see Figs. 3 and 4).

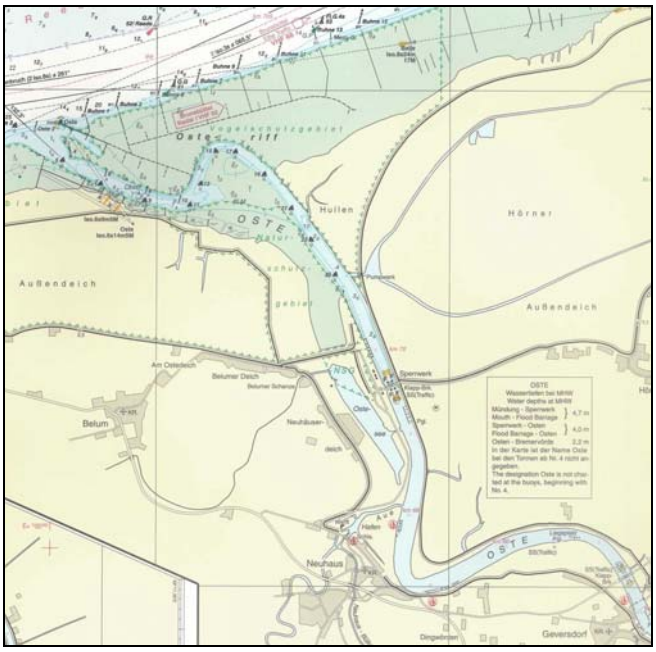


Figure 3: Excerpt from nautical chart, Oste estuary to Greversdorf


Figure 4: Excerpt from nautical chart, Greversdorf to Oberndorf

The wind was blowing from the west at 5 kts with gusts of 7 kts, which corresponded to a light breeze at 2 Bft. Visibility was not restricted. The water temperature was 13.8 °C.

It was not possible to subsequently identify the speed at which the QUINTETT was underway. Firstly, the exact time of the accident is unknown; secondly, the QUINTETT could not be identified in the records of the Vessel Traffic Service.

The wife of the owner was at the helm shortly before reaching the Oste estuary. The door to the wheelhouse (see Fig. 18) was closed. The owner was on the deck of the QUINTETT.

The boat capsized when they reached the Oste estuary in order to enter the Lower Elbe. The wreck was sighted astern at 2008 by the deep-sea pilot of a Panamanian cargo vessel sailing upstream on the Elbe. The deep-sea pilot reported a floating object on which a person was clinging to the Elbe pilot on the bridge. Using binoculars, the Elbe pilot was able to make out the capsized boat between Elbe fairway buoy numbers 51 and 49, but not a person in the water. He informed the Vessel Traffic Service on VHF channel 68. The message was transmitted to all shipping in the area on VHF channel 71. A Cypriot tanker, which was sailing from Brunsbüttel lock in the direction of the Elbe pilot station on the Outer Elbe, reached the distressed vessel at 2025. The speed was reduced and the course adjusted for the lifeboat manoeuvre in order for the lifeboat to be lowered into the water on the leeward side. The rescue team from the tanker, which was commanded by the Chief Officer, reached the wreck at 2038 and reported by radio to the Master that reportedly no person could be seen in the water.

The BIENE, which is a daughter boat of the rescue cruiser HERMAN HELMS, arrived at the wreck shortly afterwards and was also unable to detect anybody in the water. She sent a corresponding message via radio to the search and rescue services at 2046. A total of eight sea vessels, helicopter SAR 8961 of the German Navy as well as shore-based units from the police and fire brigade took part in the intensive search.

It was not possible for rescuers at the scene to see inside the vessel because only about 10 cm of the hull and the propeller protruded from the water. Furthermore, a strong flood stream prevailed. At 2330, the unsuccessful search was discontinued.

The QUINTETT was towed keel upwards into the port of Neuhaus on the Oste and moored at the pier there at about 2340. In the meantime, contact was made with the harbour master and the mayor in Oberndorf, during which the name of the vessel's owner was established.

Divers were deployed that night at 0105; however, they were not able to get inside the vessel because the entrance to the cabin superstructure was stuck in sludge. Following that, the rescue services tried to deploy salvage cushions; however, this failed due to a lack of anchoring points.

