



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

Summary
Investigation Report 515/10

Serious Marine Casualty

**Fire on a semi-trailer on board
the ferry MECKLENBURG-VORPOMMERN
on the Warnow river
on 19 November 2010**

1 November 2012

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 in the version applicable prior to 30 November 2011.

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

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

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

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1 SUMMARY

The MECKLENBURG-VORPOMMERN is a ro-ro passenger vessel and operates regularly on the Trelleborg – Rostock route.

At about 2035¹ on 19 November 2010, an HGV trailer on deck 4 of the MECKLENBURG-VORPOMMERN caught fire. The HGV trailer's slot position was on the outer right parking lane of deck 4 on the starboard side at the front parking position. The MECKLENBURG-VORPOMMERN was incoming on the maritime canal of the international port of the Hanseatic City of Rostock when the fire broke out.

Due to the early discovery of the source of the fire by a crew member, the immediate initiation of the firefighting operation, the favourable slot position of the HGV trailer and the proximity to the port facility, it was possible to prevent more severe damage from being sustained.

The assistance of the shore-based fire brigade made it possible to bring the fire under control.

At 2216, the fire brigade reported the fire was fully extinguished.

It transpired that a VW Transporter situated on the load space of the trailer had caught fire. Fire experts concluded that a technical fault was probably responsible for the development of the fire.

The MECKLENBURG-VORPOMMERN was slightly damaged by the fire. The ceiling above the slot position of HGV trailer was scorched.

No person was injured by the fire.

¹ All times shown in this report are Central European Time (CET), which corresponds to UTC + 1.

2 FACTS

2.1 Photo



© Scandlines

Figure 1: Photo of vessel

2.2 Vessel particulars

Name of vessel:	MECKLENBURG-VORPOMMERN
Type of vessel:	Passenger/ro-ro vessel
Nationality/Flag:	Germany
Port of registry:	Rostock
IMO number:	9131797
Call sign:	DQLV
Owner:	Scandlines Deutschland ²
Year built:	1996
Shipyard/Yard number:	Schichau Seebeckwerft AG/1092
Classification society:	Lloyd's Register
Length overall:	199.95 m
Breadth overall:	33.22 m
Gross tonnage:	37,987
Deadweight:	7,205 t
Draught (max.):	6.20 m
Engine rating:	25,200 kW
Main engine:	4 x MAN B&W 6 L 48/60
(Service) Speed:	18 kts
Hull material:	Steel
Hull design:	Double bottom
Minimum safe manning:	16

² In October 2012 the MECKLENBURG-VORPOMMERN was taken over by the shipping company STENA LINE SCANDINAVIA AB, Kiel, Germany

2.3 Voyage particulars

Port of departure:	Trelleborg, Sweden
Port of call:	International port of Rostock
Type of voyage:	Merchant shipping International
Cargo information:	Passengers, freight
Manning:	40
Draught at time of accident:	6.00 m
Pilot on board:	No
Canal helmsman:	No
Number of passengers:	136

2.4 Marine casualty or incident information

Type of marine casualty or incident:	Serious marine casualty, cargo fire
Date, time:	19 November 2010 at 2035
Location:	Warnow river
Latitude/Longitude:	φ 54°09.6'N λ 012°06.2'E
Ship operation and voyage segment:	Harbour mode
Place on board:	Cargo area, deck 4
Human factors:	No, technical fault
Consequences (for people, vessel, cargo, environment, other):	No injuries, marginal damage to the vessel, cargo on the semi-trailer destroyed or damaged

