



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

**Investigation Report 149/05**

**Very Serious Marine Casualty**

**Loss Over Board and Subsequent Death  
of the Skipper of SY INA 2 North of Wustrow  
on 1 May 2005**

1 April 2006

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

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## 1 Summary of the marine casualty

At about 15.00 h CEST on 1 May 2005 the 69-year-old skipper of SY INA 2 was lost over board off Wustrow on a voyage from Warnemünde to Rerik. The sea was absolutely calm and the co-sailor was just engaged in taking down the main sail under engine power, when his attention was drawn to the accident by a call. He immediately rushed aft and saw the skipper holding on to the railing outboard on a level with the cockpit on the port side with one hand. When the co-sailor did not succeed in holding the skipper by the railing, the skipper drifted away from the boat. After a "person over board" manoeuvre the co-sailor succeeded in bringing the man who had fallen over board aft at the boat ladder. At this time the accident victim was already lifeless and could no longer support the rescue attempts. In this condition it was not possible to pull the accident victim on board over the boat's ladder from the stern. That is why he was provisionally secured to the boat ladder with a boat hook and a line. The co-sailor then sent out an emergency call via VHF radio telephone that was heard by several radio stations. A tender of the Surveying, Wreck-searching and Research Vessel DENEBO of the BSH<sup>1</sup>, the WSP<sup>1</sup>-Boat WARNOW with inflatable boat, the Fast Patrol Boat ENFORCER 2 of the BGS<sup>1</sup>, the Sea Rescue Boat WOLTERA of the DGzRS<sup>1</sup> and the SAR<sup>1</sup>-helicopter RESCUE 8956 proceeded to the scene of the accident. ENFORCER 2 went alongside the sail boat at about 15.33 h. After an unsuccessful attempt at recovery, the accident victim drifted off again and was finally recovered at 15.47 h by the inflatable boat of WARNOW and brought on board the WARNOW. The emergency physician who had arrived in the meantime with the SAR helicopter continued the resuscitation measures that had already been started and ascertained the death of the accident victim at 16.20 h.

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<sup>1</sup> Abbreviations: BSH (Bundesamt für Seeschifffahrt und Hydrographie – Federal Maritime and Hydrographic Agency), WSP (Water Police), BGS (Federal Border Guard, with effect as of 1 July 2005 renamed as Federal Police (BPOL)), SAR (Search and Rescue), DGzRS (Deutsche Gesellschaft zur Rettung Schiffbrüchiger - German Maritime Rescue Service)



### 3 Vessel particulars

#### 3.1 Photo



Figure 2: Photo of vessel

#### 3.2 Particulars

Name of vessel:	INA 2
Type of vessel:	Leisure craft, Dufour 28 Mezzo
Nationality/Flag:	Federal Republic of Germany
Port of Registry:	Lemkenhafen
Call sign:	DA7785
Year built:	1984
Building yard/Building No.:	Dufour Yachts, La Rochelle
International Boat Certificate:	95531 S
Length over all:	8.50 m
Width over all:	3.16 m
Displacement:	3.50 t
Draft at the time of the accident	1.70 m
Engine rating:	18.0 hp
Main engine:	Volvo Penta 2002
Speed:	7 kn
Hull material:	plastic
Number of crew:	2
Sails:	Roller Genoa 30.2 m <sup>2</sup> , main sail 16.4 m <sup>2</sup>

## 4 Course of the accident

### 4.1 Statement by the co-sailor

According to the statements by the co-sailor on 2 and 4 May 2005, he and the skipper had sailed from the port of registry Lemkenhafen (Fehmarn) to Warnemünde on 30 April 2005. The next day the two sailors had decided to proceed to Rerik into Salzhaff with wind forces of about 2 - 3 Bft.

They had left the port at about 11.00 h and about 10 minutes later had hoisted the main sail and the roller-reefing Genoa. They had then switched off the engine. At about 12.00 h they had taken in the Genoa because the wind had stopped in order to continue under engine power with the main sail standing. At 14.45 h Rerik had been abeam and the two sailors had decided to take in the main sail too.

To this end the boom had been made fast on the aft stay with a rubber seizing in order to prevent it from striking out to port or starboard. The skipper had remained in the cockpit in order to loosen the halyard clamp of the main sail, while his co-sailor had been on the cabin roof by the mast pulling down the sail into the lazy-jacks<sup>2</sup> in order to tie it down later. The skipper had passed several straps (seizings) forward for this. The co-sailor had been kneeling on the starboard side of the cabin roof to tighten the straps. This meant that he had had no vision contact with the cockpit that was masked by a sprayhood<sup>3</sup>.

At this time he had heard his name being called very urgently. He had then immediately rushed aft and seen that the skipper was hanging outboard holding the deck on the port side with his right hand. With his foot he had then switched the throttle lever to idling and had lain down on his stomach under the railing on a level with the aft mooring clamp and tried to get hold of the skipper. In response to his request to form a "claw" with his hand, the skipper had held out his hand to him.

While the boat was still moving the hand had slipped away from him and the skipper had drifted off. He had then turned the boat and seen the man in the water approx. two boat's lengths away from him, still making swimming movements. While the boat was drifting towards the man drifting in the water, he had gone to fetch the boathook that was secured to the forward sheet and had then drawn the skipper to the boat ladder aft with this. He had managed to grab his pullover and as the man in the water had no longer assisted him and was lifeless, his arms had folded upwards and the pullover had slipped over his head. He had not been able to grab him by his fleece shirt either.

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<sup>2</sup> Lazy-jacks guide the main sail on the boom with the aid of a rope device during reefing or taking down the sail in order to prevent the sail from blowing out.

<sup>3</sup> The sprayhood on INA 2 is made of strong fabric with plastic windows and serves as protection against wind and rain in the forward part of the cockpit.



He had only been able to hold him firmly by his vest. All attempts to get hold of his body and pull him up had failed as he had been unable to lift the weight over the boat ladder (see Figures 3 and 4). That is why he had secured the man in the water with the boathook by his vest and secured this to the cockpit with seizings. His head had been above water. Further attempts to use the life-collar secured to the railing and a further life line had failed, as a helping hand was always lacking.



Figure 3: Height of pushpit INA 2



Figure 4: Pushpit, top view INA 2

After this he had used the "person over board" function on the GPS receiver and put out an emergency call on VHF Channel 16 that had been answered immediately by MRCC<sup>4</sup> Bremen. After the radio traffic he had gone back to the boat ladder and tried to pull the man in the water out of the water as far as possible. That is why he did not want to answer any further radio calls. He had maintained the securing with the boathook until the emergency rescue services arrived. This took about 15 - 20 minutes.

The first to arrive at the scene of the accident was the BGS-Boat ENFORCER 2. The boat had made fast alongside INA 2. The crew had tried to secure the body of the man in the water with a line while the co-sailor sat on the boat ladder to hold the body fast. The line had slipped over the armpits up to the neck. After this the co-sailor had had to let go. While the line was being hauled in the body had slipped out of the rope knuckle and drifted forward between the two boats. ENFORCER 2 had then cast off while INA 2 had remained at its position.

At about the same time the WSP inflatable boat of the WARNOW had reached the position of the accident. The crew had managed to recover the man in the water and take him on board the WARNOW. The co-sailor had then shifted INA 2 alongside the WARNOW.

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<sup>4</sup> MRCC (Maritime Rescue Coordination Centre – Seenotleitung Bremen)

Shortly after this the SAR helicopter had reached the scene of the accident. An emergency physician had been let down by rope and had continued the resuscitation measures. The co-sailor had then been informed that the accident victim had died.

INA 2 had then been taken to Kühlungsborn with the aid of a member of the Water Police and the co-sailor. Following a discussion with a physician, the co-sailor had been questioned on board the WARNOW by the Water Police and the Criminal Investigation Department Bad Doberan until about 22.45 h. After this INA 2 had been shifted to a berth.

