



**Bundesstelle für Seeunfalluntersuchung**  
**Federal Bureau of Maritime Casualty Investigation**  
Bundesoberbehörde im Geschäftsbereich des Bundesministeriums  
für Verkehr, Bau- und Wohnungswesen

**Investigation Report 240/04**

**Very serious marine casualty**

**Sinking of SY MADAME PELE  
and drowning of two sailors  
off Borkum on 26 August 2004**

1 May 2005

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 24 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 German version shall prevail in the interpretation of the Investigation Report.

issued by:  
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## 1 Summary of the marine casualty

SY MADAME PELE was on a transfer voyage from Kappeln to Emden with two persons on board. On 29 August 2004 the mast top of the sailing yacht was discovered south of Brauerplatten in the Voorentief, and a little later the corpse of the skipper on the Kachelotplate. The co-sailor was washed ashore in the Netherlands on Rottumerplaat on 8 September 2004. The following course of the accident can be reconstructed from the radar records of the Revierzentrale Knock, the drift calculations and the statements by witnesses.

After sailing from Nordemey on 26 August 2004 the vessel sailed until approx. 13:00<sup>1</sup> h and after that ran under engine power. It passed the Osterems buoys O5 and O6 at approx. 14:10 h and everything appears to have been in order on board until approx. 14:40 h. A complete failure of the vessel's electrical system with the navigation equipment and the radio set is considered probable in view of the arrangement of the load batteries. The vessel appears to have been drifting with bare poles, without engine and sail propulsion, with a course SSE towards Brauerplatten.

After 16:05 h the first grounding had evidently occurred and the vessel was pressed over the flat. The jib boom and the rudder only appeared to have broken off after the first ground contact.

At 16:36 h the radar echo had disappeared from the screen and the vessel sank in the deep water of the Voorentief at the southern edge of Brauerplatten.

It was not possible to ascertain precisely when the persons went over board.

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<sup>1</sup> All the times mentioned in the report relate to Central European Summer Time (CEST)

## 2 Scene of the accident

Nature of the incident: Very serious marine casualty, sinking of the yacht with two fatalities  
Date/Time: 26 August 2004, approx. 16:30 h CEST  
Location: South of Brauerplatten off Borkum  
Latitude/Longitude:  $\varphi$  53°37.9' N  $\lambda$  006°45.2' E

Excerpt from the sea chart Leisure Craft Series 3015, BSH

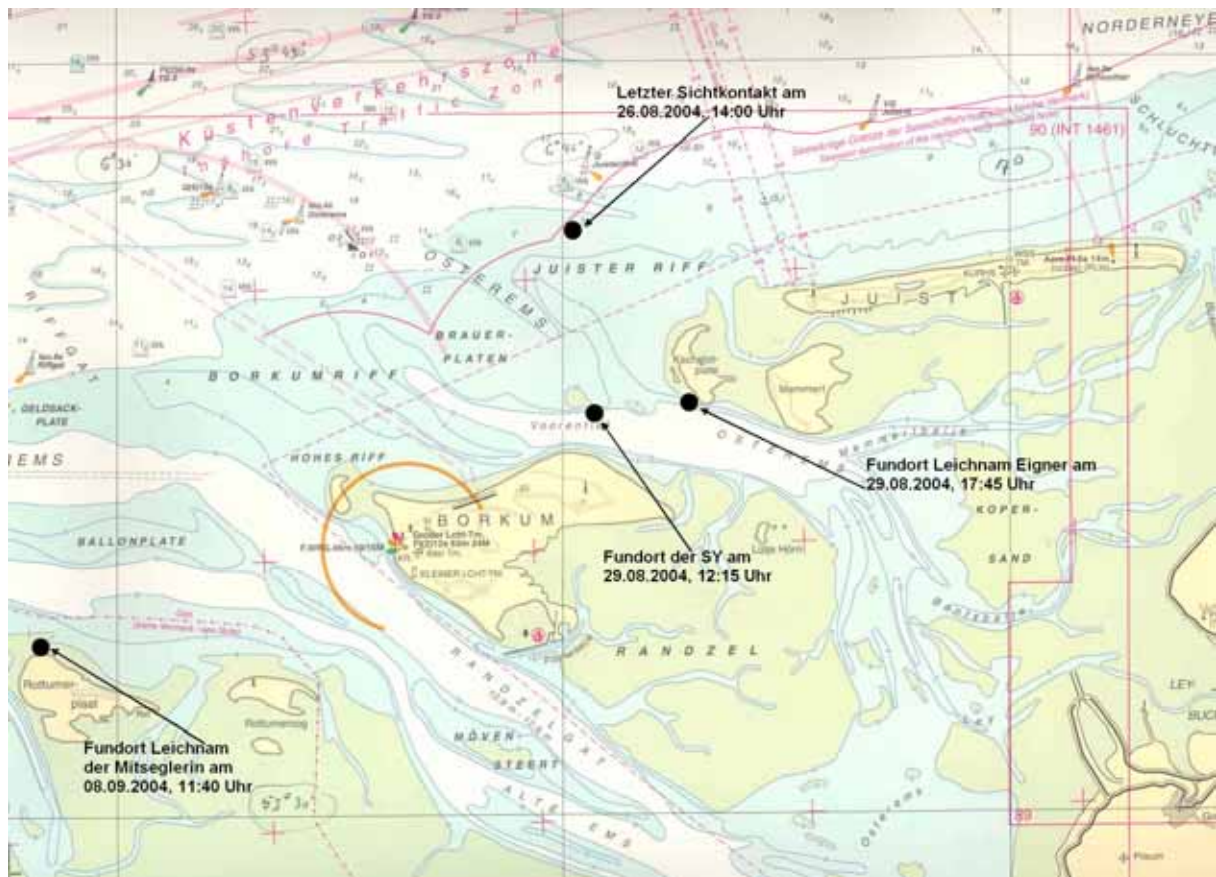


Figure 1: Sea chart

### 3 Vessel particulars

#### 3.1 Photo



Figure 2: Photo of vessel

#### 3.2 Data

Name of vessel:	MADAME PELE ex TIMSCHALL
Type of vessel:	leisure craft, sharp-ended boat
Nationality/Flag:	Federal Republic of Germany
Port of registry:	Kappeln
Year built:	approx. 1918
Building yard/building number	not known
Length over all:	13.50 m, 10.40 m between posts
Width over all:	3.25 m
Displacement:	approx. 13 t
Sail area:	approx. 123 qm (6 sails)
Draft at time of accident	2.10 m
Engine and rating:	Mercedes OM 636 , approx. 44 HP
Speed:	approx. 7 kn
Hull material:	wood coated with GRP
Number of crew:	2



## 4 Course of the accident

### 4.1 Vessel history

It was not possible to determine the exact year in which the yacht was built, or the building yard. The insurance papers state the year built as 1936. The previous owner stated plausibly that the vessel was built in 1918. The building yard was reportedly located by the Oslo Fjord in Norway. The vessel is described as a Norwegian sharp-ended boat ("Colin Archer" type). Originally the yacht was built as a fishing boat or pilot boat without engine propulsion.

The previous owner had purchased the vessel in 1981. At that time the vessel had already been ashore in the city of Kiel for two years. An engine was installed at this time. The stern post had been drilled through to install the propeller shaft and strengthened at the sides with wooden jaws.



Figure 3: Side view

The hull of the vessel was made of Norwegian pine. The frame dimensions were 150 x 150 mm with a frame spacing of 600 mm. There were no water-tight transverse and longitudinal bulkheads. The carvel planking was 30 mm thick and the hull of the vessel was coated with glass fibre-reinforced plastic (GRP) in approx. 1974.

The vessel possessed a self-draining steering and middle cockpit. It had been completely overhauled inside and built up anew by the previous owner together with a boatbuilder friend and provided with five fixed bunks, a pump WC, a sink and an oven. There was an additional superstructure above the forward companionway. The superstructures and the cockpit were made of solid mahogany and boat-building plywood. The engine, type Mercedes OM 636, was given a general overhaul and new sea valves were installed. The vessel was equipped with altogether six new, red-brown sails and rigged as a two-mast ketch, with the mizzen (wing sail) rigged jib-headed and the main sail as a gaff sail. The jib was run as a boomed jib and the jib-sail could be hauled in with a reefing roller.

An expert estimated the value of the hull as DM 70,000 (approx. € 35,000) on 11 May 1984 on behalf of the insurance company. The reported replacement price for procuring an equivalent property (as replacement value) was stated as DM 200,000 (approx. € 100,000).



Figure 4: Centre cockpit and steering cockpit

The previous owner had been trying for two years to sell the vessel. The new owner had purchased the sailing yacht TIMSCHALL at a price of € 17,000 on 16 May 2004 and renamed it MADAME PELE. After purchasing the vessel he had the yacht taken out of the water at the yard Schiffswerft Heinrich Eberhardt in Arnis on 16 June 2004. The sea valve of the main engine and the diesel hoses were dismantled and renewed. The other sea valves were also subjected to a visual inspection and operating trial. The yard described the vessel as seaworthy and no major defects were known. An invoice of € 719.16 was issued for the work performed.

#### **4.1.1 Prior damages**

Three accidents were reported to the insurance after 1984. In July 1998 water infiltrated the 50 l fuel tank that was not properly closed during a voyage on the river Schlei and damaged the fuel pump and the injection nozzles. The second incident occurred on 8 September 2001 in the Kleine Belt. At a wind force of 7 to 8 Bft the jib boom dived deep into the water in a wave trough. A considerable volume of water gathered in the small jib-sail of 10 m<sup>3</sup>. The jib boom broke as a result of wind and water pressure and damaged the jib boom tabernacle. The third insurance claim concerned an incident on 20 March 2004. The upper part of the mizzen mast broke off in the port of Kappeln at wind forces of 8 to 9 Bft. Third-party fault was ruled out. The cause was a weak point in the area of the mizzen halliard guide pulley. The jib boom and the mizzen mast were renewed completely.

According to the information supplied by the previous owner, two approx. 1.2 m long rotted planks and a frame head of approx. 0.40 m on the port side were renewed in 2003.

The new owner continued the hull insurance for an amount insured of € 25,565 with the same insurance company. During a berthing manoeuvre in summer 2004 the owner had slight contact with the pier. No damage was reported.

#### **4.2 Persons on board on the date of the accident**

Two persons were on board on the day of the accident.

##### **4.2.1 Owner/Skipper**

The yacht was skippered by the 44-year-old owner. He held a Sportboot-Führerschein Binnen (Licence for Leisure Craft in Inland Waters), dated 12 June 1977, the Sportboot Führerschein See (Licence for a Leisure Craft at Sea), issued on 5 April 2003, and the Sportküsten-Schifferschein (SKS - Licence for Leisure Craft in Coastal Waters), issued on 8 September 2003. In order to achieve the necessary 300 nm for the SKS Licence he had taken part in a manoeuvre training turn on two weekends and a one-week turn with a subsequent examination. He had passed the theory examination for the Sportsee-Schifferschein (SSS) on 8 May 2004; he cancelled a turn from 14 August to 29 August 2004 to take the examination because he was transferring SY MADAME PELE. He possessed the restrictedly valid Radio Operator Certificate (SRC) to operate the radio set, issued on 21 March 2004, and the VHF Radio Operator Certificate for Inland Shipping Radio (UBI), issued on 21 March 2004, as well as the expertise required since 18 March 2003 for the examination for signal weapons.