At about 0245, the divers were able to make out a dead dog and personal effects in the boat's interior through a smashed window (10 x 30 cm). The personal effects led to the conclusion that a female was on board, whereupon a larger opening was made in the cabin's starboard wall at about 0300. This opening made it possible to ascertain that a body was on board; the body was recovered from the wreck after the deployment of a crane at 0640. The body was that of the wife of the vessel's owner.

The body of the vessel's owner was found on 31 May 2009 and was wearing, inter alia, a fully inflated life-jacket.

## 4.2 Investigation

Officials from the Federal Bureau of Maritime Casualty Investigation (BSU) surveyed the wreck of the QUINTETT in Cuxhaven on 29 May 2009 (see Figs. 5 to 7).

The roof structure of the wheelhouse, including the window pane, was torn off while the wreck was being salvaged.

Figure 5: Wreck of the QUINTETT, view from fore

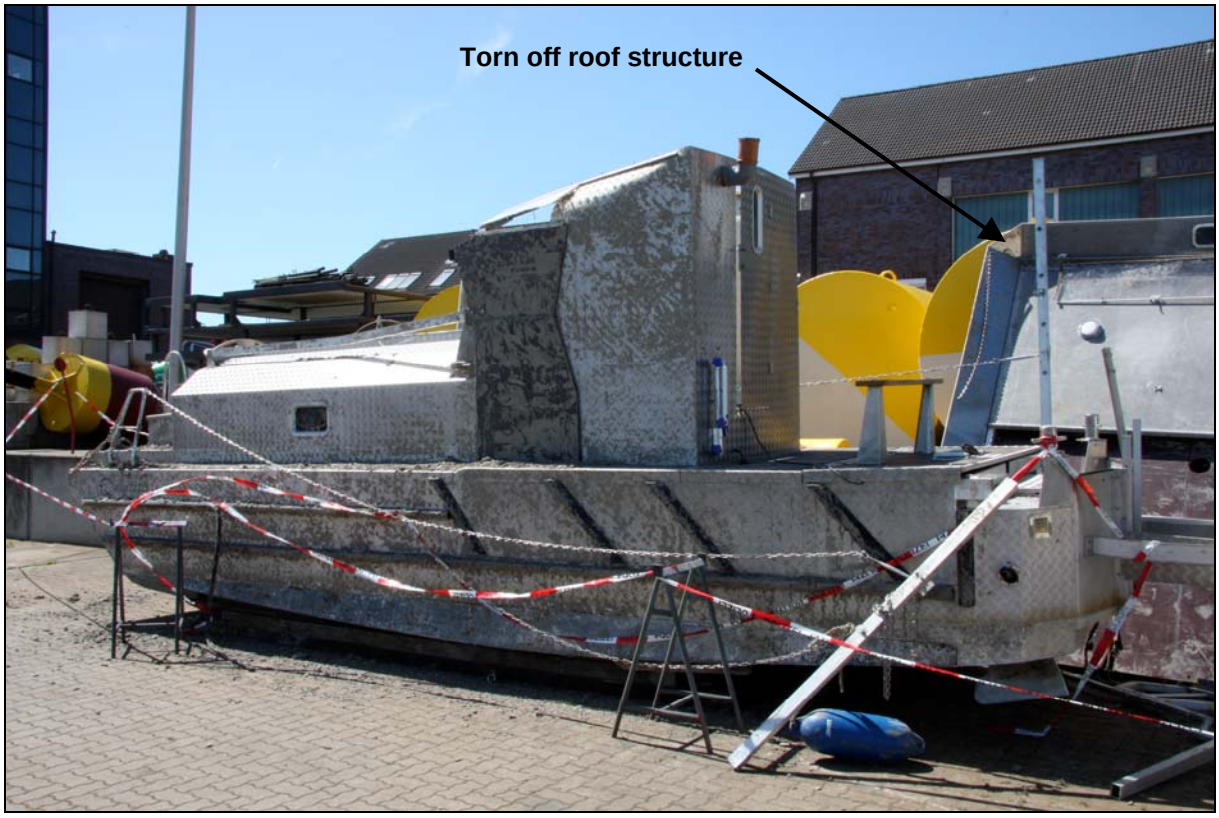


Figure 6: Wreck of the QUINTETT, view from the side

Figure 7: Wreck of the QUINTETT, view from astern

### 4.2.1 Construction

The QUINTETT was designed and constructed by the later deceased owner of the vessel. Work began in summer 2005 and lasted until autumn 2006. In May 2006, the owner gave an interview to a local newspaper, for which, inter alia, a photo of the vessel was taken (Fig. 2). Excerpts of the newspaper article follow:

> *(...) "I did not have any major plans, for my ideas were spontaneous." It was not to be an off-the-shelf boat and certainly not a boat that "tapers off at the front" and thus the final form reflects the individuality of her builder. "There is nothing that has not been thought out," he stressed during a 'tour'; "that begins with the head of a countersunk screw and ends with the space-saving companionway and its seven hinges." He only purchased the technical equipment, "everything else comes from my own workshop." (...) He intends to put a hole at the position where the keel provides the displacement so that it fills itself with water as a stabilising factor. (...)*

The entire pleasure craft – both the hull and the superstructure –was made from aluminium panels. She was not approved by the authorities; however, that was not required because the QUINTETT was used for private voyages.

The QUINTETT did not have a conventional keel design for stabilising the hull; rather, a bulb-bow-style keel design was chosen, which did not span the entire length of the boat. Each side of the otherwise pontoon-style hull was fitted with two short bilge keels (see Figs. 8 to 11).

Figure 8: Keel design of the QUINTETT, view from fore

Figure 9: Hull, port side with ballast and forward bilge keel

Figure 10: Bilge keel, aft port side, side view

Figure 11: Arrangement of the bilge keels on the port side

During the survey, the BSU officials were unable to detect an opening in the keel design through which water could penetrate. However, it cannot be ruled out that the hole mentioned during the interview by the vessel's owner is located in the underwater hull. The keel runs amidships up to the transverse axis (see Fig. 12), which means that the aft area of the keel was difficult to access.

Figure 12: Underwater hull of the QUINTETT, view from aft

The total weight of the QUINTETT was approx. 2.5 t without water, mud and the roof structure. The roof, which was assembled using aluminium and wood panels (see Fig. 13), weighed approx. 800 kg when the vessel was salvaged. The roof is 4 m long and 2.25 m wide.

Figure 13: Torn off roof of the QUINTETT

The QUINTETT's freeboard was 50 cm and the draught just short of 40 cm. The height of the wheelhouse including the roof structure was 2 m above deck.

### 4.2.2 Engine

The engine compartment is accessible through a hatch in the aft section, on which a seat is attached (see Figs. 14 and 15). It was not possible to make the selected hatch design watertight.