The crew had not been wearing life-jackets during the voyage to Rerik because the sea had been calm. There had been a life-collar with 50 m line at the stern of INA 2. The voyage plan had been drawn up using the "Offshore Navigator" programme and a laptop. During the voyage entries on the position, courses, weather and sails as well as the engine had been made on paper in a day plan that was then to be transferred into the logbook later. The co-sailor had kept the day plan and the skipper had kept the logbook.

It had not been possible to show the route planning on the laptop to the Water Police due to insufficient battery power. The day plan had probably been lost.

#### **4.2 Assignment report by the Water Police Rostock**

According to the assignment report of 1 May 2005 by the Water Police Rostock the Police Boat WARNOW (see Figure 5) had moored in the yacht marina of Kühlungsborn at 15.00 h following a coastal voyage in the sea area between Warnemünde und Kühlungsborn. At about 15.10 h the water police had heard the information by marine radio that a person had been lost over board from a sail boat.



Figure 5: WARNOW

MRCC Bremen had sent out a Mayday call about the accident at 15.15 h. The reported accident position  $\varphi 54^{\circ}07'N$   $\lambda 11^{\circ}34'E$  laid between Rerik and the Wustrow peninsular. WARNOW had left the port at 15.18 h and proceeded to the scene of the accident at maximum speed.

The inflatable boat of WARNOW that had already been set out for patrol was also to proceed to the scene of the accident at maximum speed. According to the information supplied by MRCC Bremen, the BGS Boat ENFORCER 2, the Wreck-searching and Survey Vessel DENEK, the Coastal Patrol Boat FEHMARN and an SAR helicopter had also set out for the scene of the accident.

It had been reported via VHF Channel 16 at about 15.30 h that ENFORCER 2 had reached the sail boat, that the person who had gone over board was still in the water and was being held by a second person who was on board. A little later ENFORCER 2 had asked WARNOW when it could reach the scene of the accident as there were problems with recovery. The answer had been that the inflatable boat of WARNOW would arrive in a few minutes.

The inflatable boat reached the scene of the accident at 15.47 h. At this time the accident victim had been drifting in the water and the crew of ENFORCER 2 had been trying to recover the person from the fore ship with the aid of a boathook. When this failed the crew of the inflatable boat had recovered the person and transferred him 3 - 4 minutes later to the Warnow. The lifeless person had been placed on the aft platform of the WARNOW on a level with the waterline.

The resuscitation started on board the inflatable boat had been continued there. There was reportedly no more pulse or breathing activity on the part of the accident victim and his eyes had been open with a fixed stare.

At 15.58 h INA 2 had made fast along the portside of WARNOW. The person on board the yacht had been requested to go on board the WARNOW and had been on the bridge until the SAR helicopter arrived. At about 16.00 h the tender of the DENEK, DENEK 2, had reached the scene of the accident and made fast briefly on the starboard side of WARNOW. The Second Officer of the DENEK had carried medical equipment for first aid with him, but this had not been used any more.

At 16.10 h the emergency physician had been winched down from the SAR helicopter. He had continued the resuscitation measures but these had not led to any success. Death had been ascertained at 16.20 h. During the inspection an injury above the right eye and strangulation marks on the neck had been ascertained.

The Sea Rescue Boat WOLTERA had arrived at the scene of the accident at 16.25 h. It had been agreed that the corpse should be taken to the marina in Kühlungsborn with the WARNOW. In the meantime the co-sailor had been questioned. He had also taken a Dräger Alcotest 7410 that had determined a breath alcohol content of 0.91 mg%. At 16.50 h the WARNOW had left the scene of the accident and had arrived in Kühlungsborn at 17.37 h. INA 2 had also been taken to Kühlungsborn with the aid of the co-sailor and a member of the water police.

### 4.3 Assignment report by ENFORCER 2

According to the assignment report by ENFORCER 2 of 2 May 2005 the boat (see Figure 6) had been on a patrol in the sea waters between Warnemünde and Rerik on 1 May 2005. At about 15.15 h the emergency call had been received from MRCC Bremen that a person had been lost over board from SY INA 2. The scene of the accident had been approx. 2 nm north-west of the Rerik Pier.



Figure 6: ENFORCER 2

ENFORCER 2 had reached the scene of the accident at about 15.33 h. The person on board the yacht had been aft and had been holding a lifeless person lying on his stomach with his head under water by his T-shirt. Furthermore, a blue floating line had been sighted at the stern. ENFORCER 2 had gone alongside at 15.35 h and the crew had started to rescue the lifeless person. The person on board the yacht had stated that he no longer had the strength to hold the body.

Attempts had then been made to secure the lifeless person with a line to prevent him from drifting off. The aim had been to place the rope round the person in the leg area, starting with the upper part of the body. Because of the current and the failing strength of the co-sailor the rescue attempt had been unsuccessful so that the man who had sustained the accident had drifted off.

The WARNOW had arrived at about 15.55 h and the crew had been informed of the person drifting in the water. The lifeless person had been recovered by the crew of the inflatable boat of WARNOW that had been put out. The water police had then initiated further measures. After this they had signed off at MRCC Bremen.

### **4.3.1 Supplementary comment on the assignment report**

ENFORCER 2 had gone alongside SY INA 2 with its starboard side at 15.55 h and two officers had jumped over onto the vessel. They had immediately rushed aft to help the man who was holding the accident victim. In response to the question by one of the officers about how long the accident victim had already been in the water, the co-sailor had answered "about 20 minutes". Furthermore he had informed them that he no longer had the strength to hold the person.

The officers had tried to lead a 20 mm thick line beneath the legs of the party in the water with the help of a boathook in order to fix him in position. However, this attempt had failed. In order to relieve the burden on the co-sailor one officer had tried to take over the person in the water from him. At this moment the T-shirt of the man in the water had ripped and as a result of the strong current the person had drifted along the hull in the direction of the fore ship. In order to prevent him from drifting away from the boat one officer had tried to hold the man in the water fast by his trouser waistband using a boathook. This manoeuvre had succeeded and shortly after this the accident victim had been recovered from the water by water police officers who had arrived with an inflatable boat.

## 5 Examination

The skipper's family had owned the INA 2, a yacht of type Dufour 28, for 13 years. The skipper was registered as owner. According to the statement by his daughter he had been sailing on several boat types since 1972, starting with a dinghy up to the sail boat. Sailing trips were carried out regularly. The family has long experience of sailing. The records show over 12,000 miles sailed. Trips included voyages to Denmark, e.g. round Fünen, Copenhagen, and Sweden, e.g. Göteborg with the Götakanal.

The skipper possessed a Leisure Craft Skipper's Licence, issued on 9 April 1974, the Leisure Craft Skipper's Licence Inland, issued on 2 August 1995, the Licence for Yachts for Inland Waters (A), issued on 28 October 1972, the limited-validity Radio Certificate for Very High Frequencies, issued on 10 November 1989, and a Weapon Licence for a signal pistol calibre 4, issued on 12 April 1983.

The co-sailor possesses a Leisure Craft Skipper's Licence, issued on 22 March 1991, a Leisure Craft Skipper's Licence Inland, a Licence for Yachts in Coastal Waters (BR), issued on 25 October 1991, and the limited-validity Radio Certificate for Very High Frequencies, issued on 2 November 1990.

### 5.1 Investigations by the Criminal Investigation Department Bad Doberan

The investigations by the Criminal Investigation Department are summarised below in as far as new findings are involved.