The owner had acquired all his water sports training at a sailing school in the inland area and during the necessary nautical miles to obtain his SKS Licence. The SKS examination was held before the Examining Committee Bochum of the DSV (German sailing Association).

On the basis of the information supplied by the owner to the sailing school and in Internet forums, he had only acquired his basic sailing skills in his own 470 dinghy and during turns/trips for a licence examination.

## **4.2.2 Co-sailor**

The 55-year-old co-sailor did not possess a leisure craft or sailing licence. She had participated together with the owner in a 3-day manoeuvre training weekend and a one-week turn for the Leisure Craft Coastal Area Licence for this licence, but only as co-sailor. No further sailing experience at sea could be determined.

## **4.3 Course of the voyage**

### **4.3.1 Voyages with the vessel**

On 16 May 2004 a trip for the purpose of selling the boat was made on the river Schlei together with the previous owner, in conjunction with a brief excursion under sail into the Baltic Sea.

After the purchase, work was evidently carried out on the vessel all the time during the period it was berth in Kappeln and only very few trips were made, probably under engine power.

On 17 August 2004 the yacht rammed the pier because the engine could not be switched to idling. No damage was incurred as a result.

The skipper and the co-sailor started the transfer voyage to Emden the next day.

### **4.3.2 Transfer voyage to Emden**

For the transfer voyage the skipper sought expert advice and co-sailors for the transfer of the yacht in the Internet Yacht online Forum. However, he was unable to gain any experienced co-sailors, so that he started the voyage with his co-sailor on board in Kappeln on 18 August 2004. The first station was Tiessenkai in Kiel in order to take 15 l diesel on board. The yacht spent the night from 18 to 19 August 2004 anchored at the Flemhuder See berth in the Kiel Canal. The next station was the Gieselau Lock berth. The dynamo was repaired here on 20 August 2004 at a cost of € 568.

The yacht lay in the yacht harbour Brunsbüttel from 21 to 22 August and at the Segler-Vereinigung Club in Cuxhaven from 22 to 23 August 2004. SY MADAME PELE left Cuxhaven before 08:00 on 23 August 2004 and arrived in Norderney at about 22.00 h.

It left the yacht harbour of Norderney at about 08:45 h on 26 August 2004, shortly after SY LADY O left the port. Since at that time SY MADAME PELE was only running under engine power and was much slower than SY LADY O, sight was lost already at the buoy Norderney D5/S8.

The last sighting of SY MADAME PELE was made at approx. 14:00 h by SY SÖMMERWIND in the area north of Juister Riff.

At 12:15 h on 29 August 2004 a Police Boat discovered the main mast of SY MADAME PELE projecting approx. 1 m out of the water in the Voorentief, south of Brauerplatten, at position 53°37.9'N and 006°45.2'E, and as a result of a helicopter assignment also sighted the corpse of the skipper at 17:45 h on Kachelotplate. The corpse of the co-sailor was found on Rottumerplaat at about 11:40 h on 8 September 2004.

## 5 Investigation

### 5.1 First report and classification of marine casualty

The Water Police Emden notified the Federal Bureau of Maritime Casualty Investigation (BSU) at 15:30 h on 29 August 2004 of the sinking of an at that time unknown sailing yacht in the Osterems. After the dead skipper was found, the accident was classified as a very serious marine casualty and an investigation team was formed.

### 5.2 Location at which vessel was found

After the vessel was found on 29 August 2004, a first diving operation was conducted by two DLRG divers at 17.00 h. The vessel was lying in a depth of 11 m on the southern edge of Brauerplatten with the bow pointing in a south-westerly direction to the beach. The name MADAME PELE could be ascertained on the vessel that was partly buried in sand, lying with a list of 20° to 30°. No damage was ascertained to the hull or the superstructures. The bulkhead to the cabin was standing open. Due to the tight conditions and the poor visibility the cabin was not inspected during the two diving attempts. Illuminating the cabin with divers' lamps from the exterior did not reveal the whereabouts of the persons. The rudder blade of the sailing yacht was standing away from the aft vessel on top. The upper pintle had evidently been ripped out or broken off and only the fastening at the bottom appeared to be still there. The mizzen boom was reportedly broken halfway along (this was not confirmed by the diving assignment of the police divers on 3 September). The sails were tied fast to the booms. A wooden bar approx. 1.20 m long was hanging upright on the main sail (in the shrouds over the boom). The tender "TIMMISCHALL", approx. 2.10 m long by 1.10 wide was no longer tied on deck and has not been found to date. This boat was made of boat-builder's plywood and did not have any buoyancy aids.



Figure 5: Tender

The next diving operation was conducted by two police divers on 3 September 2004. The starboard side of the hull was buried in sand up to the deck and the vessel was now lying at a depth of 11 m with a list of approx. 45° at low water with the stem facing in a south-westerly direction. No damage to the planks on the port side could be felt on the actual hull. Both masts and the rig were undamaged. The main mast projected approx. 1.50 m out of the water at low water. The starboard side lights had been ripped out of the shrouds. The jib sail had been ripped out of the mast rail and was swaying over the vessel. The jib boom was broken off close to the stem and was still directly next to the vessel, being held by the bow stays.

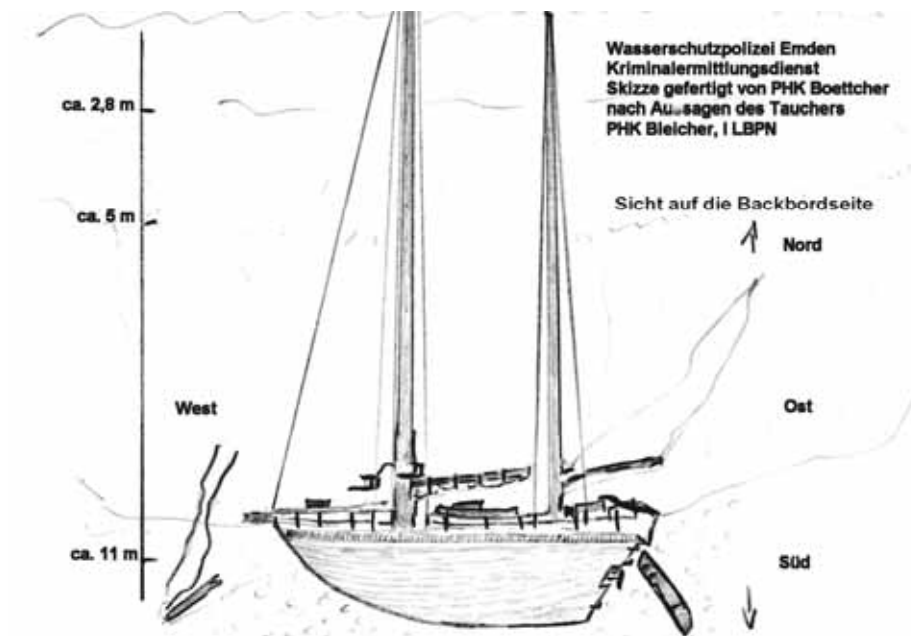


Figure 6: diver's sketch, side

The three-blade propeller was not bent and was plugged freely in the shaft. The mounted rudder was lying on the starboard side next to the yacht and was held close to the vessel by a lashing. An examination revealed that the pintles of the rudder blade had been pressed out of the rudder eyes. The pintles on the rudder blade were not cross-pegged, despite the bore holes there.

The vessel was not closed. The companionway in the aft steering cockpit to the aft cabin was open. The sliding hatch from the companionway to midships in the guest cockpit was open. The companionway in front of the main mast to the fore ship bunks was closed and was broken open by the divers in order to look for the missing co-sailor. Altogether four lifejackets were found in the forward area.

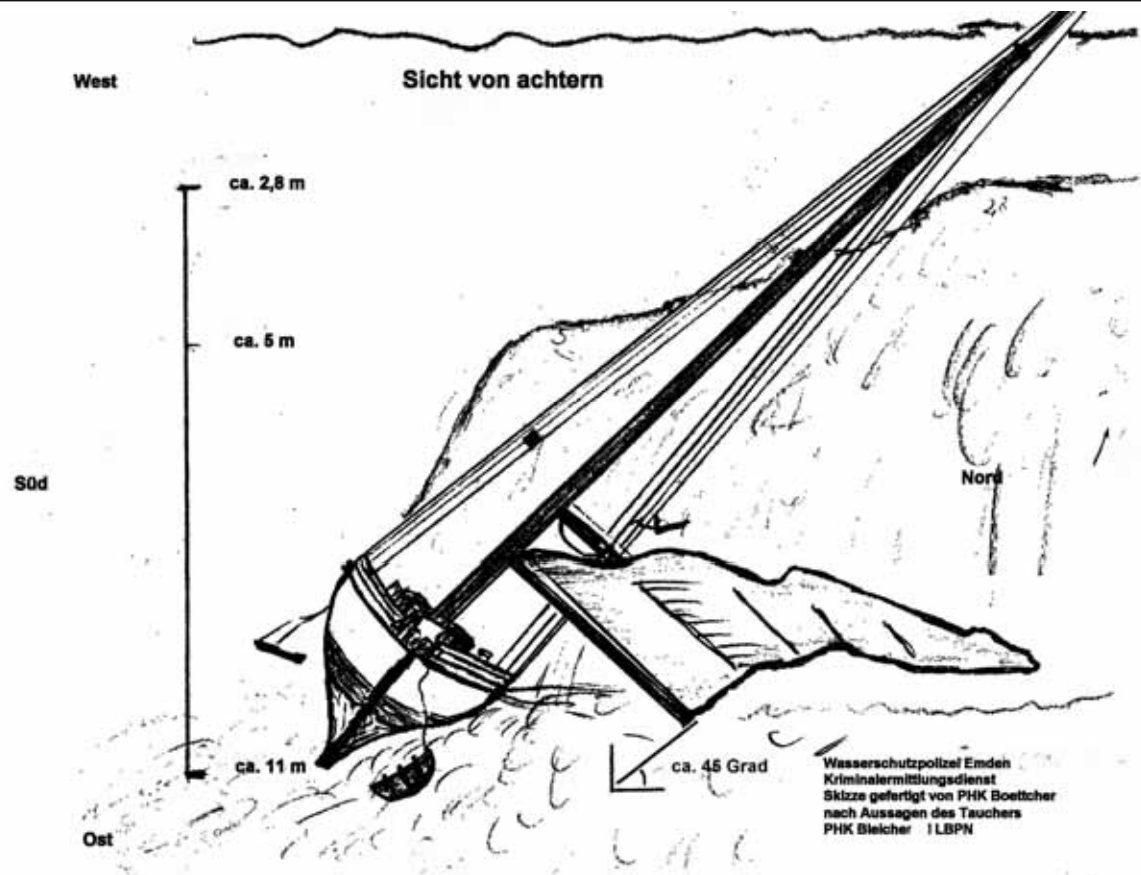


Figure 7: Diver's sketch from aft

### 5.3 Finding of the corpses

The skipper's corpse was found at the southern tip of Kachelotplate at position 53°38.2'N and 006°49.8'E on 29 August 2004. The skipper was wearing an oilskin jacket and oilskin trousers. He had an inflated lifejacket on, but this was not closed. He had altogether six licence certificates as original documents with him. The receipts for port charges in Brunsbüttel, Cuxhaven and Norderney were found in his pockets, as well as a fuel receipt for 15 l diesel from Kiel and a hand-written invoice for the repair of the dynamo at the Gieselau Lock berth.