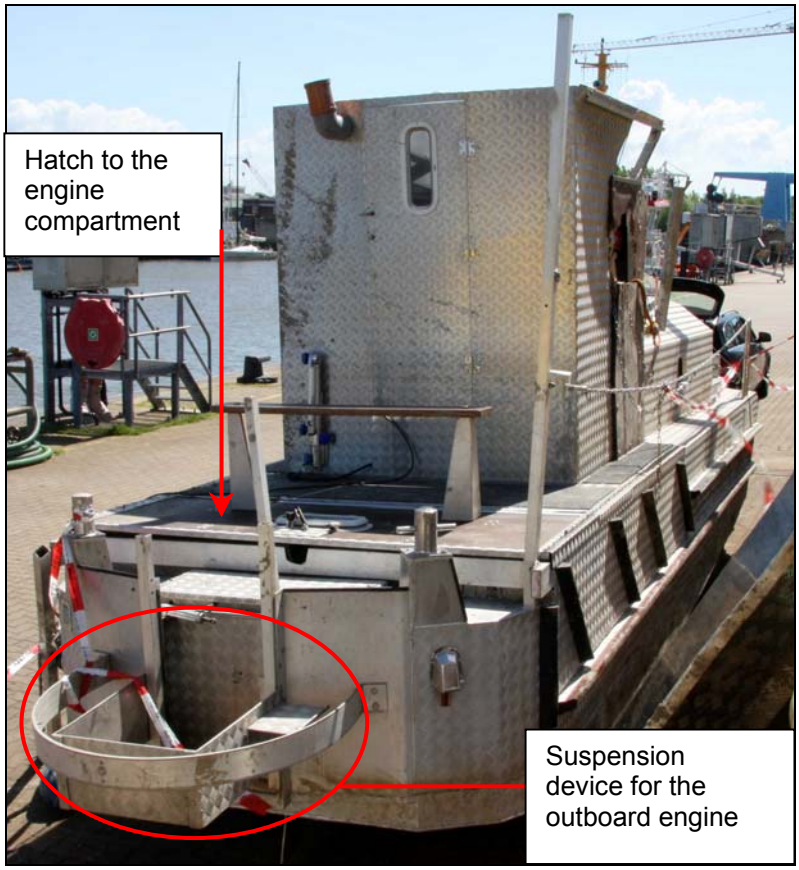


Figure 14: Aft section of the QUINTETT

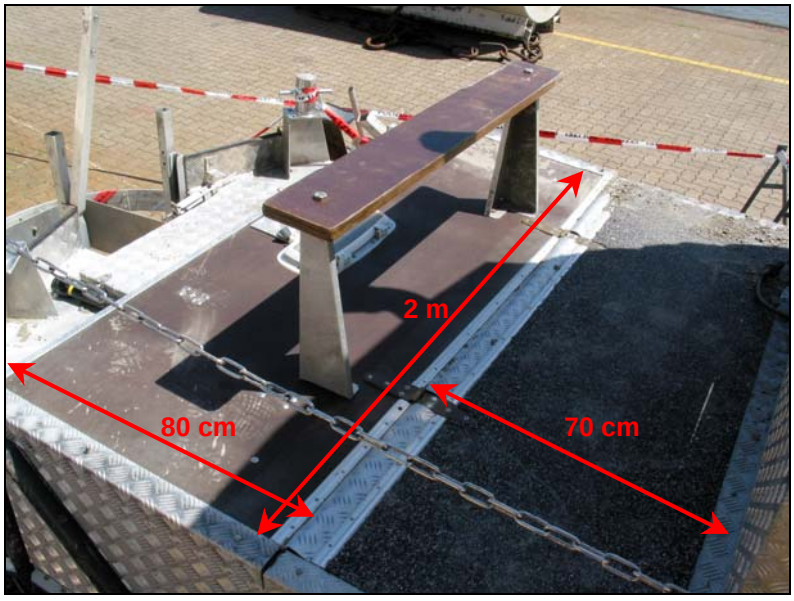


Figure 15: Access hatch for the engine compartment

The engine compartment is 75 cm deep, which means that it is only possible to move in there in a crouched position.

The drive rating of the 2 cylinder diesel engine is 18 kW. The fuel is supplied via a plastic tube, the end of which is attached to a copper pipe section, which is inserted into a hole in the lid of a plastic canister (approx. 25 l) without being fixed in place (see Fig. 16). The feed line was filled with fuel. The canister is also connected with the engine via a fuel-leakage line.

Figure 16: The engine installed on the QUINTETT

The power rating of the Mercury outboard engine is 11.2 kW (equivalent to 15 BHP). It can be operated from the wheelhouse via a connection line.

### 4.2.3 Superstructure and navigational equipment

The superstructure is accessed via a door opening (about 1.50 m high and 50 cm wide) on the back of the wheelhouse (see Fig. 17).

Figure 17: Access door to the wheelhouse

During the survey by officials from the BSU, the door was buckled and increased effort was required to open and close it. When the door to the wheelhouse is closed and the hatch to the engine compartment is open, the door is obstructed by the seat. It is then impossible to open the door from inside the wheelhouse (see Fig. 18).

Figure 18: The wheelhouse of the QUINTETT

Since it is not possible to fix the hatch of the engine compartment in a closed position with a latch or hinges, it opens without any intervention once the vessel is keel up.

The BSU assumes that the wife of the vessel's owner, who was situated in the superstructure – presumably in the wheelhouse – at the time of the accident, had no way of opening the door while the hatch to the engine compartment was open.

There was another exit from the cabin, albeit very cramped. A stowage compartment exists in the forward area, which can be accessed through a 60 cm high and 48 cm wide opening (see Fig. 19).

Figure 19: Cabin of the QUINTETT

A hatch (70 x 70 cm) which leads to the foredeck can be reached via this stowage compartment (see Figs. 20 and 21). As is the case with the engine compartment hatch, this hatch cannot be locked from the outside. A 1 m long rope with a snap hook link is attached to the inside of the hatch cover, with which the cover can be fixed to a loop in the stowage compartment.