The co-sailor had been questioned by the Criminal Investigation Department at 19.45 h on 1 May 2005. He had been willing to make a statement on the course of the accident although he still had a blood alcohol content of 0.27 mg%. The statements essentially coincide with the circumstances already described. The only new findings had been that the boathook had broken during the rescue attempts and that the skipper had possibly fallen over board on the aft port side while urinating. Furthermore, the skipper had had a heart complaint and had had to take tablets. During the voyage the skipper had felt well and had also consumed alcoholic beverages.

#### 5.1.1 Report on the criminological examination of INA 2

The stern of INA 2 was 2.90 m wide. The height between the waterline and deck was 90 cm. The row of seats in the cockpit lined with wood had been 47 cm deep and was located 36 cm inboard. The seat height was 34 cm. The boom had a height of 1.77 m measured from the floor of the cockpit.

The distance between the clew and the outer edge of the stern had been approx. 1 m. The main sheet had been mounted at a distance of 1.30 m from the stern. There had been traces of a blood-like substance on the sheet at a height of 0.9 to 1 m. There had been firmly mounted pushpits on board that had been interrupted aft in the area of the boat ladder by flexible plastic-coated wires and that were drawn through on the port and starboard sides of the cockpit forward on the railing stanchions. The railing height had been 63 cm measured from the top wire. The spacing of the railing stanchions in the cockpit area had been approx. 1.60 m.

There had been a life-collar aft on the starboard side and an outboard engine mounted on the port side. There had been a soaked blue pullover and a red jacket lying beneath the tiller. Left of the tiller, at a distance of 20 cm, there had been grey abrasion on the plastic lining over a width of 3.5 cm. There had been a broken boathook on the starboard seat row. The boathook had been made of a hollow aluminium tube and a plastic hook. The front part of the boathook had been 62 cm long and the rear part 1.07 m long. At the front part of the boathook, measured at a distance of 45 cm from the tip, a blood-like substance had been found adhering over a length of approx. 1.5 cm.

There had been berths aft in the cabin on the port and starboard side. The galley had been mounted on the port side and the navigation and radio area had been on the starboard side. These were followed by the saloon with the table and two upholstered bench seats. On the port side there had been a tarpaulin on the floor, and on the starboard side a sea bag on the bench seat. There had been four open and two closed bottles of alcoholic beverages. No traces of any physical dispute had been found on deck or in the cabin.

The corpse of the skipper had been clothed with a pair of blue casual trousers and a blue T-shirt, as well as brown boat shoes. The garments had been wet through. Some vomit had been adhering to the T-shirt. The T-shirt had been severed at the right-hand armpit. The wrist-watch had stopped at 14.57 h.

### **5.1.2 Traces on the corpse and post mortem report**

The criminological autopsy had revealed that the right-hand eyelid had been torn and a strangulation mark made by a braided rope that did not go right round was found at the forward side of the neck in the area of the larynx. There was an 0.8 cm thick strangulation mark without any pattern in the right-hand armpit. The strangulation mark had run out on the forward and rear side of the shoulder. There had been large-area, rice grain-sized lesions on the inside of the left upper arm. There had been strangulation marking on the left on the back caused by a braided rope.

In order to ascertain the cause of death and the time of death two expert opinions were commissioned from the Institute for Forensic Medicine in Rostock by the public prosecutor's office in Rostock, that in summary come to the following conclusion:

Death occurred by drowning. A drowning incident lasts roughly between four and eight minutes. In the present case it must be assumed that on the one hand the fact that the accident victim held fast in the meantime could have prolonged the drowning incident, and on the other hand the alcoholic influence ascertained (blood alcohol content 2.29 mg%), the water temperature of 8°C to 9°C, the existing heart complaint and the age can have shortened the drowning incident.

If the accident victim went over board at about 15.10 h or a few minutes before this and no signs of life had been ascertained for the time after 15.30 h, it is to be assumed that he had been dead already when ENFORCER 2 arrived. It is not possible to determine the time of death more precisely on the basis of the files and the results of the post mortem.

As the post mortem revealed, the respiratory tract was blocked by liquid and hence irreversible damage caused by lack of oxygen was sustained by the vital inner organs and central regulation mechanisms of the brain. This caused the acute death. The post mortem did not reveal any indications of serious prior illnesses or gross influence of force. The many injuries ascertained on the accident victim indicate force applied by third parties and can certainly have been caused by recovery and rescue measures. With the exception of the rib fractures, the injuries can have been caused both while the person was alive, while he was dying, or shortly after death occurred. The rib fractures not surrounded by blood were without doubt sustained after death, evidently within the framework of the resuscitation measures.

## **5.2 Weather expertise**

On 3 May 2005 the BSU commissioned the Department Marine Meteorological Services of the Germany's National Meteorological Service (DWD) to examine the wind and sea conditions off the German Baltic Sea coast between Rerik and Warnemünde between 10.00 h and 16.00 h CEST on 1 May 2005.

On Sunday, 1 May 2005, the weather over Europe was determined by high air pressure over the Mediterranean and two low pressure whirls over the North East Atlantic. There was an area of low pressure between Greenland and Norway, and a second between Ireland and the Azores. The front systems of both areas of low pressure extended as far as North Germany and the Western Baltic Sea, but did not have much effect on the weather.

The analysis of the data bases presented shows that on 1 May 2005 a north-easterly to easterly wind, on average force 2 to 4 Bft, was blowing in the subject sea area between 10.00 h and 16.00 h CEST. There were no distinctive gusts and thunderstorms. The



weather was bright to cloudy and dry. The horizontal visibility was between 5 and 10 km. The air temperature was 14°C, the water temperature 8°C.

At a mean wind force between 2 and 4 Bft from a north-easterly direction, it was possible for a wind sea with characteristic wave heights of at most 0.5 m and periods of 3 s to develop. There was no swell. An overall sea with characteristic wave heights of about 0.5 m resulted.

### 5.3 Survey by the BSU on board INA 2

On 13 August 2005 two staff members of the BSU visited the INA 2 in Lemkenhafen. Initially the daughter and co-sailor of the accident victim were present, as well as two friends. In the presence of the BSU and a friend, the co-sailor then described the course of the accident, starting from the time at which he was at the foot of the mast engaged in taking down the sails.



Figure 7: View from mast foot INA 2

As a result of the high freeboard of 90 cm, there had always been one hand lacking to help him in his attempt to rescue the accident victim so that he could hold fast onto the boat himself and on the other hand hold the man in the water by the boat ladder (see Figures 8 and 9). The accident victim had already been lifeless at this time. He had tried to secure the man in the water to the boat ladder using lines and a boathook in order to call for help by radio. It did not appear possible to him to try and use the life-collar that was mounted on the railing on the starboard side aft.



Figure 8: Cockpit INA 2



Figure 9: Stern from behind, INA 2

He had been unable to pull the man in the water, who weighed approx. 70 kg, on board by himself. He had taken the lines to secure the man in the water from the port and starboard side of the companionway. He might possibly also have used a sheet to secure him. He had had to go down onto the boat ladder in order to hold the head of the man who had sustained the accident above water. Here the linkage of the sun-sail (Kuchenbude)<sup>5</sup> and the outboard engine mounted aft on the port side had been a hindrance to him. When ENFORCER 2 was alongside the crew had tried to draw a line under the armpits of the man in the water in order to pull him up with the end of the line and the running part. Here the arms of the man in the water had folded upwards and the line had partly been tight round his neck. That is why he had called upon the BGS crew to be careful.<sup>6</sup> Ultimately the man in the water had drifted off again and been recovered by the inflatable boat of the WSP. During the voyage the physical constitution of the skipper had been normal and not irregular. He had been surprised at the alcohol content measured during the post mortem. He had no explanation for this. The boat had been equipped as usual at the start of the season. They had taken the basic necessities of foods, beverages and items of equipment from their home to Lemkenhafen before the start of the voyage. Some of the alcoholic beverages had originated from the remains of the last season. Before the boat was taken into winter storage at the end of the season the beverages and provisions left behind were cleared out, taken home, and if expedient used again for the next season. That had been the procedure followed over the last years. The crew had not been wearing life-jackets during the voyage because the sea had been smooth as a mirror.