Excerpt from Nautical Chart (ENC) DE 516500, BSH

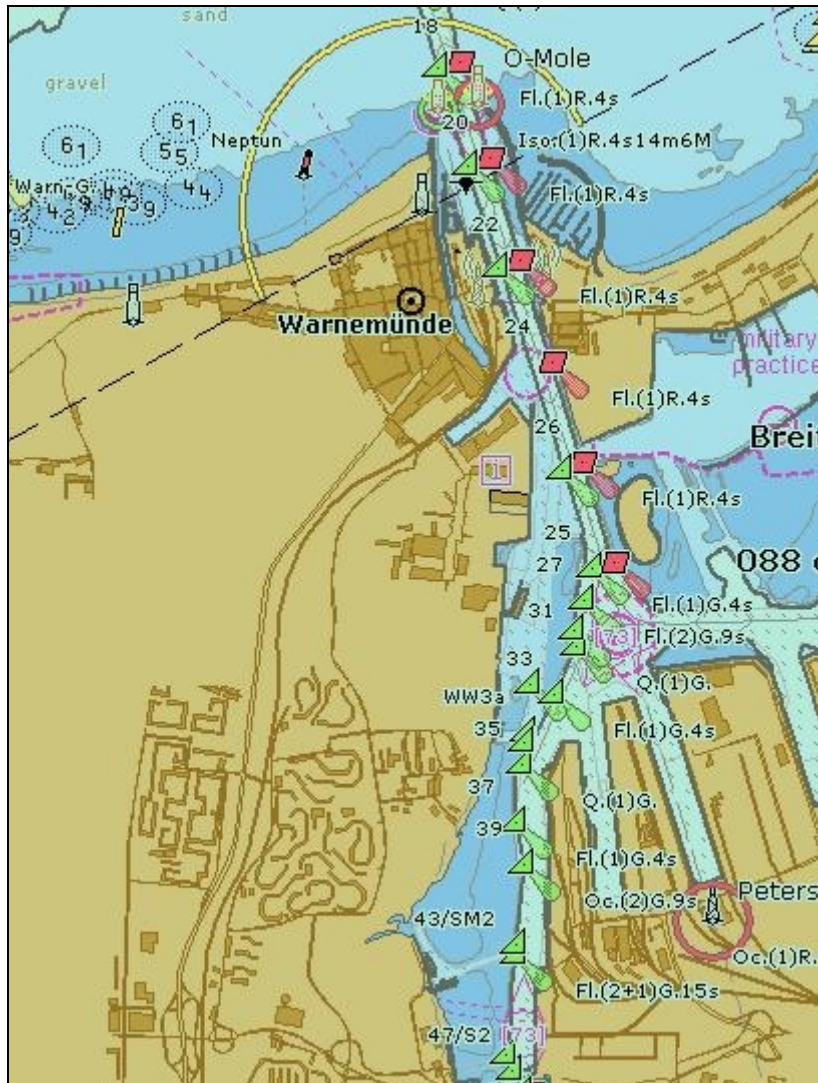


Figure 2: Nautical chart

2.5 Shore authority involvement and emergency response

Agencies involved:	Vessel Traffic Service Warnemünde, various police stations, Rostock fire brigade
Resources used:	One fireboat 16 fire engines with 81 firefighters, a police boat, police vehicles, emergency tug BALTIC and a harbour tug
Action taken:	The fire brigade fought the fire after the vessel berthed and later kept fire watch. The police provided security, recorded the passengers and the damage, and investigated the cause of the fire. Emergency tug on standby at the vessel. The harbour tug assisted during the berthing manoeuvre.
Results achieved:	Fire fought rapidly, no injuries or environmental pollution

3 COURSE OF THE ACCIDENT AND INVESTIGATION

3.1 Course of the accident

The MECKLENBURG-VORPOMMERN is a ro-ro passenger vessel and operates regularly on the Trelleborg – Rostock route.

The vessel has three loading decks; railway wagons can be transported on deck 3. The height of loading decks 4 and 5 is sufficient for HGV trailers.

For rolling cargo, access to decks 3 and 4 is via the stern and shore-based ramps. Deck 4 also has an opening in the bow area on the starboard side. A suitable ramp is located ashore for this as well. Deck 5 can be accessed via a ramp in the vessel.

The vessel has a forward and an aft bridge.

Since the vessel moves astern when coming alongside the appropriately shaped wharf facility, the berthing manoeuvre is controlled from the aft bridge.

The master of the vessel is exempted from the obligation of pilotage for the voyage up to the usual berth.