It is not possible to go on deck via one of the three cabin windows. The internal dimension of the forward window is 50 x 20 cm, that of each of the two side windows is 30 x 15 cm. Only the forward window was hinged.

Figure 20: Hatch on the foredeck of the QUINTETT, open


Figure 21: Hatch on the foredeck of the QUINTETT, closed

95 cm from the floor of the stowage compartment to the upper edge of the hatch coaming has to be negotiated in order to exit the cabin and go on deck.

The BSU assumes that after she capsized the cabin of the QUINTETT quickly filled with water because there was a general lack of watertight integrity. In particular, water could enter through the hatch unimpeded. The woman would have had to proceed from the wheelhouse to the forward stowage compartment under those circumstances in order to then go outside through the hatch. That only appears possible under conditions whereby the capsizing of the vessel did not lead to panic, severe injury or loss of consciousness. In retrospect, that can only be speculated on.

### 4.2.4 Navigational equipment

The QUINTETT was equipped with a magnetic compass, a GPS navigation system and an autopilot control panel. Paper nautical charts and sailing directions were not found.

Figure 22: The wheelhouse of the QUINTETT, inside

The BSU was able to export the stored data from the GPS navigation system with the support of the BSH. However, the data gave no indication of the speed of the QUINTETT because no waypoints were set.

### 4.2.5 Competence of the crew

The female skipper had been in possession of the Pleasure Craft Skipper's Licence (Power/Sail) Sea since 1991 and was therefore entitled to control pleasure craft on navigable maritime waterways. In contrast, the vessel's owner was not entitled to control pleasure craft. Furthermore, BSU investigations revealed no evidence to suggest that he possessed in-depth knowledge of shipbuilding. He had already built another boat before the QUINTETT; however, this, with exception to the hull which was subsequently used for the QUINTETT, was destroyed by a cable fire.

### 4.2.6 Suitability of the QUINTETT as a sea-going pleasure craft

Pleasure craft are defined in various acts as "water craft that are built and used for sports and recreational purposes"[2]. Sea-going vessels are vessels that are fit and intended for use at sea and are also used regularly for that purpose[3].

The BSU has doubts as to whether the QUINTETT was, in terms of her design, fit for seafaring, i.e. both on navigable maritime waterways as well as beyond coastal waters. Investigations by the BSU revealed that the married couple had already sailed into Brunsbüttel on the QUINTETT frequently. According to the newspaper interview, they even intended to cruise the Stockholm archipelago. Therefore, the vessel was earmarked for use in a sea area from the outset. However, the unconventional design was more the result of spontaneous inspirations than technical standards. According to information provided by third parties, warnings with respect to the QUINTETT having insufficient stability were dismissed by the owner of the vessel.

A cursory inspection of the QUINTETT raises doubt as to whether the necessary stability, i.e. the ability of the vessel to counterbalance the heel caused by wind and sea conditions and return to an upright position, is given. Since the QUINTETT possesses a quasi-unique design type, the BSU has abstained from subjecting the vessel to a scientific heeling test and more detailed investigations. The vessel will no longer be used for seafaring and the extent to which precise determination of the weight and centre of gravity of the QUINTETT will be of use to other owners of pleasure craft is not evident.

The BSU therefore confines itself to a general statement that with every self-designed vessel, it is essential to take into account the righting components.

In relation to the massive aluminium superstructures, the aluminium hull of the QUINTETT was only marginally submerged. With a draught just short of 40 cm,

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[2] See, inter alia, art. 1 para. 1 (1) of the German Maritime Pleasure Yachting Navigating Licences Ordinance and art. 2 (1) of the Maritime Pleasure Yachting Ordinance

[3] Verdict of the Maritime Board of Inquiry on 21 January 1988 regarding the pleasure craft 'PIRAT'

the aluminium panels towered up to a maximum of 2.5 m above the water line. This weight distribution made it impossible for the QUINTETT to right herself after capsizing.