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<sup>5</sup> The Kuchenbude is the name given by sailors to a sun-sail consisting of linkage and solid fabric and that protects the cockpit as well as the sprayhood against weather influences.

<sup>6</sup> After questioning the crew members it was stated that they had not heard such a remark by the co-sailor at any time and would certainly dispute that the line had ever been in the vicinity of the neck of the person in the water during the attempted recovery.

### 5.3.1 Equipment of INA 2

Unit	Manufacturer	Type	Serial Number
Main compass	Plastimo	Contest	
Steering compass	Plastimo	Contest	
Bearing compass	Autohelm	Personal	
Log	Autohelm	Tridata	Z1321120425
Echo sounder	Autohelm	Tridata	Z1321120425
Wind direction indicator	NASA	Clipper/Wind	NC07 S/N50883 DA
VHF maritime radio phone	Shipmate	RS 8100 S	69921
Mobile radio telephone (cell phone)	Motorola		
Weather radio receiver	MS-Elektronik	M 7 Q	SN00800001
Navtex receiver	MS-Elektronik	MS-32 Tp	
Radio receiver	Grundig	Satellit	G-RV54
NASA PC-sensor	NASA	PC-Sensor	147EO18
Multiplexer	Sievers	SB 2005	
GPS receiver (stationary)	Phillips	APN 9 (MK 9)	769289
GPS receiver (manual unit)	Magellan	3000XL	
Radar	Ferropilot	1621 MK - 2	R071 - 7558
Sea chart plotter	Ferropilot	Yeoman N	6498
Barograph, electronic	Objekta		
Binoculars	Steiner	Navigator II	
On-board battery charger	Philippi	pro BL 12/32-2	15238
Autopilot, electric	Autohelm	1000	AZ 3231270030
Inflatable boat	Pischel	Bolero	
Outboard engine	Evinrude	4 BR	BE4BREO03944031
Signal pistol	Mondial	Cal. 4	Mo3878
Computer	Fujitsu Siemens	Amilo D 7820	3659580521
Printer	Canon	BJ 30	42760
Sea charts N.V. Arnis	Series 1-4		
Port manuals	Baltic Sea	1A, 1B, 2	
2 life-jackets	Secumar	150 N automatic	
1 life-jacket	AW Niemeyer	150 N automatic	

### Sails and hull

Length over all:	8.50 m	Rig:	Sloop
Length at waterline:	7.50 m	Mast height above water line	11.72 m
Width over all:	3.16 m	Measured sail area:	46.6 m <sup>2</sup>
Draft:	1.70 m	Main sail:	16.4 m <sup>2</sup>
Displacement:	3.40 t	Roller-reefing Genoa	30.2 m <sup>2</sup>
Building material:	3.40 t	Jib	20.0 m <sup>2</sup>
Registered tonnage:		Storm jib:	4.0 m <sup>2</sup>
Hull speed:	6.6 knots	Blister:	48. m <sup>2</sup>
Fuel tank, content:	45.0 litres		
Water tank, content:	70.0 litres		
<b>Engine</b>			
Engine type:	Penta 2002	Propeller, type:	2 vanes, fixed
Manufacturer:	Volvo	Direction of turning:	left-hand
Oil filter No.:	834337	Smallest turning circle:	
Rating:	18,0 PS	of the boat to:	starboard
Engine oil, type:	20/40	Most favourable berthing side	
Quantity at oil change:	2,5 litres	of boat is:	starboard
Shaft anode:	873411	Volvo	
Maximum revs.:	min speed: 7 kn	Consumption:	1.8 l/h
Cruising speed:	min speed: 5 kn	Consumption:	1.5 l/h
Slow speed:	min speed: 2 kn	Consumption:	1.0 l/h

### 5.4 Report by MRCC Bremen

The MRCC Bremen coordinated the rescue assignment via VHF radio traffic after being informed by DENEb that an emergency call had been received from INA 2. The following message was transmitted: "MAYDAY RELAY, MAYDAY RELAY, MAYDAY RELAY - to all marine radio stations, here is BREMEN RESCUE (three times), information No. 1, day and time group – 01, 1315 Begin MAYDAY, Person in water at position 54°07'N 11°34'E. Shipping is requested to keep a sharp lookout and inform BREMEN RESCUE. Here is BREMEN RESCUE, over."

It had not been possible to establish any more radio contact with INA 2. According to the information available two persons had been on board INA 2, one of whom had been lifeless outboard. ENFORCER 2 had reached the scene of the accident first. According to its report one co-sailor had been holding the man in the water fast. That was why it was not possible to operate the radio at the same time. After this ENFORCER 2 went alongside INA 2 and tried to recover the lifeless person. Somewhat later they reported that the lifeless person was being picked up by the inflatable boat of WARNOW. After

this WARNOW reported that the man who had sustained the accident was on board and it looked as though he had been unconscious for 20 minutes. The Emergency Rescue Boat WOLTERA reported that two emergency physicians and two rescue paramedics with medical equipment were on board and that it would proceed to the scene of the accident. It was to proceed towards the WARNOW. In order to save time an emergency physician was winched up from the WOLTERA by the SAR helicopter and set down on the WARNOW. When the emergency physician ascertained the death of the accident victim on board the WARNOW, the maritime emergency case of BREMEN RESCUE was terminated.

## 5.5 Survey of ENFORCER 2

On 25 August 2005 the BSU surveyed ENFORCER 2 at the Federal Police in Rostock. According to the statement by the crew that had been on board on the day of the accident of INA 2, ENFORCER 2 had reached the scene of the accident at full speed at 15.33 h. The crew had assumed that at that time the man who had sustained the accident had been in the water for about 20 minutes. The co-sailor had been lying aft between the railing and the deck in a smooth sea and holding the man in the water by his T-shirt. The accident victim had been lying under the stern edge of INA 2 with his head under water. That was why the commander had decided to go alongside. One crew member of ENFORCER 2 had then transferred to INA 2 and tried with one hand to pull the lifeless body up by his T-shirt. The T-shirt had ripped as he did so. After this an attempt had been made with the aid of the boathook and a blue mooring line to get hold of the feet of the lifeless person. Before this had been done the line had slipped off and the lifeless person had drifted forward between the boats. After this the inflatable boat of the water police had arrived and recovered the man in the water.

ENFORCER 2 has two inflatable life-rafts, each for six persons, secured aft on the port and starboard sides next to the platform. On the boat deck a rescue rod with a fixed ring and loop and a life-ring with 28 m of line are mounted on the port side. If a lifeless person were to be recovered with the rescue rod, one crew member would have to go into the water to fasten the loop in the ring to provide support to the lifeless person. For its own rescue purposes, the crew has inflatable life-jackets, solid jackets and immersion suits as well as the two life-rafts. No rescue boat, life-collars/life buoys, a climbing rescue net or a stretcher for bringing a person in the water on board are available.

In response to questioning, the crew of ENFORCER 2 performed a "person over board" manoeuvre off the high dune north-east of the Rostock Sea Canal. A buoy was thrown over board for this purpose. After three minutes the buoy was alongside on the starboard side and could be guided by two crew members secured with a life-belt and a rescue rod (see Figure 10) aft to the rescue platform at the aft edge of the stern. It was possible to pull the buoy on board over the platform (see Figure 11) that ends almost on a level with the waterline and set it down on board over an approx. 40 cm high folding ladder. One crew member was equipped with an immersion suit for this.