The account of the course of the accident is based on the analysis of the voyage data recorder, the statements of individual crew members as well as various reports by the agencies involved and two fire investigators.

The MECKLENBURG-VORPOMMERN sailed into the port of Rostock on 19 November 2010. This involved the master assuming command in the fairway of the sea canal at 2014. The second officer and a helmsman were also located on the bridge.

At 2024, the vessel was between the moles. At 2030, the second officer left the forward bridge and went to the aft bridge to prepare it for the takeover.

At 2037, the second officer, who was on the aft bridge, was informed by internal ship telephone that a trailer was burning on deck 4 by a crew member who passed this deck while proceeding to the manoeuvring station. The second officer immediately forwarded this message to the master on the forward bridge and the chief officer.

At this point, the vessel was level with buoys 25/28 and thus just off the so-called turning circle, where she was to be turned in order to reverse into the berth.

At 2039, the fire was also identified by the fire detection system and an alarm followed.

On the forward bridge attempts were made to obtain an overview of the situation using the surveillance cameras, which were also installed on deck 4. However, only smoke was visible.

Since the fire detection system indicated the area concerned, attempts were made to start the drencher system in this area (sections 8 and 9). This did not work immediately due to the stiffness of a control valve.

At the same time, the second officer informed the crew about the fire with an announcement and the general alarm was sounded.

From 2041, the chief officer was on deck 4 in the capacity of operational commander and the second officer had returned to the forward bridge.

The remaining crew members took up the positions they had been assigned to in case of fire.

At 2043 (the vessel was on the turning circle turning to port at this point), the audible signal of the general alarm was turned off again. Communication on the bridge was thus less impaired.

The master notified Vessel Traffic Service (VTS) Warnemünde of the fire over VHF and asked it to order the fire brigade to proceed to the intended berth.