### 4.2.7 Wind and current conditions

A westerly wind with a strength of approx. 5 kts prevailed on the evening of 21 May 2009. Waterways and Shipping Office (WSA) Cuxhaven prepared a flow expertise for the area relevant to the accident, Lower Elbe and the Oste estuary, for the BSU.

The WSA established that in all probability it could be assumed that at the time of the accident the flood current velocity was reportedly 2 to a maximum of 3.5 kts in the direction of 80°. It was said that this wide range was due to the fact that at the presumed time of the accident there was a strong tidal rise. It was anticipated that two hours later more than 2 kts reportedly still prevailed, with a decreasing tendency.

No current measurements from the immediate vicinity of buoy number 51 are available for the period in question. The next long-term monitoring station is 'LZ2a' in the proximity of anchorage buoy 'Neufeld Anchorage Buoy 8' at a distance of approx. 2.5 km to the north-east. Legacy data from a measurement at buoy number 47 could be used to validate the estimated current velocity made on the basis of the data from LZ2a in the proximity of buoy number 51 at the time of the accident. As regards the water levels at buoy number 51 at the time of the accident, the levels 'Otterndorf' (8.4 km to the west) and 'Osteriff' (2 km to the east) were applied.

The graphical analysis of the findings of the WSA's expertise illustrates that the QUINTETT entered the Elbe fairway during the flood stream (see Figs 23 and 24).