Figure 10: Rescue rod ENFORCER 2



Figure 11: Platform ENFORCER 2

The "buoy over board" manoeuvre proceeded without any problem. Such emergency cases at sea occur about four times a year. However, the actual task of ENFORCER 2 was to monitor the border. The boat was optimally constructed and equipped for this purpose.

### 5.5.1 Technical particulars of ENFORCER 2

ENFORCER 2 has a length over all of 16.1 m and a draft of 0.9 m with a freeboard of 1.0 m at the aft ship. With its water-jet drive and engine power from two turbo diesel engines each with 653 kW (875 hp) it can reach a maximum speed of 45 kn. It has good manoeuvring properties and can turn almost on the spot. Its sea behaviour is good. The BSU observed that during the trip on the estuary with a calm sea and at slow speed, permanent helm movements were necessary to hold the boat on course. There are four high-level seats with seatbelts installed in the wheelhouse. Due to the firmly fixed seat positions all-round vision is limited during travel (see Figure 12). The two forward places are designed for operating the navigation and radio equipment. The helm, consisting of a hydraulic steering system with swivel water jet drives, is operated from the starboard side. VHF Channel 16 is permanently monitored.



Figure 12: Bridge window ENFORCER 2

## 5.6 Survey on the Rescue Cruiser HERMANN RUDOLF MEYER

A "person over board" manoeuvre was tried out on the rescue cruiser (see Figure 13) at Blexen Roads off Bremerhaven on 6 September 2005. A BSU staff member wearing an immersion suit went into the water for this and was recovered by the daughter boat of the rescue cruiser (see Figures 14 and 15). To this end the daughter boat was launched into the water via the carriage of the rescue cruiser.



Figure 13: Rescue Cruiser HERMANN RUDOLF MEYER





Figure 14: "Person over board" manoeuvre“



Figure 15: Daughter boat CHRISTIAN

The rescue was carried out without any problems in a calm sea. The test person could be taken on board through the gate of the daughter boat aft on the starboard side almost at the level of the waterline, swimming on his back, by a crew member holding fast to the rod mounted on the boat with one hand. After this the daughter boat went back onto the carriage of the rescue cruiser and was heaved up and secured. Without the daughter boat it was not possible to draw the test person from the water directly onto HERMANN RUDOLF MEYER (see Figure 16).



Figure 16: "Person over board" manoeuvre

The German Sea Rescue Service has developed the rescue system with rescue cruiser and daughter boat in the course of time and 140 years of experience, and it has proved successful on the German coasts. In addition there is a stretcher with solid shell lining on board the sea rescue cruiser for transporting sick persons. This means that persons can be carried from board lying down (see Figure 17). A climbing rescue net is mounted



midships on the port side and can be hung over board if needed. Persons who still have sufficient strength can climb on board using the net (see Figure 18). The freeboard is about 1.20 m. A rescue rod with loop is currently being serviced on shore and could not be presented. On other vessels the rescue rod has already been taken out of service as it is difficult to guide persons in the water to the boat with it.

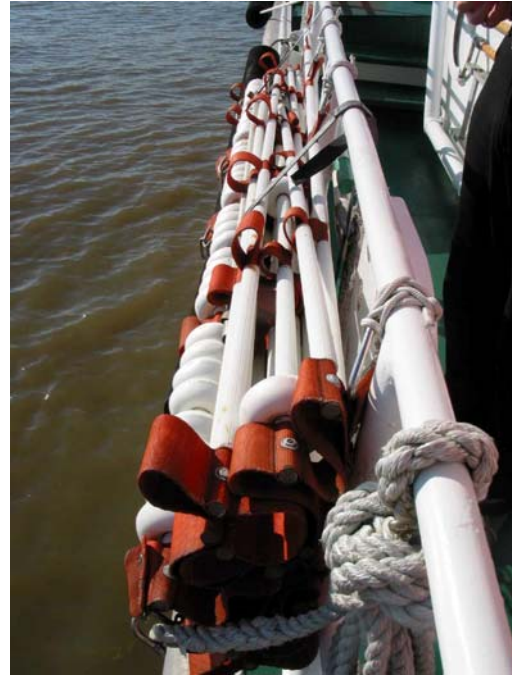


Figure 17: Stretcher Rescue Cruiser HERMANN RUDOLF MEYER

Figure 18: Climbing rescue net

The rescue cruiser also has several radio systems. VHF Channel 16 is monitored round the clock. In addition there is a VHF Channel 0 reserved for the German Sea Rescue Service fleet and a few public authority vessels of the WSV – Federal Waterways and Shipping Administration (e.g. NEUWERK, MELLUM) for internal communication with MRCC. The cruiser has a defibrillator and an oxygen device in addition to other apparatus for first aid measures. It is also possible to call in radio physician advisory services from Cuxhaven.

Recovering a lifeless or weak person from the water is problematic without a rescue system like that possessed by a rescue cruiser. Even with a slight freeboard height of about 50 cm, it is hardly possible to grab a person who is wet through and pull him/her on board. On board sail boats like INA 2 with a freeboard of 90 cm it is practically impossible to pull a helpless person on board. In the estimation of the emergency cruiser, the first measure should therefore be an attempt to keep the head above water and to secure the helpless person. Wearing a life-jacket is considered crucial for this.

## 5.7 Systems for rescuing persons in the water

The BSU has set out further rescue systems below that are used for rescuing a person from the water under certain circumstances. The list simply serves as an example. In the case of auxiliary persons who under certain circumstances go into the water to rescue (third-party rescue) lifeless or helpless persons, their own readiness to take risks, securing and endangerment must be taken into account.

### 5.7.1 Ring life-saver, life-jacket, life-collar (horse-shoe form), life-buoy and working safety jacket

In order to facilitate rescue in the case of these life saving appliances it is to be considered that ideally they should have been put on already before a person goes over board. However, it is still possible to put them on in the water. It is generally easier for a helping person to put a ring life-saver and life-collar as well as a life-buoy (see Figure 19) onto a lifeless body in the water as rescue means than it is to put on a life-jacket and inflatable working jacket. In the case of helpless persons there is additionally the risk that they may slip out of ring life-saver, or in the case of the life-buoy that is also used by the DLRG<sup>7</sup>, that they can slip off. Generally, however, the body can be held with the head above the water.

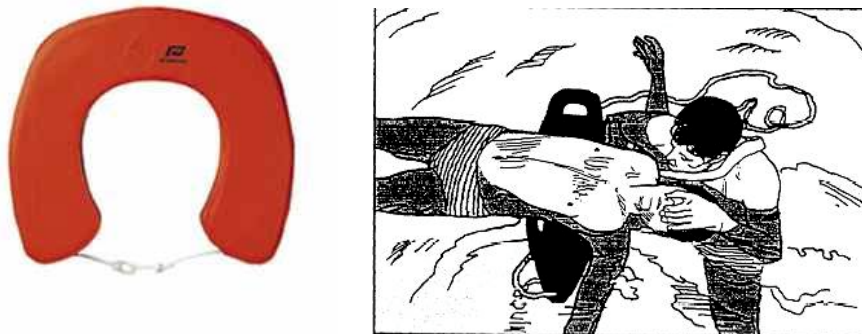


Figure 19: Horse-shoe life-collar, use of life-buoy DLRG

### 5.7.2 Immersion diving suits

Immersion suits (see Figure 20) are stipulated for crews in the merchant navy. They protect against frostbite and depending on the model are buoyant. Depending on the model, when an immersion suit is used the person in the water automatically swims on his/her back without any further rescue means being necessary. However, the freedom of movement is restricted.

<sup>7</sup> DLRG Deutsche Lebens-Rettungs-Gesellschaft – German Maritime Rescue Service



Figure 20: Immersion diving suit

### 5.7.3 Rescue rod

Rescue rods are available with and without a rescue loop. In some systems the loop must be operated in the water for lashing. With the rescue rod or possibly with a boathook it is possible to guide persons in the water to the boat and to the boat ladder or climbing rail (see Figure 10).