The co-sailor's corpse was found without oilskins and lifejacket on 8 September 2004 at position 53°33.5'N and 006°28'E, northern tip of Rottumerplaat.

The post mortem of the two corpses did not reveal any indications of third party fault. The secondary injuries were not the cause of the death. Death occurred by drowning.

## **5.4 Distress calls**

No emergency or urgent messages were sent by the VHF radio set.

The radio set Navman 7100 DSC has functions for a DSC emergency call and reception. If a GPS receiver is connected properly, the position is transmitted automatically. The Garmin GPS 152 satellite navigator does not have a separate power supply with built-in batteries. It was not possible to determine the exact mounting location of the radio set and the GPS as well as the proper expert connection to the board power supply. It is to be assumed that both units were installed close to the navigation place in the aft cabin. According to the information supplied by witnesses, the aerial for the GPS had been positioned in the aft area and it is probable that the GPS was installed here too.

No emergency call was made by the skipper's mobile telephone either. No distress signals were sighted in the period in question.

## **5.5 Statements regarding the vessel and the crew**

### **5.5.1 Survey by a master boat builder**

An expert master boat builder for classic yachts had inspected the vessel on shore at the yard Werft Eberhardt in Arnis on 27 March 2004. This expert reported that he had only been asked without engagement by the present owner for his opinion of the condition of the boat. An expert opinion in writing was expressly not asked for; he was only to provide oral advice on the assessment of the GRP coating. During questioning as witness the expert stated that he had examined the GRP coating by tapping it and making moisture measurements. No GRP detachments from the wooden planks were ascertained. The vessel hull was built strongly with well dimensioned double frames at close frame spacing. Inside dry rot was ascertained in the planking in three places on the port side at accessible places in the above-water area. There was damage in need of repair to the deck superstructures and the bulwark. The mizzen mast was broken and had not yet been renewed. The standing rigging and the chain plates were reportedly in need of renewal. The sea valves in the engine room were jammed or over-aged. The recommendation given to the present owner was to go to a yard and have the defects rectified. A rough cost framework of the works to be carried out was drawn up by hand and handed over to the subsequent owner, who up to that time he had not yet decided to buy the vessel. The expert had the impression that the subsequent owner had only little seamanship expertise. He, the subsequent owner, described himself as "more or less skilled" technically and with his hands, and this appraisal was confirmed during talks about repair works.



### **5.5.2 Pier neighbour in Kappeln**

One witness, the pier neighbour of the skipper in Kappeln, stated that mainly the boat had only been tinkered with and navigation instruments installed. He had noticed that a GPS aerial had been installed in an unfavourable position on the starboard side on deck next to the steering cockpit. There was a danger that this aerial could easily be damaged when climbing from one cockpit into the other. This witness also saw a post being rammed during a berthing manoeuvre. He had the impression that the co-sailor was not in a position to throw a line ashore from a distance of 3 m. The skipper appeared to be swamped with the situation and did not manage to handle the vessel under engine power at low wind force. No damage to the bowsprit and the vessel were evident.

### **5.5.3 Electrician**

An electrician who was present to repair the dynamo at the berth at Gieselau Lock reported that the electrical system on the vessel was in a disastrous condition. The load battery had no diodes switched parallel to the starter battery. The two batteries were not connected to the dynamo, and according to the skipper were always charged with the shore current charging device. The load battery was installed below the floor boards and the companionway from the cockpit, and the starter battery was installed aft next to the engine. The electrician had installed a new power supply between the starter battery and the dynamo. No order was issued for proper connection of the load battery to the starter battery. However, attention was drawn to the incorrect wiring of the rest of the electrical system. For reasons of cost no further maintenance work was carried out on the electrical system. The engine was very rusty and there had been 10 cm of water in the bilge. The deck appeared to be cleared.

### **5.5.4 Previous owner**

The previous owner stated before the BSU that he had owned the vessel for 23 years. The vessel had been in good, seaworthy condition when sold and had not had any water-tight bulkheads. The two cockpits were self-draining. Both cockpit floors were above the floating waterline, and the central cockpit had a drain on the starboard side jointly with the WC. The sink had a drain to the port side. The sea valves had been installed since 1981.

The bilge water could only be pumped out of the vessel with a hand-operated pump. This pump, type Whale Gusher, was firmly installed in the aft cabin under the starboard bunk.

The lids of the locker seats were provided with moss rubber seals in the central cockpit but were only held in place by their own weight. The locker seats could not be closed water-tight and in a heeling position water could enter into the superstructure.

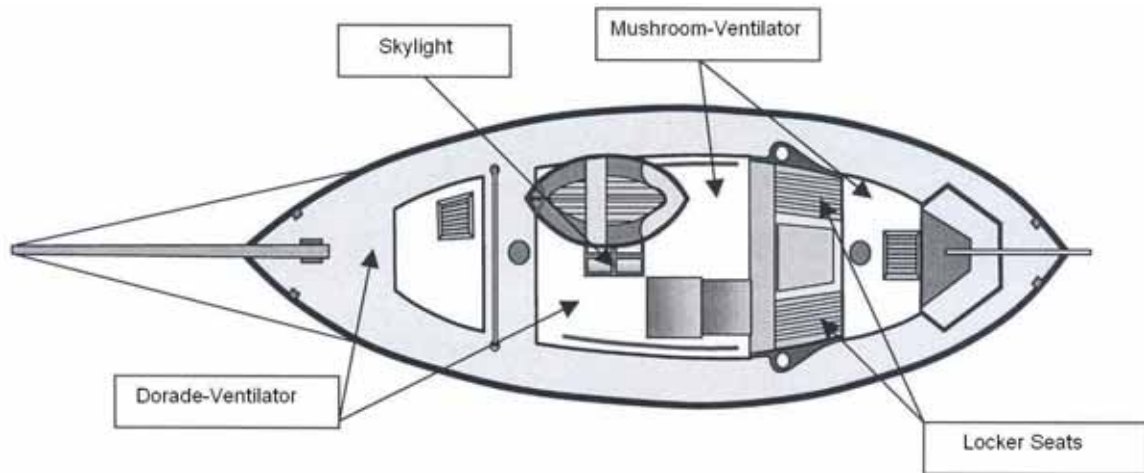


Figure 8: Deck drawing

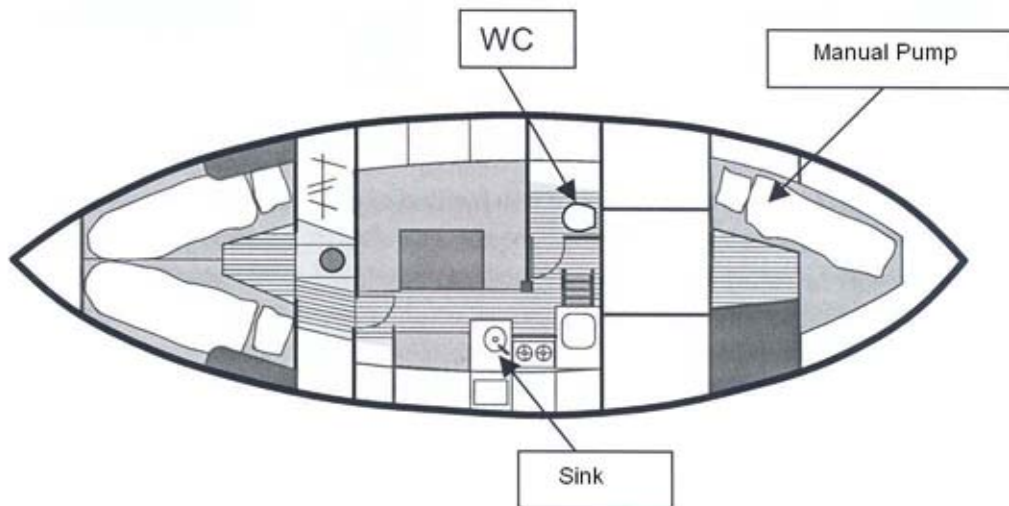


Figure 9: Below-deck drawing

The skylight was provided with a moss rubber seal and latch and a tarpaulin could be drawn over it too.

There were two Dorade ventilators that were installed on a wooden box. This box was built up as protection against water infiltration. It was not possible to lock this from inside. The ventilators could be turned aft and as an additional protection be locked from the exterior with cover caps that were on board. There was one mushroom ventilator each in the WC and the aft cabin area. These could be locked from the inside.

The depth down to the internal keel (beneath the floor boards) was approx. 60 cm. A water level of 2 to 3 cm beneath the floor boards results in approx. 2.5 to 3 t water in the vessel.

Two to three approx. five-year-old distress rockets and a NICO signal unit with six shots were sold with the boat. The service life of the distress signals had expired and they were stored in the WC area. A life-cape with line was stored in the cockpit

locker. Steel life-lines with appropriate fastening devices on deck had reportedly also been on board.

The vessel did not have a sea railing, only an approx. 25 cm high bullwark made of wood.

A liferaft, life jackets and sea charts were not sold with the boat.

An 8 mm bolt was inserted through the top pintle of the rudder as a safeguard against the rudder floating upwards.

### **5.5.5 Investigation in Internet forums**

The skipper had made various enquiries in the Yacht online Forum and had received more or less qualified answers too.

The first enquiry was made on 8 November 2003 to assess an old wooden boat that had been coated with four to eight layers of GRP in the seventies. The owner had evidently already concerned himself with the condition of the vessel long before the purchase.

On 7 June 2004 a question regarding the maximum stress of the halliards and sheets was made: "*Hallo, I have to replace the running rigging in my financial bottomless pit. ....*"

On 21 June 2004 the subject of "coupling a new steering compass and GPS with DSC radio set" was discussed: "*...I would like to couple my Navman 7100 DSC-radio set with my Garmin GPS 152 (via NMEA). Unfortunately after reading the modest manual I have not managed to instal the cables properly....*"

A sea radio set of type DSC VHF 7100 was registered with the Regulating Authority for Telecommunications Post (RegTP) as of 2 June 2004. A call sign and a MMSI number were allocated. The owner purchased the satellite navigation set Garmin GPS 152 in Summer 2004 from a mail order firm. This unit was splash water-proof and could therefore be installed in the cockpit too. It did not have a separate battery supply, but instead had to be connected to the ship's electricity network. The data exchange with the DSC radio set via NMEA standard connection could be realised without any problems. The radio set was not used.

On 5 July 2004 the skipper asked in the forum about the cross section of an ammeter to be connected.

As of 29 July 2004 his contributions concerned the transfer from Kappeln to Emden. He asked for co-sailors and tips for the voyage, and in particular asked how the traffic separation zones were to be crossed and whether it was possible to anchor for a night north of Wangerooge. Since the vessel was only to be sailed with two persons, he decided not to take the Cuxhaven-Helgoland-Borkum run. It was not possible to determine to what extent he responded to tips of shortening the voyage via Juister Riff and running through the Osterems.

### **5.5.6 Vessel's engine**

According to the information supplied by the previous owner the built-in diesel engine of type Mercedes OM 636 had a rating of approx. 44 hp.

The engine had last been reconditioned in 1998 for DM 3,676.-- by a specialist firm within the framework of an insurance claim. The fuel system was cleaned completely

and the tank was subjected to suction extraction. The injection pump was repaired and new injection nozzles were installed.