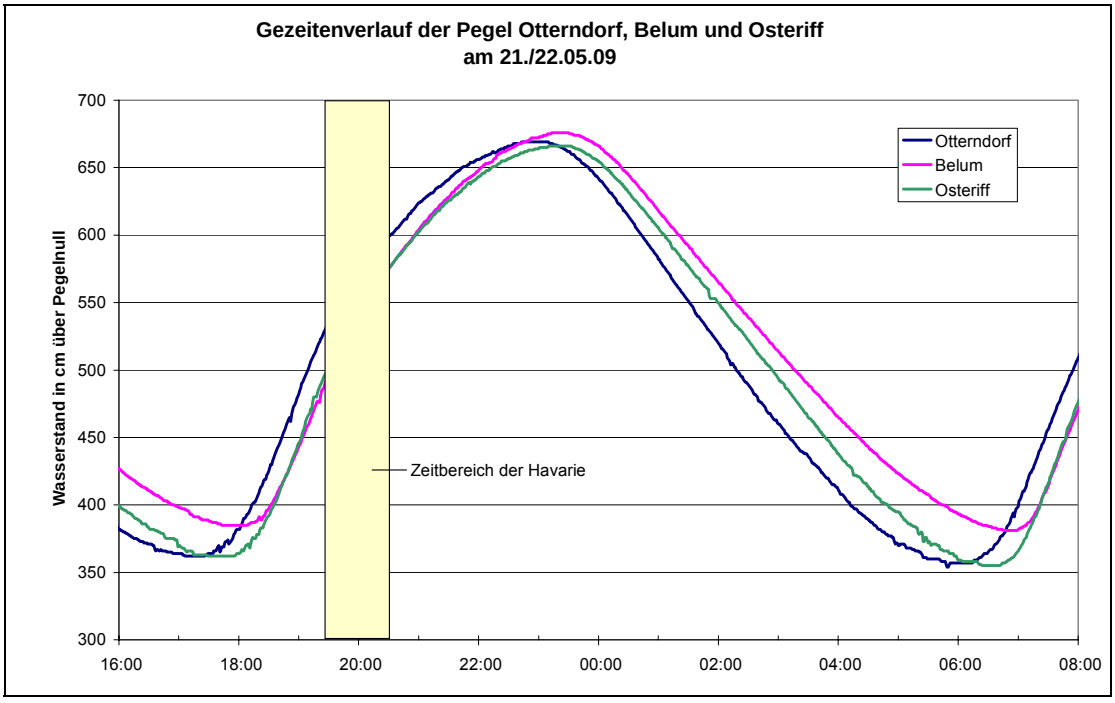


Figure 23: Tidal movement on the day of the accident

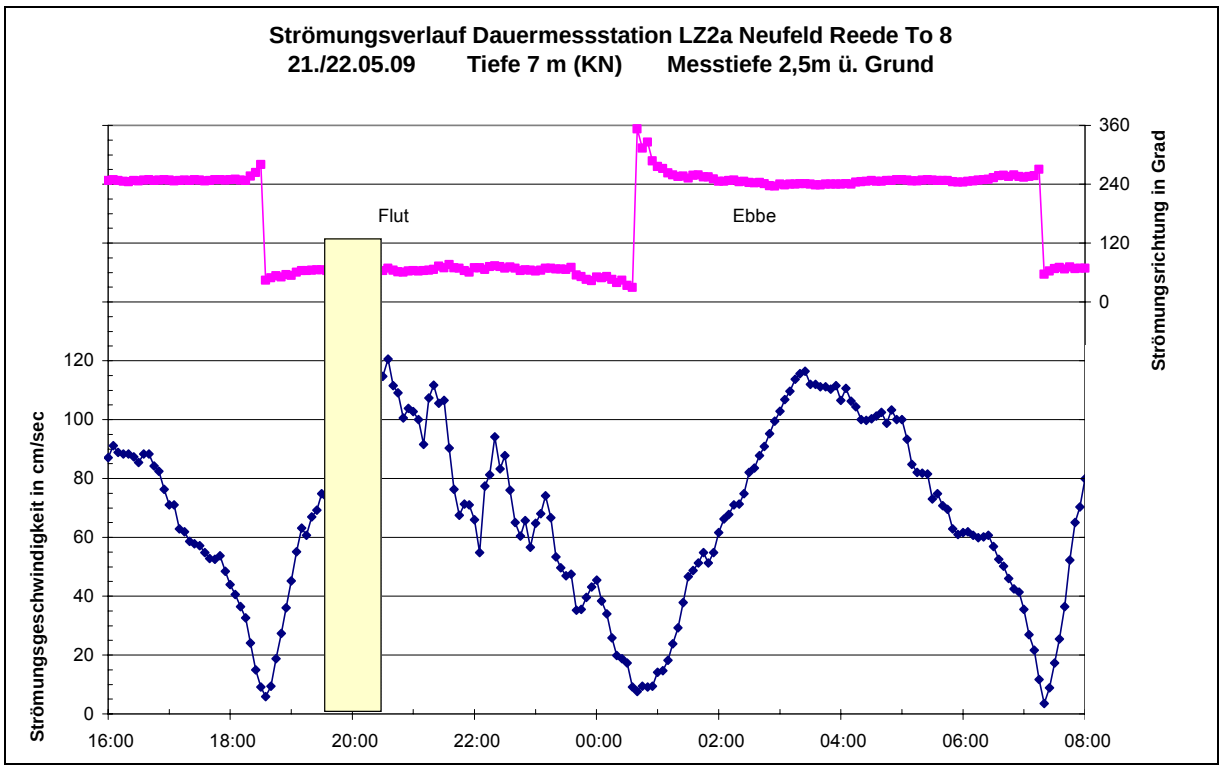


Figure 24: Current movement on the day of the accident

The strong tide not only facilitated the capsizing of the QUINTETT, but also the way in which the vessel's owner drifted after she capsized.

# 5 Conclusion

The QUINTETT was self-designed and built in disregard of basic stability requirements. In the prevailing flow conditions at the time of the accident, she was hardly in a position to enter the Lower Elbe without complications. The short bilge keels and bulb-bow-style keel design, which possibly had a moderate ballast function, could provide the strong tidal surge with only little resistance.

At the moment that the vessel was keel upwards, the female skipper stood little chance of getting out of the superstructure through the only exit door because of the obstruction caused by the design. The vessel's owner drifted as a result of the current and was found dead later in spite of wearing a life-jacket and immediate search measures.

# 6 Sources

- Investigations by Waterway Police Cuxhaven
- Mission log of Gemeinsames Lagezentrum See [Joint Maritime Reporting Centre] (GLZ) Cuxhaven
- Report form of Vessel Traffic Service Cuxhaven
- Mission log of the Maritime Rescue Coordination Centre (MRCC)
- Report of the pilot who gave notification of the accident
- Reports of the pilot and the Master of the tanker that arrived at the scene of the accident first
- Newspaper interview with the later deceased owner
- Information from witnesses who spoke with the later deceased owner about the QUINTETT before the accident
- Flow expertise by Waterways and Shipping Office Cuxhaven
- Official nautical charts of the Federal Maritime and Hydrographic Agency