### 5.7.4 Climbing rescue net

There are climbing rescue nets with and without a frame. In the case of nets without a frame the net is hung on the railing and should reach down to the water (see Figure 21). Nets with frames can be led into the water. The person drifting in the water could then be heaved onto the boat with the net and frame via guest ropes with the assistance of a person in the water and other helpers. However, when this system is used the possibility of additional injuries cannot be ruled out, especially in the case of lifeless persons.



Figure 21: Rescue net <sup>8</sup>

### 5.7.5 Platform astern

A platform astern at the boat is a good structural measure making it easier to bring a person on board out of the water. Ideally the platform should only be a few cm above the waterline. This means that a lifeless person can at least be raised onto the platform. Then under certain circumstances one auxiliary person is sufficient to pull up the soaked body (see Figure 11). In the case of rough seas it can be difficult to recover the person who has sustained the accident via the stern, as he could be killed by the up and down movements of the boat.

### 5.7.6 Rescue boat

In the case of high walled vessels an accident lifeboat that in leisure shipping is often a small inflatable boat is a good possibility for bringing a helpless person in the water initially to about water level height in the accident lifeboat. However, a sufficient number of crew are necessary to use this, as well as sufficient space for stowing the boat on the

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<sup>8</sup> Publication of the photos with kind permission of Messrs. Dacon Sub Sea A/S, Norway

parent vessel. Furthermore, such a boat must have sufficient space for the helper and a minimum of stability. In leisure shipping inflatable boats are occasionally towed. This system has proved positive for the professional rescuers of the DGzRS (see Chapter 5.5 above). However, lowering an accident lifeboat depends on the weather conditions, with consideration given to jeopardising the rescuers.

### 5.7.7 Lifesaving floats/life-rafts and inflatable rescue boats

These life saving appliances chiefly serve for group rescues. They offer space for the entire crew and afford protection against weather and hypothermia. They are also equipped with signals, first-aid equipment and provisions (drinking water, food). The life-rafts are activated either manually or automatically via a water-pressure lock. The disadvantage is that active work is necessary to occupy the life-raft. Furthermore, it cannot be manoeuvred. Lifeless persons could be drawn on board at waterline level with the assistance of a helper.

There are also one-man inflatable rescue boats with an inflatable device that can be stowed in a carrier bag.



Figure 22: One-man inflatable rescue boat<sup>9</sup>

### 5.7.8 Rescue stretcher, rescue lifting systems with floating and sinking loops

Under the medical aspect and to avoid blood circulation failures, when rescuing weakened and under-cooled persons from the water, such persons should be moved as little as possible and be transported horizontally. From the point of view of practice, this type of rescuing is not possible without auxiliary means.

With the aid of a rescue stretcher injured or lifeless persons can be transported lying down and be recovered from the vessel gently. Recovery over great differences in

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<sup>9</sup> Publication of the photos with kind permission of Messrs. SailGB, UK



height or obstacles can be performed by roping. Various systems enter into consideration as rescue stretchers. On rescue cruisers, stretchers with a solid shell are used (see Figure 17).

At the University of Applied Science Hildesheim/Holzminden/Göttingen a system with floating and sinking loop was developed within the framework of the "Rescue Lifting System" (RLS) research project (see Figure 23)<sup>10</sup>, that is also recommended by the See-BG (Marine Insurance and Safety Association) in Germany. The RLS also makes it easier for the helper to put it on a helpless person in the water.

The person sustaining the accident could first be lifted into a life-raft in horizontal position with the aid of handles and without hoisting gear (see Figure 24)<sup>10</sup>. As an enormous effort is necessary for the crew to lift the injured person from the water, and the high wall of the yacht represents an almost insurmountable obstacle, an attempt could be made to draw the accident victim on board with the aid of the main sheet or the main halyard (see Figure 25)<sup>10</sup>. If the combination of a halyard and a winch is not sufficient to achieve the necessary force on an 8.50 m long yacht such as INA 2, a tackle - ideally with 6-fold shearing - on the main halyard should be used for help.

If an additional tackle is not available, better transmission of force could be achieved by using the main sheet completely detached at the foot block and from the boom by hooking the upper block into the halyard and hooking the lower block into the rescue equipment. Another possibility would be to use the main sheet by unhooking the foot block and hooking it into the rescue device at the foot block and thus under the main boom head. It should be considered here that in the case of rough seas the boom might under certain circumstances have to be additionally secured.

A pre-mounted lifting device with winch and high transmission of forces (see Figures 26, 27 and 28) mounted on the mast next to the guide block oriented crossways below the spreader, and a free-running block with snap hook at the free end of the winch rope to be hooked into the shroud as needed, for hooking in of the rescue device would be optimal. Such a lifting device would be ready for use at any time.



Figure 23: RLS with floating and sinking loop    Figure 24: Rescue from the life raft

<sup>10</sup> Photos published with kind permission of Prof. Michael Schwindt and Dipl.-Ing. Dr. med. Wolfgang Baumeier



Figure 25: Winching up a person



Figure 26: IKAR-height-securing device Type HRA with rescue lift device<sup>11</sup>



Figure 27: Possible attachment of the rescue system<sup>11</sup>



Figure 28: Use of rig tripod<sup>11</sup>

<sup>11</sup> Photos published with kind permission of Messrs. IKAR GmbH, Fulda. In the event of rescue after a fall this winch system can be engaged in a suspension unit by a second person so that the accident victim can be heaved up safely with pre-mounted rope guiding with holder and block. The transmission of force is 1:10 and facilitates winching. The winch also has a brake system that keeps to the 6 kN fall attenuation required by the See-BG (Marine Insurance and Safety Association). Consequently the system can also be used for persons as a height-securing system, for example when working in the mast or on deck, in order to prevent a fall. This technique has already proved successful thousands of times on shore in conjunction with a rig tripod or other types of suspension.



### 5.7.9 Securing the rescuer with line or life-belt

In the case of some life saving appliances (e.g. ring life-buoy and life-collar) it is possible to mount safety lines already on the rescue devices. This means that on the one hand the helper going into the water can be secured, and on the other hand the helpless person who has fallen over board can be brought to the boat.

The DLRG for instance uses rescue lines with rescue loops among its rescue equipment (see Figure 27). The loop is secured over the shoulders and armpits of the rescuer. This means that the rescuer is secured and can for instance be pulled back with the rescued person. Another way of securing is e.g. to attach safety lines during fire protection work or during diving. Here the line is passed forward round the neck and armpits and knotted with a bowline hitch (see Figure 29). In the case of a life-belt (see Figure 30) the rescue line could simply be hooked in with a snap hook or be knotted with a bowline hitch without a hook.



Figure 29: Putting on a rescue line



Figure 30: Life-belt

## 6 Analysis

The very serious maritime casualty with fatality on sail boat INA 2 is attributable to the fact that the skipper probably lost his balance and fell over board from the cockpit area on the port side at about 15.00 h. It was not possible to determine the exact course definitely. He might have stumbled over the firmly mounted brackets of the linkage for the weather protection (sun-sail). The skipper was under the influence of alcohol and during the sea passage was not secured with a life-belt, a life-jacket or an inflatable work jacket. At the time of the accident the sea was calm.

At the time of the accident the co-sailor was at the mast foot tying down the main sail. The measures conducted directly after this did not lead to success. Initially the skipper was able to hold fast on to the railing stanchion, but could not climb back on board, not even with the assistance of the co-sailor.

The accident victim thereupon drifted away from the boat, whereby the co-sailor was able to see him making swimming motions. The co-sailor initiated a "person-over-board" manoeuvre with which he was able to bring the accident victim aft to the boat's ladder at the sloping stern of INA 2. With a freeboard of 90 cm the co-sailor could only provisionally secure the accident victim with lines and by holding him fast. At this time the accident victim was already lifeless.