The skipper had had the sea valve renewed at the Eberhard yard in Arnis and the diesel lines removed and sealed. A trial run of the engine was carried out without any complaints.

The fuel tank had a capacity of 50 l. The tank was presumably last filled in Kiel-Holtenau judging by the receipts found with the skipper. Nothing is known about a spare canister. Nor was it possible to determine whether additional diesel was taken on board on the way.

The section from Kiel to Norderney and to the place where the vessel sank was determined as 144 nm. The fuel consumption at cruising speed for a vessel of this size is between 2.5 to 3 l/h depending on the wind conditions. With a tank content of 50 l this results in a running time of 16 to 20 hours.

Consequently it was not possible to run to the scene of the accident solely under engine power without refilling again.

## Calculation of the distance and the fuel consumption

### **Complete distances:**

1.) Holtenau to Brunsbüttel	50 nm
2.) Brunsbüttel to Cuxhaven	16 nm
3.) Cuxhaven to Norderney	65 nm
4.) Norderney to Osterems Tn. O 6 incl. a turn of approx. 1 nm to the north	13 nm
Gesamt :	144 nm

### **Under engine power:**

#### according to statements:

1.) Holtenau to Brunsbüttel	50 nm
2.) Brunsbüttel to Cuxhaven	16 nm

#### Presumptions:

3.) Leaving Cuxhaven and partly passage of Elbe	5 nm
4.) Approach Norderney to port	5 nm
5.) Leaving Norderney	3 nm
6.) Approx. 13:30 h turn to the north under engine at approx. 14:30 h then possibly motor failure	3 nm
	82 nm

### **Under sail**

1.) Cuxhaven to Norderney (at 23.8.04 at 22:00 Uhr fast in Norderney, Wind from SE - ESE 5-6 Bft)	55 nm
2.) Norderney up to approx. 13:30 h at 26.8.04 (Wind from NW 4-5 Bft later 5-6 Bft)	7 nm
	62 nm

### **Calculation of fuel consumption**

Capacity tank: 50 Liter

Consumption motor OM 636: approx. 2,5 to 3 l per hour

Running time at 2,5 l	$50 / 2,5 =$	20 hours	approx. at 3/4 load
Running time at 3,0 l	$50 / 3,0 =$	16,7 hours	approx. at full load

82 nm / 20 hours = 4,1 kn per hour

82 nm / 16,7 hours = 4,9 kn per hour

Only on the canal distance from Flemhuder Lake to Gieselaulock, on a distance of approx. 18 nm, headwind prevailed. Otherwise the wind came from astern respectively from abeam.

The distance from Brunsbüttel to Cuxhaven was run with the stream on falling tide.

### 5.5.7 Type of vessel

In the first reports on the accident and the newspaper reports it was stated that the vessel was a "Colin Archer" type. It is stated from the start in the insurance policies that the vessel is a sailing yacht of the "Colin Archer" type. In the Internet Forum the owner wrote that he was looking for a suitable steering compass for his old "Colin Archer", year built 1918.

The Norwegian ship designer Colin Archer (1832-1921) designed and built over 200 vessels. His designs included yachts, pilot boats, rescue vessels, fishing vessels and the polar research vessel FRAM of the Norwegian Fridtjof Nansen. Generally the name Colin Archer is connected with the design and construction of the "Redningskøite" (rescue ketches). These vessels were characterised by exceptionally good seaworthiness and sailing qualities. The dimensions of the RS 1 - Colin Archer built in 1893 and still in operation are: length over deck 13.95 m, width: 4.65 m, draft: 2.30 m. The vessel weighed over 30 t. Below deck there were altogether three water-tight compartments connected by hatches.

The investigation of the marine casualty revealed that many vessels with the designation "Colin Archer" are offered on the boating market. The designation "Colin Archer" is automatically connected with the special seaworthiness of the rescue ketches and thus suggests that these vessels can evidently be sold more easily.

The investigation has not confirmed that the designer Colin Archer was co-involved in the building of SY MADAME PELE. The information "sharp-ended boat" or "Norwegian sharp-ended boat" as type of vessel is more exact and does not exert any influence on the value.

## 5.6 Course of voyage

### 5.6.1 Voyage Kiel Canal to Cuxhaven

SY VICTORIA encountered SY MADAME PELE several times at berths between the berth Flemhuder See in the Kiel Canal and Cuxhaven. According to the statement made by the skipper of this sailing yacht, the transfer voyage was being carried out under a certain pressure of time. No sails were set from the Baltic Sea to Cuxhaven. The vessel was reportedly very under-powered with the engine. With gusty winds of 7 to 8 Bft from ahead it only managed to run 1 to 2 kn. The vessel took on water from the deck. In Cuxhaven the wet and soggy cushions from the fore ship were dried on deck. The skipper expressed the supposition that the Dorade ventilator was not water-tight or had not been closed. The deep bilge was full of water up to three fingers below the floor boards.

As regards the sailing experience and seamanship capabilities, it was stated that the skipper had said that he was actually a dinghy sailor and had only been on a charter voyage twice. He made a calm impression, was willing and endeavouring to do everything right. However, he lacked experience for the areas he was passing through. The co-sailor had no experience on boats at all. She was already a little

irritated by certain discomforts during the voyage and in matters of managing the vessel she relied completely on the skipper.

### **5.6.2 Voyage of SY SÖMMERWIND from Norderney**

SY SÖMMERWIND left Norderney almost one hour after SY MADAME PELE at approx. 09:45 h with a wind force of 4 to 5 Bft. SY SÖMMERWIND is a motor sailer of type Southerly 115 with a length of 11.20 m and a width of 3.69 m, weighing approx. 8.0 t. SY SÖMMERWIND has a lift keel with a draft of 0.70 m to 2.10 m. This vessel was manned with an experienced skipper and a second person. The planned destination was around Juist, across the Osterems and Memmertbalje to Norddeich.

The skipper of SY SÖMMERWIND saw a two-masted sailing yacht at a distance of approx. 200 m on a northerly course at about 14:00 h in the area north of Juister Riff between positions 53°41.17'N 006°45.05'E and 53°41.586'N 006°45.15'E. After making a tack he proceeded on a parallel course with the vessel. This vessel might have set a studding sail. The skipper could not remember whether this vessel had set a sail. Before the encounter with this sailing yacht a red sail had been seen which for a relatively long time was considered to be a buoy. SY SÖMMERWIND had a much faster speed so that it soon lost sight of the other vessel. It was not possible to recognise the vessel exactly since SY SÖMMERWIND had enough problems of its own at wind forces of 6 Bft increasing to 6 to 7 Bft with wave heights of 2 to 4 m. The skipper stated that he had not known the Osterems before and that he did not want to experience a passage again with the wind and weather conditions prevailing in the Osterems. From buoy O6 he only sailed with a genna sail and the engine running too. The lift keel had been drawn in halfway. At a speed of approx. 9 kn SY SÖMMERWIND began to surf in the Osterems navigation channel with an aft sea. In Memmertbalje at approx. 15:00 h the yacht could no longer hold its course in a rolling squall with a wind force of over 8 Bft and had to be turned into the wind. SY SÖMMERWIND reached Norddeich without any major problems at approx. 17.15 h.

The sailors on SY SÖMMERWIND could no longer remember the type of vessel, the name of the vessel or the colour of the hull. However, excerpts from the sea chart plotter were transmitted with the stored GPS data over the entire course of the voyage. With these plots it was possible to identify SY SÖMMERWIND as well as SY MADAME PELE exactly in the records of the radar data of the Revierzentrale Knock.

The following voyage records originate from on board SY SÖMMERWIND.

Az.: 240/04



Figure 10: GPS plot, course of voyage

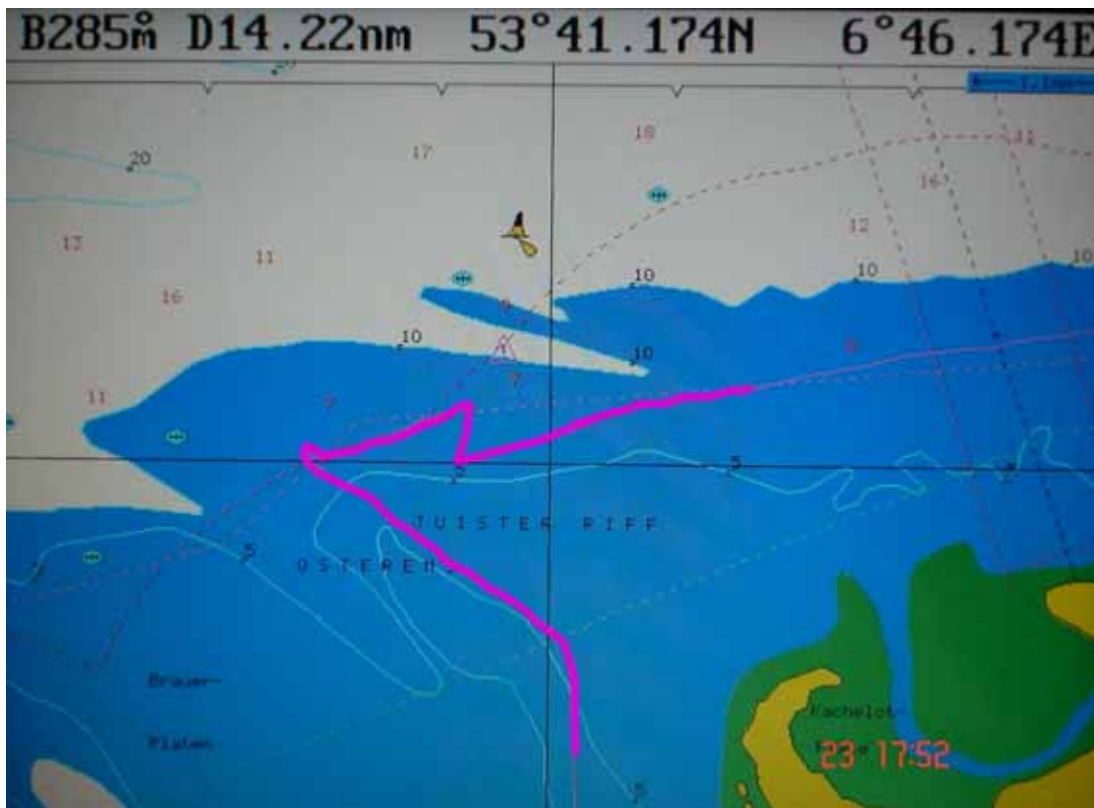


Figure 11: Detail plot Juister Riff



## 5.7 Turn guide

It was not possible to ascertain whether the appropriate port manuals, sea manuals or turn guides for the sea area were on board. The following excerpts are an example of the description of the sea area North Sea and Ems:

### 5.7.1 Nordseehandbuch (North Sea Manual) BSH No. 20061

#### C1.4.2.

*"Navigating the narrow sea channels and mud flat navigation channels between the North, East and West Frisian Islands requires special attention. Those not familiar with the area should always take a pilot...."*

*Navigating the narrow sea channels in stormy weather. From the sea the breakers on the bar of the narrow sea channel appear less high than they are in reality and can easily be underestimated especially by a low vessel ..."*

#### C7.3.7

*Even at low wind forces there are breakers on the Brauerplatten and Kachelotplate; with a strong in-shore wind the breakers also run over the navigation channel between Juister Riff and Brauerplatten so that in such cases a passage through the Westerems should be preferred."*

### 5.7.2 Törnführer Nordseeküste (Turn guide North Sea Coast) – Jan Werner

*"At wind force 7 just stay in the harbour - and definitely if visibility is poor. If we should have any problems, then not in the open sea area and certainly not when approaching Heligoland, but vice versa: when approaching the narrow sea channels and the river estuaries from Heligoland. ...."*

*The waters around Memmert are certainly an interesting, versatile area. Without any doubt a run out into the open sea is exciting: one navigates through the channel marked with buoys, very close past Memmert and the ever growing Kachelotplate into the open water, reached after the Juister Riff - but - please - only in good weather...."*

## 5.8 Weather report

Germany's National Meteorological Service (DWD) issued an expertise on the wind conditions between Kappeln, the Kiel Canal, Cuxhaven and Borkum between 18 and 25 August 2004 and an expertise on the weather and sea conditions of 26 August 2004 on behalf of the Federal Bureau of Maritime Casualty Investigation (BSU) .