The co-sailor was unable to use the life-collar mounted aft on the starboard side and had difficulty in keeping the accident victim's head above water. According to the statement by the co-sailor he would have needed a helping hand all the time for recovery. In addition the high freeboard, the foot brackets of the linkage of the sun-sail and outboard engine mounted aft on the port side were hindrances. At about 15.10 h the co-sailor was able to send out an emergency call and after this he returned to the accident victim.

According to the forensic expert opinion, drowning takes about 4-8 minutes. The fact that the co-sailor held him fast in the meantime prolonged the drowning operation. A water temperature of 8-9°C, the influence of alcohol, the age and the already existing heart complaint of the accident victim shortened the drowning operation. It is to be assumed that the accident victim had already died when the first rescuers arrived at about 15.30 h.

The attempt to pull the accident victim on board over the boat ladder with the aid of the co-sailor and a crew member of ENFORCER 2 also failed. This may have been possible under certain circumstances, if an additional person in the water had assisted. For reasons of individual security, at a water temperature of 8°C to 9°C it would first have been necessary for the crew member of ENFORCER 2 to put on an immersion suit.

The rescue rod was no longer used. A crew member would have had to go into the water with a protective suit to operate the loop on the rescue rod too, in order to pull the loop inside the metal ring round the lifeless body of the accident victim.

In the meantime the situation had changed as the accident victim had drifted between the two boats lying alongside and a new rescue attempt had to be initiated.

At the same time at 15.47 h the inflatable boat of the Water Police Boat WARNOW was at the scene. The crew of the inflatable boat could then ultimately take up the body drifting in the water and transfer it to the WARNOW.

## 7 Safety recommendations

The BSU initially refers to the safety recommendation of Investigation Report 145/04, reproduced in abbreviated form below:

"All operators and skippers of leisure craft must ensure that depending area sailed (high seas, coastal waters, protected waters) their boat is of such a nature that the risk of falling over board is reduced as far as possible and re-entry is facilitated. Even experienced leisure craft skippers should constantly review their readiness for risk. The structural requirements of Directives 94/25/EC and 2003/44/EC of the European Parliament and the Council, the CE Guidelines for Leisure Craft and the Safety Guidelines of the Cruiser Department of the German Sailing Association (Deutscher Seglerverband e.V.) as well as the brochure "Safety at sea and in coastal areas" (Sicherheit im See- und Küstenbereich) of the Federal Maritime and Hydrographic Agency (BSH) should be observed."

The BSU advises crews in leisure shipping to wear a life-jacket during their trips and, if appropriate, life-belts for work on deck. The owners and vessel skippers are advised to check safety equipment on their leisure craft and, if appropriate, to improve this as regards suitability, especially for trips with small crews.

The BSU acknowledges that rescue assignments are not among the primary tasks of the Federal Police. Despite this, due to their presence in coastal waters vessels of the Federal Police are frequently among the first at the scene. In so far the BSU recommends that the Federal Police Office in Rostock as operator of ENFORCER 2 and the Federal Ministry of the Interior as owner of the vessels of the Federal Police should review existing life saving appliances for its expediency and if appropriate take suitable measures to improve the equipment in order to facilitate recovery of persons who have fallen over board.

In connection with the death by drowning and rescue from distress, the BSU refers to the SARRRAH (Search and Rescue, Resuscitation and Rewarming in Accidental Hypothermia) project of the Clinic for Anesthesiology of the University of Lübeck and the book "Handbook on Drowning".

## Sources

- Investigations
  - Federal Police Office Rostock, formerly Federal Border Protection Office
  - Water Police Rostock (WSP)
  - Criminal Investigation Department Rostock
  - Public Prosecutor's Office Stralsund and Rostock
  - Surveys on board INA 2, ENFORCER 2, HERMANN RUDOLF MEYER by the Federal Bureau of Maritime Casualty Investigation (BSU)
- Written statements/comments
  - Co-sailor
- Expert opinion/technical article
  - Institute for Forensic Medicine Rostock, Post Mortem Report
  - Crew of the Rescue Cruiser HERMANN RUDOLF MEYER , questioning by BSU
  - Maritime Rescue Coordination Center (MRCC ) Bremen, VHF Record Deutsche Gesellschaft zur Rettung Schiffbrüchiger (DGzRS – German Maritime Rescue Service), questioning by BSU
  - Chart
  - Federal Maritime and Hydrographic Agency (BSH)
  - Germany's National Meteorological Service (DWD), Business Division Sea Shipping (Department Marine Meteorological Services)
- Event Seemannschaft heute – Mensch über Bord – was tun? (Event Seamanship today - person over board - what is to be done?)
  - Sailing School Well Sailing of 13 January 2006
- Documents
  - Sicherheit im See- und Küstenbereich (Rules of Carefulness for Water Sports) BSH
  - Safety Guidelines (Equipment and Safety of Sailing Yachts/Multi-hull Boats) Cruiser Division of the Deutsche Segler-Verband e.V. (DSV)
  - Brochure "Sicher an Bord ...", (Safe on Board) Kreuzer Yacht Club Deutschland e.V.
  - EC Directive 94/25/EG
  - EC Directive 2003/44/EG
  - CE Guidelines for Leisure Craft
  - Deutsche Lebens-Rettungs-Gesellschaft (DLRG) German Life Saving Federation
  - SARRRAH Project – Search and Rescue, Resuscitation and Rewarming in Accidental Hypothermia)
  - RLS Double-loop Recovery Technology - University for Applied Science and Art, FH Hildesheim/Holzminden/Göttingen
  - Handbook on Drowning - Prevention Rescue Treatment, Maatschappij tot Redding van Drenkelingen - World Congress on Drowning Amsterdam 26 to 28 June 2002
- Photos, drawings
  - Boat owner, DGzRS, DLRG, Dacon Sub Sea A/S Norway, SailGB United Kingdom, BSU, IKAR GmbH Fulda
  - Photos from Prof. Michael Schwindt and Dipl.-Ing. Dr. med. Wolfgang Baumeier

## Annex - Comments

In accordance with § 15 Para. 1 Maritime Safety Investigation Law (SUG) in conjunction with § 17 Para. 2 FIUUG, justified essential comments are taken into consideration in the investigation report. Accordingly individual statements are reproduced below:

### Excerpt from the comment from the University Clinic Schleswig-Holstein, Lübeck

The basis for this expert opinion is almost twenty years of practical experience in rescue medicine at the emergency medical centre of a university hospital and now ten years of working with maritime emergency medicine in cooperation with the DGzRS, the Navy, state and federal authorities present off the German coast, the merchant navy, maritime training institutions and the International Maritime Organization (IMO). The scientific and practical work in accident mechanisms and treatment of accidental hypothermia at sea and on shore are accorded particular importance within the framework of the SARRRAH project.

#### Fundamental comments on hypothermia as a consequence of an accident:

Cooling of the human body in cold water depends on very many factors and cannot be predicted reliably. Studies of real accident situations show that accident victims can certainly survive three hours in water at a temperature of 8°. Lowering of the body core temperature and hence of the brain temperature distinctly increases brain tolerance to oxygen shortage. Scientifically processed casuistics describe survival without consequences of up to one hour after a circulatory stoppage.

Cooling of the brain directly after circulatory stoppage also has a protective effect on the brain substance.

#### That is why the following recommendations can be formulated from the information in the draft investigation report:

1. The rescue chain for shipwreck victims includes search, technical rescue, first aid, rescue service and medical measures, possibly treatment during transport and in the hospital. The weakest link determines the success. The preparations on board a vessel must include keeping and furnishing appropriate rescue equipment, preparing applicable procedures, practice drills in handling the equipment and the procedures, effective first aid measures taking into account the special situation of hypothermia, guidance of technical and maritime-medical professional helpers.
2. Already on the journey to the scene of the accident one crew member should put on protective clothing (if available) to provide assistance in the water.