According to the first expertise, the wind direction on 23 August 2004 was SE, later ESE with a wind force of 5 to 6 Bft and gusts of 6 to 7 Bft. The sea height ranged between 0.5 m to 1.0 m.

The wind forecast for 26 August 2004 at 5:00 a.m. stated NW 4 to 5 Bft, temporarily 6 Bft with showery squalls. The analysis of the actual existing weather and sea data of 26 August 2004 revealed that in the sea area between Norderney and Borkum there was a north-westerly wind whose average strength increased in the course of the

afternoon to 5 to 6 Bft with squalls of 7 to 8 Bft. It can be assumed that at the position of the accident from 16:00 h onwards a slight nozzle effect had set in with the northerly flow direction between the island of Borkum and Kachelotplate and Memmert. As a result of this local, wind-strengthening effect the middle wind probably achieved the full strength of 6 Bft with storm squalls of 8 Bft for part of the time.

Apart from frequent rain showers the horizontal visibilities were very good at over 20 km. In the showers visibility dropped temporarily to levels of below 5 km.

With the given wind force conditions it was possible for a sea with characteristic wave heights of 1.5 and later around 2 m with periods of around 5 s to develop depending on the wind direction, duration of wind action and the fetch. The information regarding the wave height always refers to the characteristic wave height. This corresponds to the arithmetic mean of the top third of the wave heights in a period of observation. This means that a number of individual waves is higher than the characteristic wave height. In rare cases individual waves can exceed the characteristic wave height by 70% to 100%.

SY LADY O received a weather report for the Borkum area with a wind strength forecast of 6 to 7 Bft and wave heights of 2 m via mobile telephone.

## **5.9 Radar records**

The area of the Ems is monitored by the traffic securing system EMS-Traffic. Radar records of the Revierzentrale Knock have been submitted to the BSU. According to the analysis of these over 900 radar plots the course of the voyage from 12:02 h to sinking at 16:36 h was reconstructed very precisely. The radar record precision is approx. 10 m.

It is not evident from the records that any manoeuvre was run to recover any person over board.

Az.: 240/04

The following plots are examples of the vessel movements recorded every 15 to 30s.

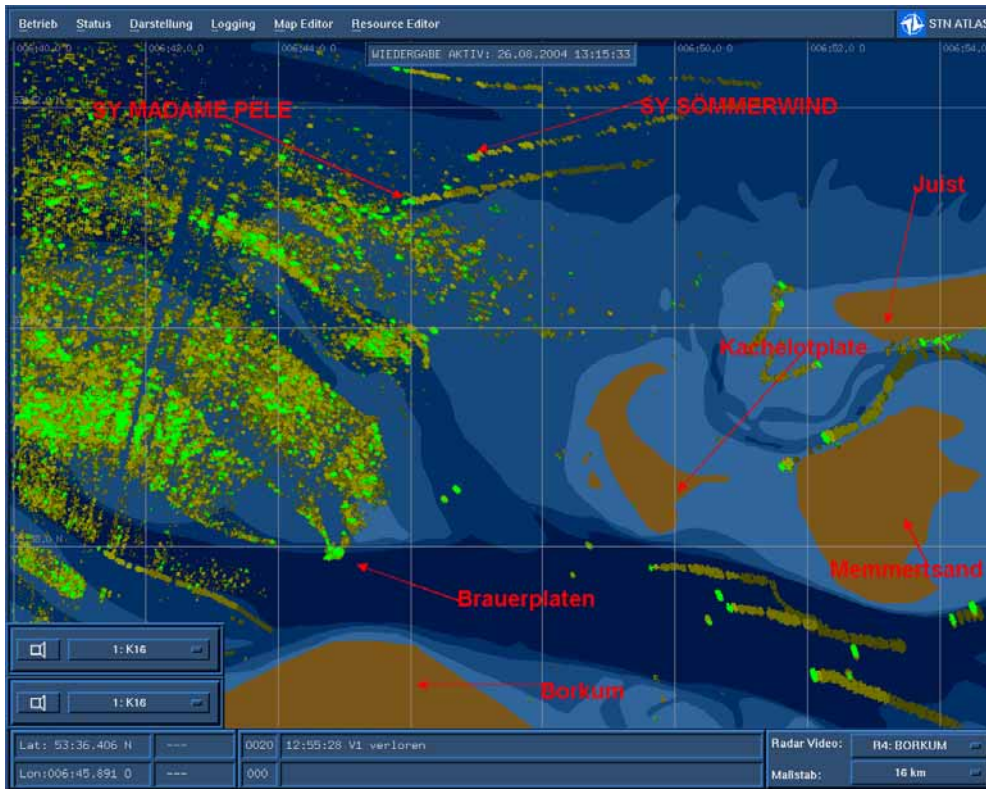


Figure 12: Plot of 13:15:33 h

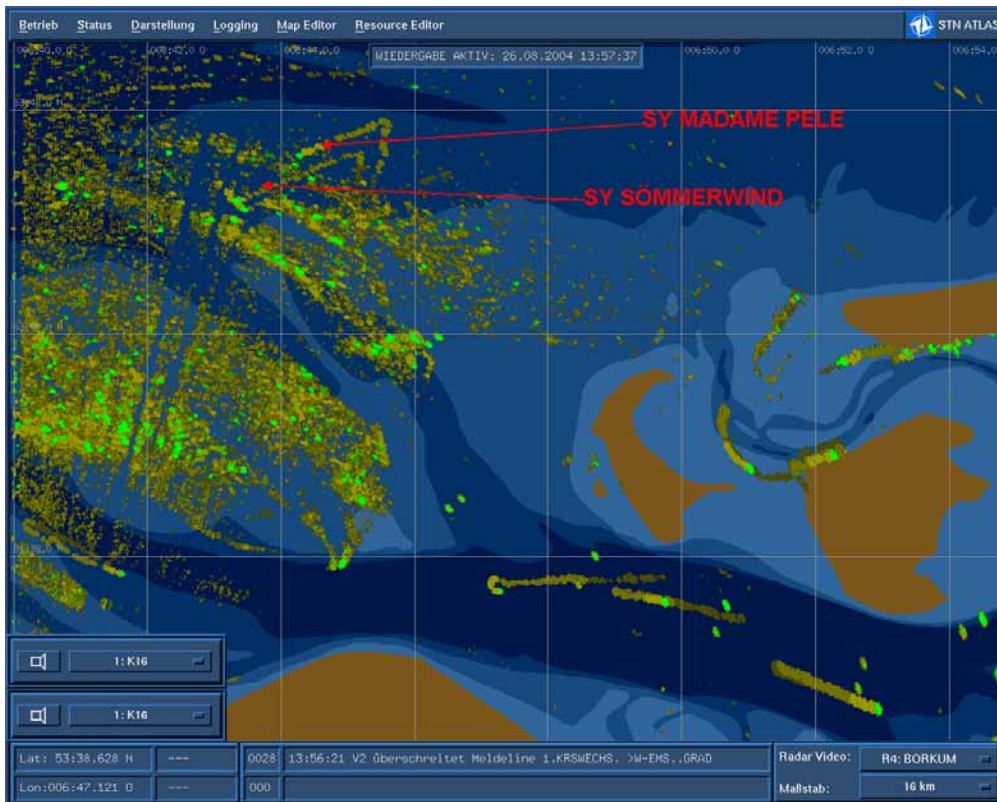


Figure 13: Plot of 13:57:37 h

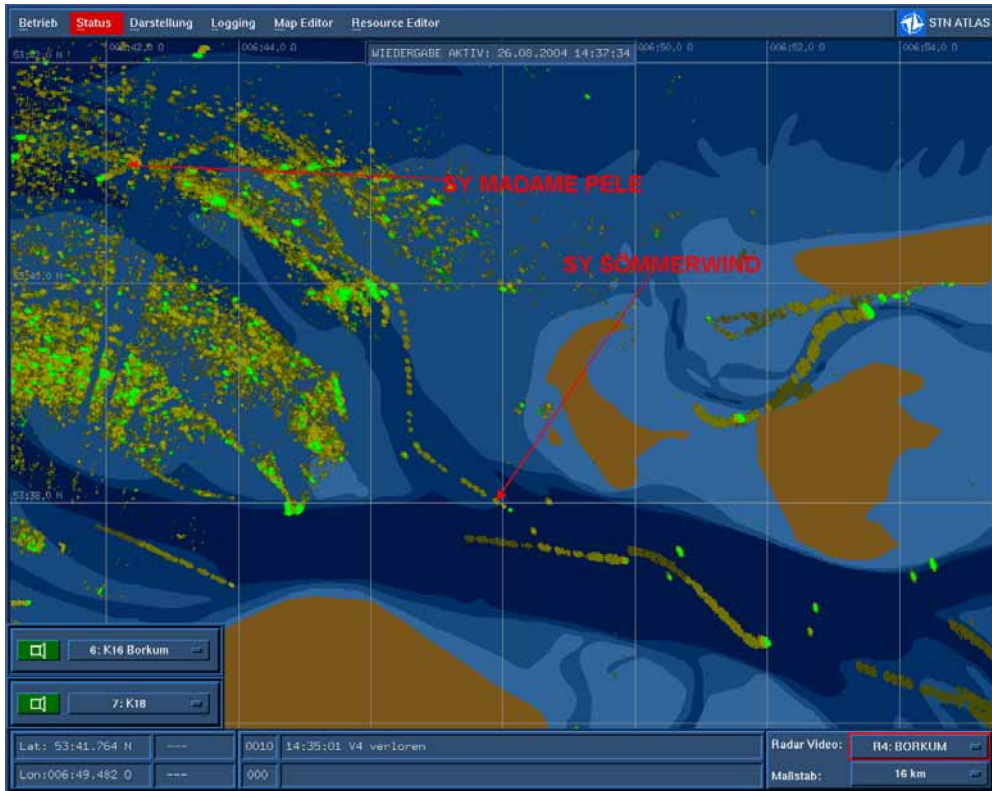


Figure 14: Plot of 14:37:34 h

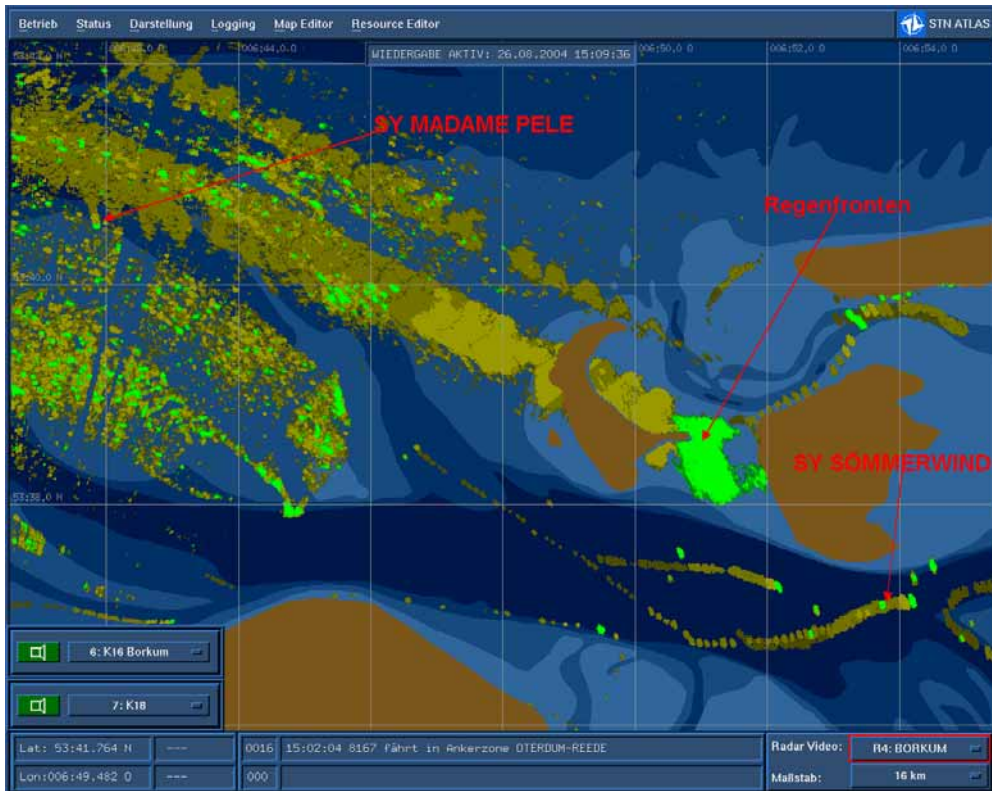


Figure 15: Plot of 15:09:36 h

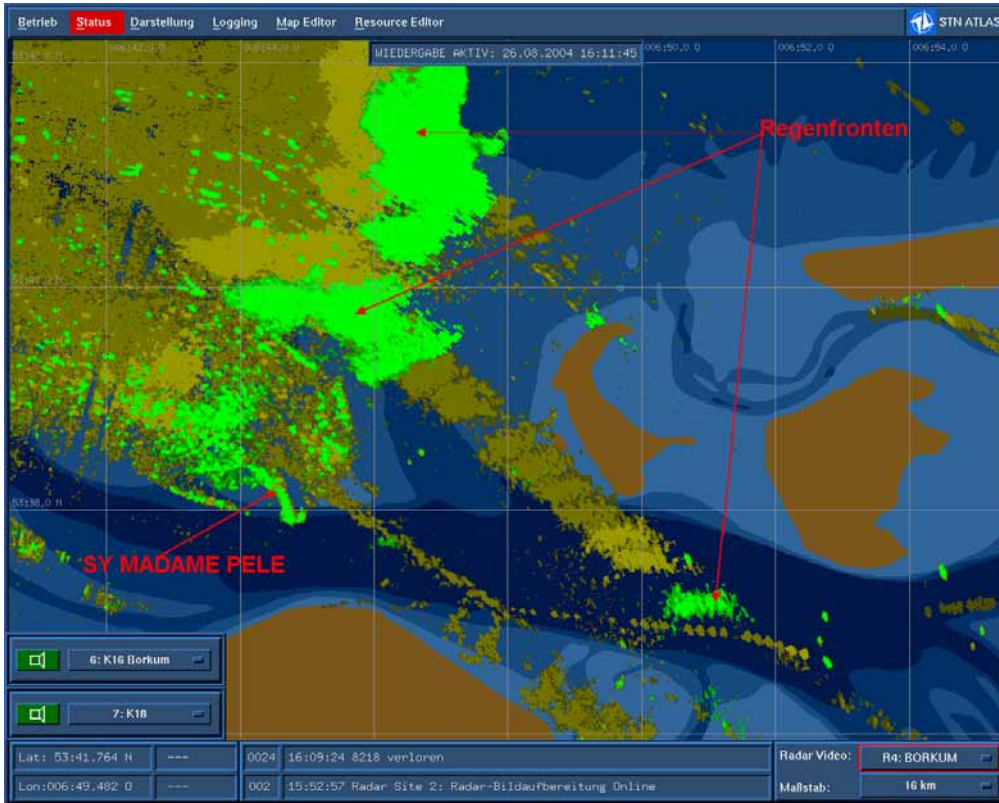


Figure 16: Plot of 16:11:45 h

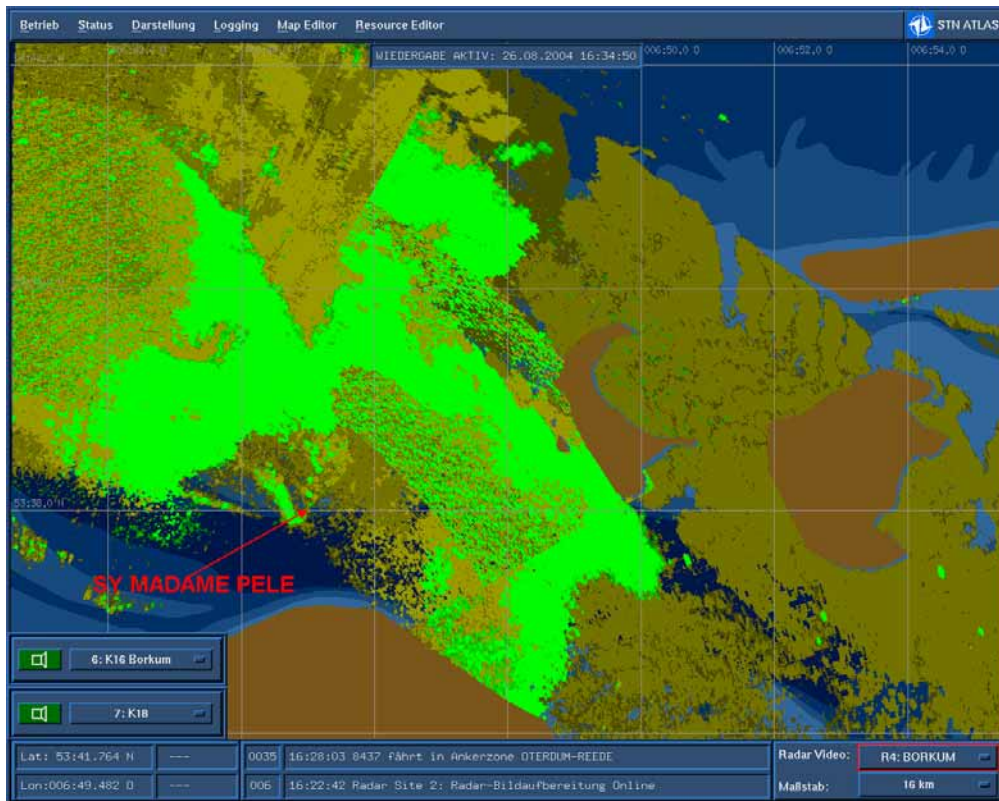


Figure 17: Plot of 16:34:50 h

After the larger rain front had passed with wind speeds of approx. 8 Bft the echo of SY MADAME PELE was lost at 16:36 h.

The individual radar plots were transferred to a sea chart and this shows the following course of the voyage.

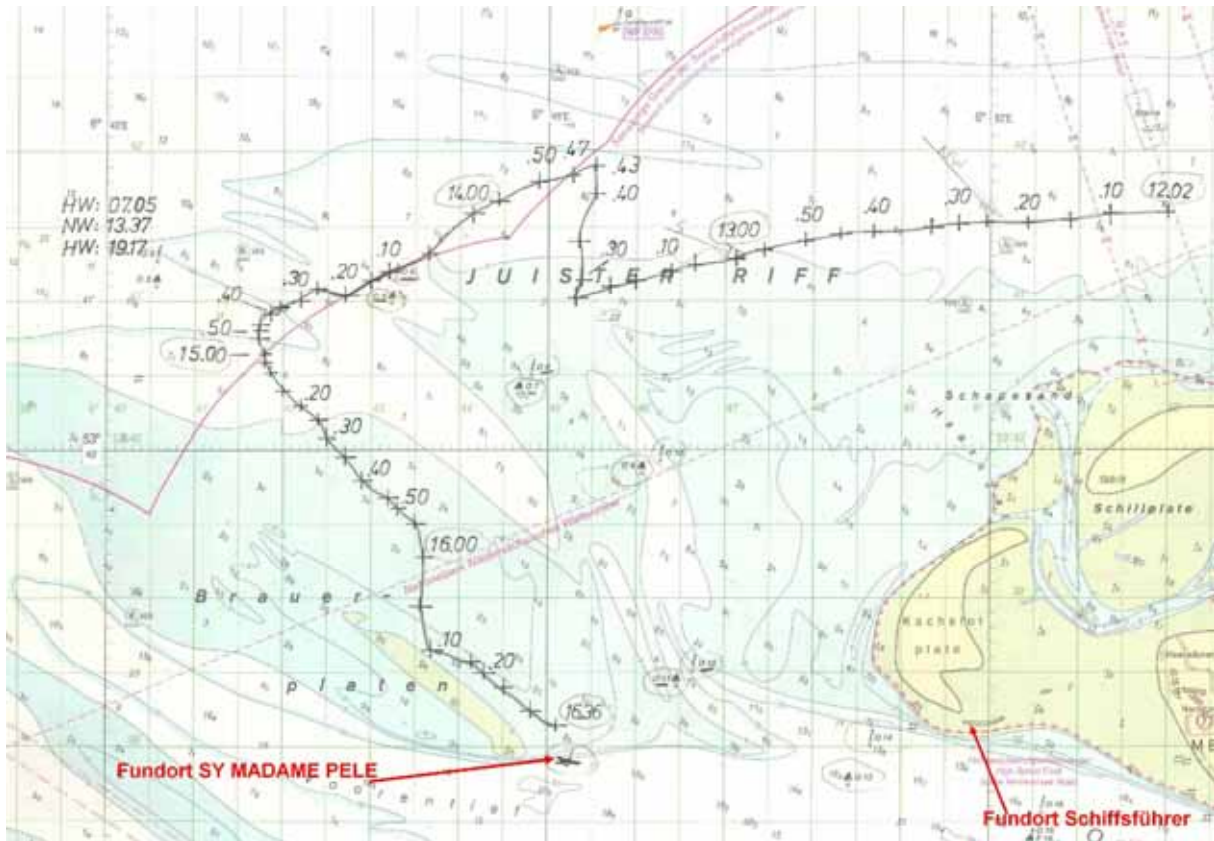


Figure 18: Course of voyage from 12:05 h to approx. 16:36 h

## 5.10 Drift characteristics

Several variants of the drifting behaviour of SY MADAME PELE and the crew members from 14:40 h onwards were calculated by the BSH on behalf of the BSU. It is not possible to make a reliable statement for the co-sailor since the calculation models are only designed for objects drifting on the surface. No life jacket was found near the corpse of the co-sailor. It can be assumed that she was driven below the water surface or onto the bottom at an early stage.