3. At least the crews on public authority vessels off the German coast should be trained in resuscitating shipwreck victims under the specially difficult conditions at sea and be equipped with simple medical technical auxiliary equipment.
4. Every person rescued from cold water without a sign of life, who could still have lived within the last 60 minutes and does not show any fatal injuries or signs of the beginning of tissue decomposition can potentially be resuscitated. Reanimation must be started and continued consistently until warming up again in a suitable hospital.
5. The SAR helicopters off the German coast should be regularly manned with qualified emergency physicians as is customary in some other IMO States (letter to the BMVBW<sup>12</sup> and BMVg<sup>13</sup>, dated 29 April 2003, see below).
6. The BSU investigation reports should include a description and critical assessment of the measures by first aid providers and (SAR) rescue services.

Excerpt from the letter of 29 April 2003 to BMVBW and BMVg

Life-saving, medical, immediate measures must conform with emergency medical standards in the maritime SAR service too. In order to ensure maximum safety for the flying crew, the physician and the patient, crew coordination must proceed routinely.

The physician accompanying the flight must

- a) be qualified and experienced as an emergency physician,
- b) possess the "Intensive Transport" Certificate required by the Federal Medical Association (applies for the Heligoland location especially),
- c) have undergone safety instructions for the helicopter,
- d) have been familiarised with winching procedures and survival training at sea (according to the specifications of the fleet command),
- e) escort every flight, including control flights, on stand-by with the status of a crew member.

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<sup>12</sup> As of 22.11.2005 Federal Ministry for Transport, Building and Housing (BMVBW)

<sup>13</sup> Federal Ministry of Defence

### Proposal for realisation

Within the framework of civil-military cooperation a few North-German hospitals and rescue service providers release specially trained physicians for a time for this task. These staff the helicopter and service point for a week at a time, or in other time models together with the flying crew. Suitable physicians are those who as senior emergency physicians appointed by the local authorities have undergone the "Supplementary course for senior emergency physicians for assignments at sea" organised by the Deutsche Havariekommando (Central Command for Maritime Emergencies Germany).



### **Excerpt from the comment by the designer of the Rescue Lifting Systems (RLS)**

In the years 1986 to 1996, parallel with the development of the "medically preferred lying-sitting position", the designer pursued the problem addressed in this report as to whether and how the necessary strength can be provided to bring an accident victim on board, especially on sailing yachts. All the variants accessible to him on different kinds of sail boats were investigated, via questioning and surveys too, and a distinction was revealed between

the possibility of using equipment already available on sailing boats in order to allow individual and weaker persons to lift a person of medium weight from the water onto the deck without external aid, and

the possibility of retrofitting sailing yachts not provided with suitable equipment (e.g. where winches are too weak) with simple and reasonable devices (e.g. a separate pulley).

The possibility of lifting a person out of the water and on to deck is greatly promoted if the rescue equipment used for this makes it possible for the person to stay in the rescue equipment for a relatively long time without this harming the circulation, breathing and pain sensation, as this means that the weaker person can rest frequently and sufficiently while bringing the victim on board and the time available for bringing him/her successfully on board is substantially and critically prolonged.

For this reason, after initially investigating the customary single-loop rescue equipment the designer of the RLS worked only with the double-loop technique.

After sufficiently long testing - mainly for well over half an hour (!) - on nearly all relatively large sail yachts from a length of 11 m upwards, it was possible to find a suitable variant for the use of a halyard available on board and a strength-saving two-gear winch or tackle with which it is possible even for weaker crew members to develop the power necessary for bringing a person hanging outboards over the water (dry exercise) or in the water (wet exercise) on board the vessel. However, even experienced skippers and co-sailors nearly always required an amazingly long time to find out the suitable combination of existing equipment in cases of emergency, whereby the crews frequently subsequently made proposals for improvement.

On yachts shorter than 10 m in length it was nearly always necessary to recommend and test additional equipment on board with a sufficiently strong power transmission. Among other items reference is made here to US Patent 4,599,073, dated 8 July 1986. Before knowledge of this patent was gained, a similar tackle with six-fold power transmission with and without the use of a winch was also tested successfully with female students.

As experience shows, during training of "person-over-board" manoeuvres, only the first part of this manoeuvre is practised, not just on leisure craft but also by official service stations, in other words proceeding to the accident victim and drawing the accident victim towards the vessel. The crucial second part of the manoeuvre - securing a

helpless person drifting in the water and heaving this person out of the water onto the deck with an "on-board" manoeuvre that is gentle on the circulation as medically required - is practiced by grabbing an object ("buoy" or for sail boats generally two fenders tied together that are then taken up with a hook), which the designer of the RLS considers to be one of the main causes of failures to bring persons on board in real life situations.

In the long term it is therefore desirable for the Federal Bureau of Maritime Casualty Investigation (BSU) to issue a recommendation sooner or later that prior to the voyage the equipment on board yachts be at least tried out in a dry practice exercise as regards its suitability for producing sufficient strength to bring a person on board, and that in the event that the equipment available is not sufficient for this, that advisory services and retrofitting are recommended. Blocks and stronger winches or a separate hoisting device are suitable for retrofitting.

The "correspondence group" of the IMO<sup>14</sup> is currently working on a comprehensive guide for rescue techniques. The present draft makes the following core demand: "11.2 It helps to consider the possibilities beforehand, possible problems and possible solutions. It helps to prepare. And preparation means assessing the recovery options aboard your ship, and training in their use. 11.3 It could save a life (even yours!). It could save many lives. 8.4 ... People who have been in the water, the injured and the incapable, should be lifted in a horizontal or near-horizontal position if possible (for example, in a basket, or in two strops; one under the arms, the other under the knees). This minimises the risk of shock induced by sudden transfer from the water and possible hypothermia."

Quotation from a rescue physician of 11 November 2004:

*"Rescuing helpless persons from the water makes particularly high demands on the rescuers and the rescue means available. If a shipwreck victim or almost drowned person is found by the search and rescue services and secured on the surface of the water, in a second stage of the technical rescue this person must be brought onto a safe platform. This represents the most difficult phase in the rescue chain ..."*

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<sup>14</sup> International Maritime Organization

### **Excerpt from the comment by the Federal Ministry of the Interior**

Like all boats and vessels of the Federal Police, the Control Boat ENFORCER 2<sup>15</sup> is equipped in accordance with the valid safety regulations and thus has appropriate rescue means for rescue by the crew and by third parties.

The recommendations of the BSU that existing rescue means be reviewed for their expediency with a view to improvement is therefore a constant process that is always taken into account, both in daily performance of tasks and in the procurement of new items of equipment and their subsequent use. The same applies for implementing experience from the SARRRAH project that aims to improve the rescue and treatment concepts for shipwreck victims and persons with life-threatening hypothermia, as well as to increase the survival rate after accidents with hypothermia. The Federal Police has also been pursuing this goal for a long time and since 2004 has also used parts of the SARRRAH equipment for first aid training and ship safety requirement training of crews.

Following successful testing of the RLS Rescue System (Type G) for recovering accident victims from the water in an almost horizontal position, the assignment vessels of the Federal Police will now be equipped with this life saving appliance in order to prevent the so-called recovery death among hypothermia victims.

The Federal Police is greatly interested in protecting its own personnel optimally in the performance of their tasks and of contributing to ensuring safety at sea with the operating vessels assigned.

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<sup>15</sup> The Control Boat ENFORCER 2 has been chartered for a limited period up to the assignment of the new control boats of the Federal Police Office Rostock.