### 5.10.1 Drift calculation SY MADAME PELE

It was assumed that the yacht was without engine and sail propulsion at approx. 14:40 h and possibly unmanned. Two variants were calculated. Firstly, a drifting yacht that was still fully floating, and secondly a drifting yacht half under water. Two different simulations were carried out for this with different wind thrust coefficients. The wind thrust coefficient describes the factor with which the wind directly determines the drift of the boat. The value 5% applies for a vessel that has not capsized with a relatively large wind attack area due to the rig and the part of the vessel above water. The factor 1% was taken for a vessel that has instead capsized and is lying flat on the water. According to the calculations of the two simulations the yacht can have drifted on the way recorded by the Revierzentrale in both cases.

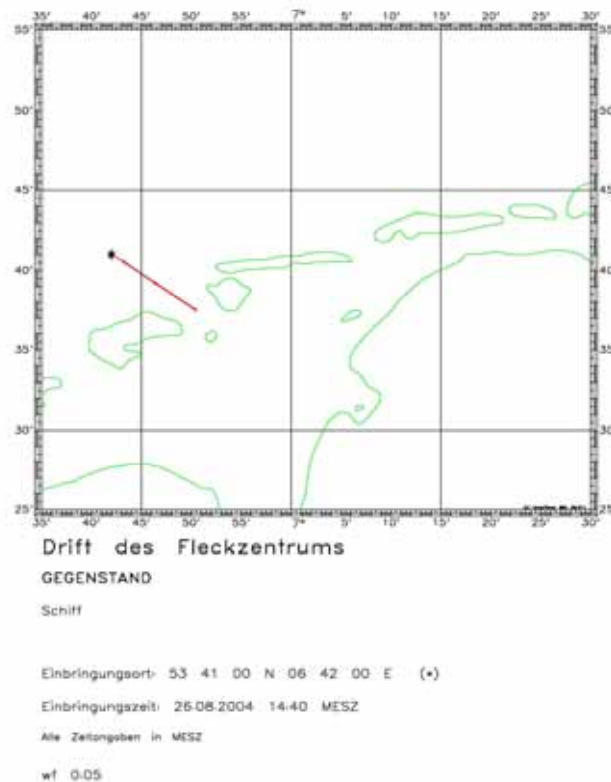


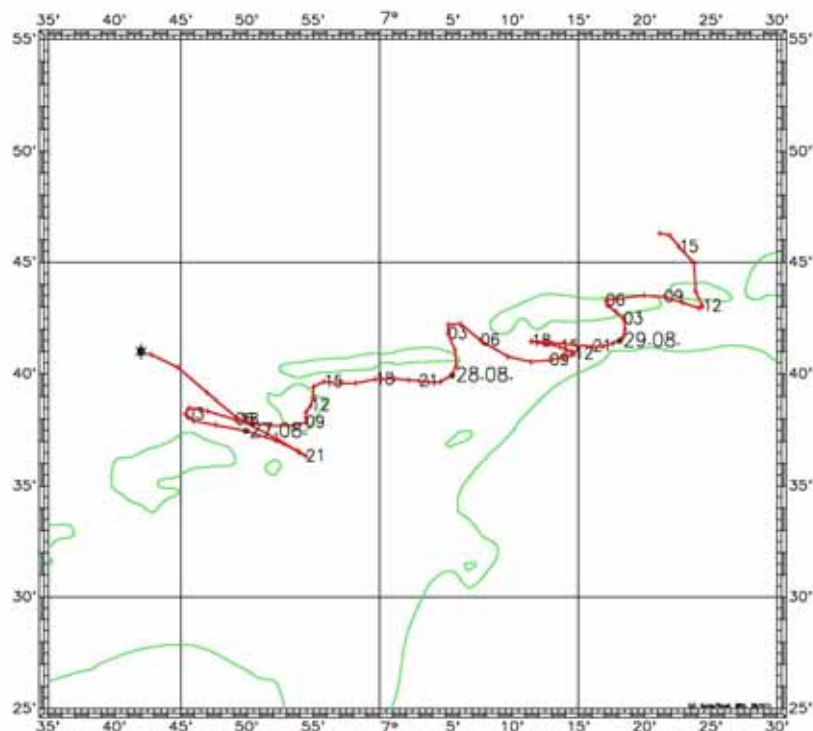
Figure 19: Drift characteristics of the yacht

### 5.10.2 Drift calculation for the skipper

According to the drift calculation it is assumed that the skipper most probably stranded in the morning or in the course of the morning of 27 August 2004.

It is possible that he went over board at 14:40 h or after 16:36 h judging by the drift path.

The following chart shows the drift of several possible position locations. If possible position locations lie on both sides of an island, as shown in the following chart the drift path islands can cross the land. This is largely due to the relatively high resolution of the calculation model of one nautical mile.



Drift des Fleckzentrums

GEGENSTAND

person

Einbringungsort: 53 41 00 N 06 42 00 E (\*)

Einbringungszeit: 26.08.2004 14:40 MESZ

Alle Zeitangaben in MESZ

wf 0.014

Figure 20: Drift of one person with life jacket



### 5.11 Water gauge curves and wind measurements

At the Borkum South Beach and Memmert water gauge the water level curves, wind direction and speed were recorded. The time stated is related to Central European Time (CET).

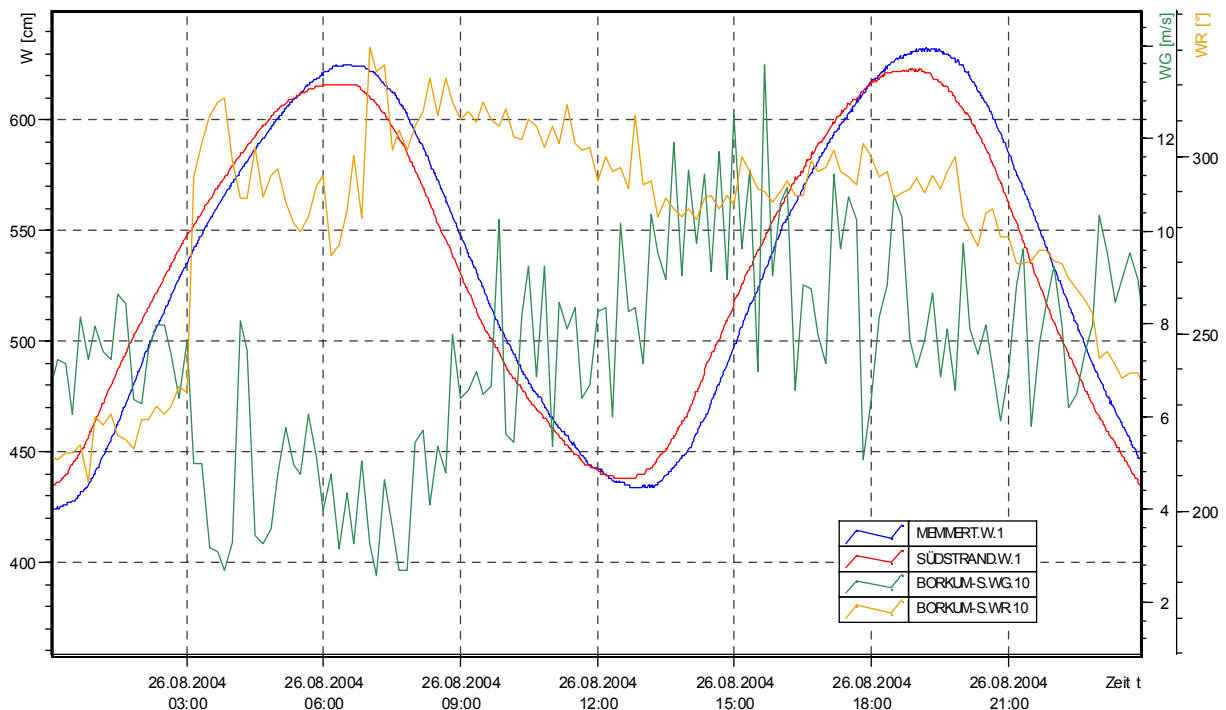


Figure 21: Water gauge curve and wind display

According to the water gauge curve above it was low water at 14:10 h (CEST) on Memmert on 26 August. The wind direction at Borkum South Beach at 09:00 h was from 320° and the wind turned back slowly. At 13:00 h a direction of 290° was measured. The highest wind force was measured at approx. 16:45 h on Borkum with 13.8 m/s (approx. 6 to 7 Bft) from direction approx. 290°.

### 5.12 Sounding data

The area round Brauerplatten is exposed to permanent change due to tidal currents. The sea area around Brauerplatten, Juister Riff, Osterems and Voorentief was last surveyed by the Survey Vessel WEGA during the period 27 March to 6 May 2004. The vessel location was determined with DGPS. The reference water gauge was Borkum South Beach and the echo soundings are made on MSpNW.

After the marine casualty the area was not measured again. Extra shallows or greater depths are possible following the last soundings.

Az.: 240/04

The following depths were calculated at the various positions for the sounding locations for 26 August 2004:

Time	Position	Sounding depths in m without wave	Sounding depths in m with a wave height of		
			1.50	2m	3m
1.)16:05 CEST	53°38'57'' N, 006°43'33'' E	4.20 m	3.45	3.10	2.70
2.)16:10 CEST	53°38'39'' N 006°43'42'' E	2.80 m	2.05	1.80	1.30
3.)16:36 CEST	53°38'09'' N 006°45'06'' E	3.00 m	2.25	2.00	1.50

The course of SY MADAME PELE and the place of the last under-water position on 29 August 2004 have been entered in the sounding plan of May 2004.

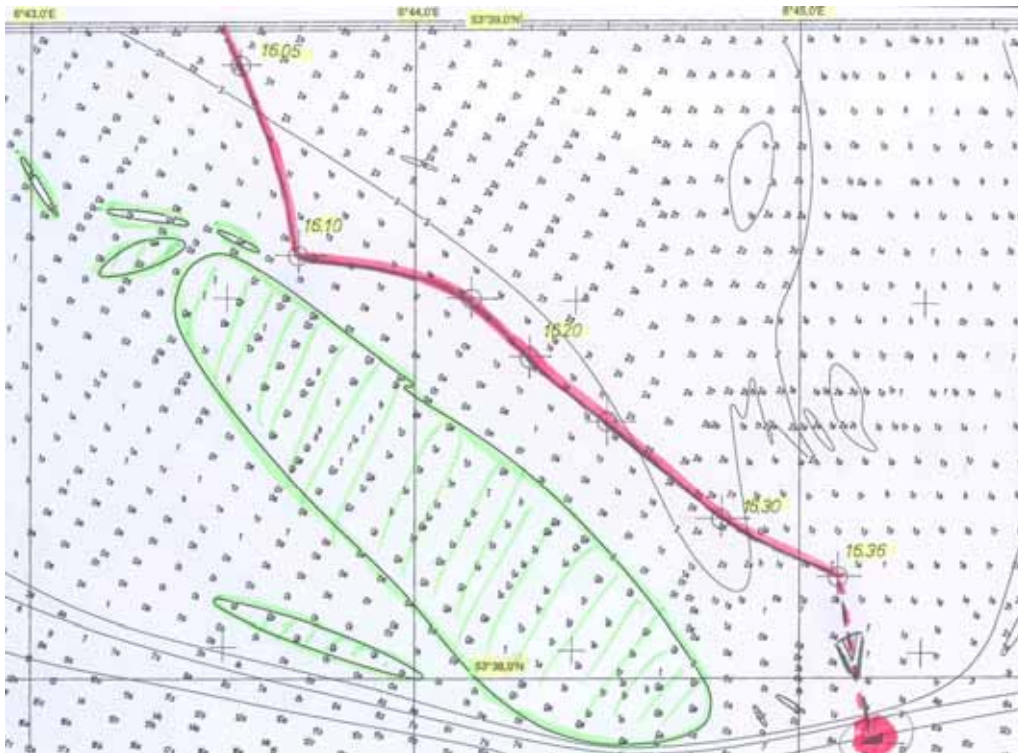


Figure 22: Course in the sounding plan

## 6 Analysis

As regards the technical condition of the yacht the voyage was poorly prepared and was under pressure of time. The skipper's lack of experience with the sea area and the yacht were co-responsible for the marine casualty. The only co-sailor was no help to the skipper. As regards the complicated operation of the sails, the arrangements of the bilge pump, the engine, the radio system, the navigation etc. in conjunction with the difficult area being sailed, the sailing yacht was not sufficient manned.

### 6.1 Vessel

The vessel did not satisfy all conditions recommended in the Safety Guidelines of the Cruiser Department of the Deutsche Segler-Verband (German Sailing Association) and the Classification Guideline of Germanischer Lloyd for leisure craft for a sea-going sail boat. According to these guidelines a sea railing with a height of 600 mm required was not present.

There was only a manual bilge pump below deck to pump out the bilge water. There should be at least two bilge pumps on yachts, and it should be possible to operate one pump directly above deck.

The draining pipe of the cockpit was joint with the outlet from the WC. According to recommendations cockpit draining pipes are to be kept open at all times and may not be connected with bilge pump draining pipes.

The navigation and safety equipment was not sufficient on several counts. There was no liferaft on board.

It was not possible to produce a watertight condition in several places, e.g. for the ventilators and the cockpit seats.

The vessel was a sharp-ended boat. The designation "Colin Archer" leads to a false safety feeling with regard to seaworthiness.

According to the assessment by the diver observations at the point where the vessel was found, the ship's hull, the superstructures and the rig remained intact. It is concluded from this that the wind and sea stresses did not lead to any damage. The breakage of the jib boom and the rudder probably only occurred at a very late stage in connection with groundings.

### 6.2 Electrics

The electric system of the vessel had not been executed expertly. Charging of the load batteries with shore current only necessarily leads to power failure after relatively long use. With the arrangement of the load batteries beneath the floor boards it can be assumed that these are flooded with relatively large quantity of water. With the failure of the load battery it was no longer possible to determine the position exactly and use the radio set. According to the Internet enquiry by the skipper it can be suspected that it was not possible to connect the radio set to the GPS.

It complies with practice to separate the load batteries from the battery only intended for starting the engine.

### 6.3 Engine

Several original documents and invoices were found in the skipper's pockets. There was only one fuel voucher for 15 l diesel. Accordingly it can be assumed that he did not fill up again and must have sailed for a relatively long period. After being started the diesel engine OM 636 continues to run after a power failure. A failure of the starter battery cannot have led to the engine stopping. It is to be presumed that the engine stopped due to lack of fuel. This indicates that the tank was run empty, since no oil escaping was noticed at the wreck of the vessel. However, it is also possible that oil sludge and water of condensation in the tank led to the engine stopping. The divers stated that the propeller was undamaged and could be turned freely. Consequently a piston seizure, blocking of the engine or of the propeller shaft can be ruled out.

### 6.4 Skipper and co-sailor

According to the investigations the skipper had all the necessary licences for the yacht and the area sailed. No evidence of experience of the nautical miles is required for the Sportbootführerschein See acquired on 5 April 2003. The skipper only needed a confirmation of 300 nautical miles for the Sportküstenschifferschein acquired on 8 September 2003. He had acquired these nautical miles in the two turns on a weekend and a one-week turn. No further seamanship practice and experience could be determined. The skipper had a great deal of theoretical knowledge without practical seamanship experience.

A quotation from a sailing school is: "*Nobody ever became a seaman at his desk,*" and according to the BSH brochure "Sicherheit in See- und Küstenbereich" ("Safety in Sea and Coastal Areas") in the first precautionary rules for water sports persons it is therefore also stated:

#### **1. Assess your knowledge and capabilities correctly**

*Even if you have proven in the examination that you can manage a leisure craft, first acquire practical experience by day in protected waters that are only little used by professional shipping.*

The skipper had evidently not observed these recommendations sufficiently and overestimated himself and his experience. The co-sailor was of no help to him and according to the statements the skipper virtually navigated as a single-handed sailor.

He obtained advice on the Internet about navigating the North Sea. In an age of electronic information public forums have increased on all areas in the water sports sector. The information and assistance obtained via the Internet cannot be any substitute for the advice of experienced experts known personally and reading sea manuals etc. It was not possible to ascertain whether he accepted the advice given on the Internet. A forum participant not known to him had given him the advice, for example, to shorten the voyage across the Osterems in good weather.

## **6.5 Presumed course of the accident**

With the records available from the Revierzentrale and the statements the following course of the accident can be assumed as most probable.

With a wind direction from SE to ESE at a windforce of 5 to 6 Bft on 23 August 2004 it can be assumed that SY MADAME PELE was moved under sail for most of the time over 60 nm from Cuxhaven to Norderney. It can also be assumed that with a wind direction from NW at 4 to 5 Bft on 26 August 2004 the vessel was sailed up to 13:00 h from Norderney. Assuming that on these two days approx. 60 nm were travelled under sail power alone, it should be possible to navigate the section from Kiel-Holtenau to the Osterems under engine with just one tank full.

There are some indications that the sails were lowered after 13:00 h, since the wind turned back a little and it was no longer possible to maintain the heading under sail alone. The courses from 13:25 h to 13:43 h and from 14:20 h to 14:30 h could only be steered under the prevailing wind direction under sail with engine support or solely under engine power.

The Osterems buoys O5 and O6 were passed at close quarters at approx. 14:10 h. If the ship's electronics and navigation equipment and the radio set had failed at this time, which appears to be probable due to the unfavourable arrangement of the load batteries, it would have been easily possible to find the position terrestrially with the good visibilities. According to this the owner ought to have known where the vessel was. If he deliberately wanted to run into the Osterems, he would now have had to make a change in course, falling by 110° to a course of approx. 130°. Instead he continued to run for 10 minutes on the old course of 240°. At 14:20 h the course was changed to 290° for about 5 minutes and then up to 14:40 h the vessel proceeded back on the course of approx. 240° on which it had been heading since 13:45 h.

The manoeuvres after 14:40 h cannot be explained under navigational and seamanship aspects. At a position two cable length south of buoys O3 and O5 the vessel falls off increasingly very slowly and at approx. 15:00 h goes onto a course of approx. 135°. At a speed of 1.6 kn over ground it is steered away from the Osterems navigation channel onto Brauerplatten. In view of this speed, the vessel appears to have drifted despite the current running with it and the aft wind without engine and sail propulsion with bare poles after 14:40 h.

Deliberate navigation of the Osterems and lack of orientation of the skipper can evidently be ruled out. It is more probable that due to a problem on board the vessel was steered or fell off unintentionally to SE.

The first ground contact due to shallows appears to have occurred at 16:05 h. With the water depths calculated in the wave trough of 1.30 m to 2.05 m the vessel with an original draft of 2.10 m was pushed over the flat water. This draft was probably substantially higher at the first ground contact since a relatively large volume of water had probably collected in the vessel through the ventilator openings and the cockpit seats that could not be closed sea-tight. It was not possible to pump the water out of the vessel easily with the only pump installed below deck.

The jib boom and the rudder appear to have been broken off after the first ground contact. The breakers breaking over the vessel evidently led to the aft cabin and the forward area below deck running full of water through the open insert hatches.

The radar echo disappeared from the screen at 16:36 h. At this time the vessel probably heeled over onto its side with the water in the bilge and the superstructures. The tide still coming in for a further three hours probably pushed the vessel over the flat until it ultimately sunk in the deep water of Voorentief at the edge of Brauerplaten.

There are no witnesses for when and how the two persons on board left the vessel. According to the drift calculations it is probable that one or the other of the two persons could have gone over board after 14:40 h. However, it is also probable that one or both persons were still on board up to the end of the radar records at 16:36 h. The first possibility would be that both the skipper and the co-sailor and possibly only one person could have fallen over board at 14:40 h, for example when climbing from the steering cockpit to the centre cockpit. Rescue manoeuvres evidently were not or could not be carried out.

The second possibility would be that the persons were on board until the vessel sunk. The fact that the co-sailor was not wearing any oilskins and was not wearing a life jacket either indicates that she was surprised by the accident.

The skipper was wearing oilskins and a life jacket. It is very unusual that he was carrying all his licences as originals and all the invoices paid up to then with him despite rain showers and splash water. This behaviour indicates that he left the vessel consciously and only at a relatively late point when he must have realised that the vessel could not longer be saved.

## **6.6 Summary**

The accident with two fatalities has shown that the experience and knowledge of the skipper were not sufficient for the sea area. The skipper was evidently not sufficiently familiar with the properties and fittings of the vessel. The vessel was not necessarily suitable for the area navigated with its equipment condition, safety equipment and as regards its navigating and operating condition. Aids that are indispensable for planning and carrying out the voyage such as sea charts, sea manuals, tidal calendars and port manuals must be observed. The advice and experience reports of unknown persons, especially those whose acquaintance is only made in Internet forums, should be treated with caution.

## **7 Safety recommendation(s)**

The sailing schools and sailing clubs providing training are called upon to draw the attention of water sports persons even more intensively to safety rules. If these rules, that are printed in the free BSH brochure "Sicherheit im See- und Küstenbereich" (Safety in Sea and Coastal Areas) are observed consistently, it should be possible to prevent accidents with a fatal outcome.

The instructors should point out that the minimal knowledge of seamanship tested in the licence examinations cannot replace practical experience in difficult sea areas. As is known, experience comes from doing, in other words the more nautical miles are navigated on water, the greater the practical knowledge learned in this way.

Owners and skippers are advised to observe the safety guidelines - Equipment and Safety of Sailing Yachts/Multiple-hull Boats of the Deutsche Segler-Verband (German Sailing Association) in the interest of their own safety and that of the vessel and the crew.

## 8 Sources

- Investigations by the Water Police (WSP)
- Written statements/comments/testimony by
  - previous owner
  - insurance company
  - expert
  - sailors
- Sea charts and vessel particulars of the BSH
- Water level calculations and drift calculations by the BSH
- Sounding values by the WSA Emden (WSA)
- Official weather expertise by the DWD
- Radar records by the vessel securing services/Verkehrszentralen (VTS)
- Investigations in the Yacht online Forum of 8.11.2003 to 1.10.2004  
[www.dk-forenserver.de](http://www.dk-forenserver.de)
- Sea manuals/literature
  - Törnführer Nordseeküste1 by Jan Werner, 4<sup>th</sup> edition, Delius Klasing Verlag
  - Nordseehandbuch Östlicher Teil (North Sea Manual, Eastern Part) BSH No. 20061
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