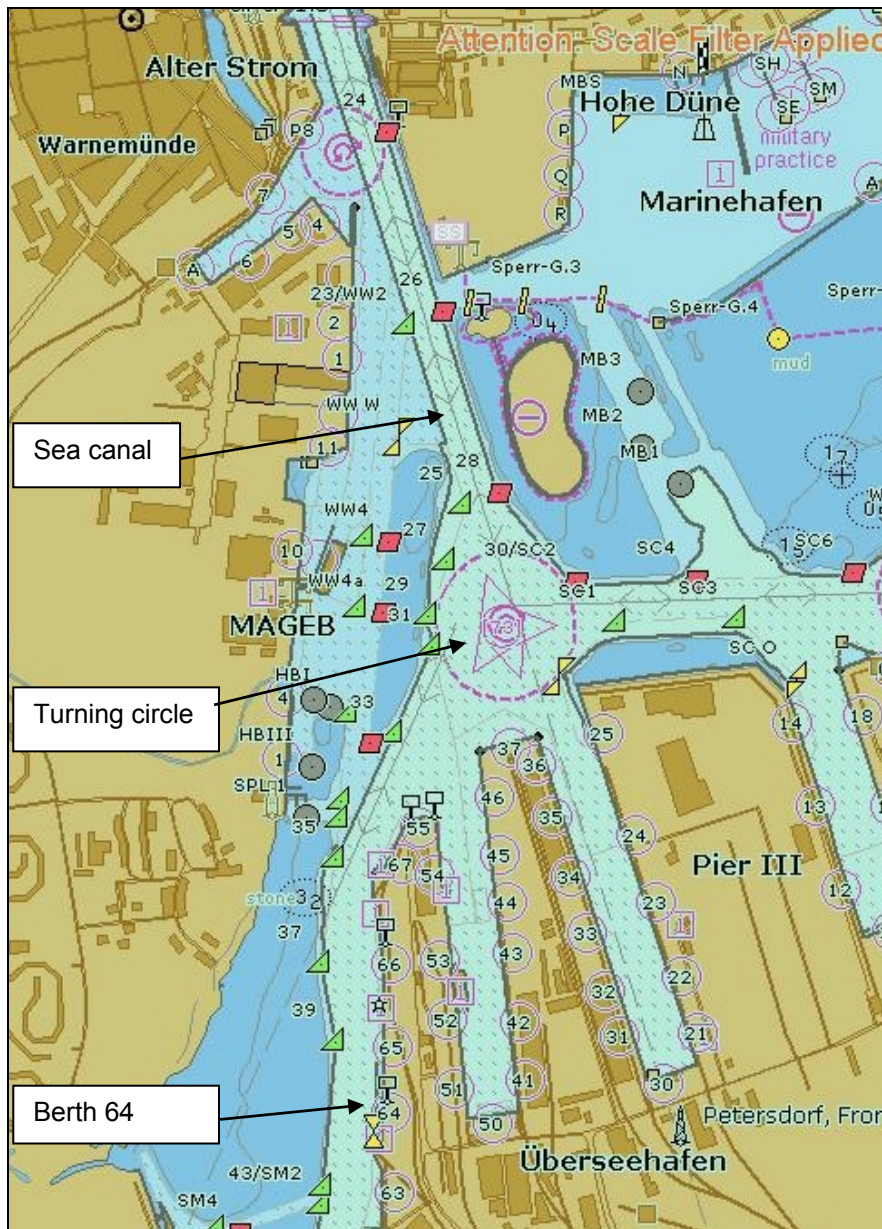


Figure 3: Excerpt from Nautical Chart (ENC) DE 516500 of the BSH with sea canal, turning circle and berth of the MECKLENBURG-VORPOMMERN

At 2044, the second officer informed the passengers about the fire in German and English on behalf of the master and instructed them to assemble at the information desk on deck 5.

At 2045, the master was informed that the drencher system was working. The second officer was ordered to go to the aft bridge again and standby for the steering control switchover. The vessel began to move astern and now had about 1 nm to cover in reverse.

At 2047, the steering control was switched to the aft bridge and the master immediately proceeded to this bridge.

Between 2047 and 2049, the second officer appeared on the forward bridge again.

At 2049, the second officer initiated the shipping company alarm pursuant to the master's instruction. At the same time, the ventilation fans on deck 4 were turned on again to extract the smoke there and the response team proceeded to deck 4 and started to fight the fire there.

At 2050, the second officer elaborated on the type of fire in a further conversation with VTS Warnemünde. He was then informed that the VTS had alerted the emergency tug BALTIC, which was moored in Warnemünde.

The support team was ordered to initiate cooling measures on deck 5.

At 2053, the master again ordered the second officer to make an announcement to the passengers.

At 2054, the passenger care team reported that all its members were present.

At 2055, VTS Warnemünde informed the Maritime Emergencies Reporting and Assessment Centre (MERAC) in Cuxhaven.

At 2056, the task of the support team was extended to assisting with the evacuation of the passengers. One minute later, the second officer informed the passengers about the situation again by means of a bilingual announcement.

At 2058, the emergency tug BALTIC cast off.

At 2059, the MECKLENBURG-VORPOMMERN was at her berth (pier 64). To begin with, mooring lines were passed only to the stern as there were no crew members available to make fast at the bow, respectively, the station on the starboard side of deck 4 was inaccessible due to the fire. Therefore, the bow thrusters were used to maintain the vessel's position at the wharf.

The fire brigade was on standby at the berth. However, the master was unable to make contact with the fire brigade by VHF marine radio.

The stern doors were opened immediately after berthing and contact was made with the fire brigade on deck 3 by the chief officer at 2112.

At this point, contact had not been made with the master.

It was not possible to make the first VHF contact between the master and shore-based operational units over marine radio until about 2145.

At 2105, the support team was ordered to establish whether it would be reportedly possible to evacuate the passengers via deck 3.

At 2106, fireboat 40-3 of the Rostock fire brigade reported to the VTS that she had cast off.

At 2107, the fire brigade unit deployed on the vessel asked whether it would be possible to use water from the vessel's system for the extinguishing operation.

At 2110, the survey of the evacuation route for the passengers was finished and the evacuation was initiated from the assembly station at the information desk via deck 5, stairwell H and deck 3.

At 2113, to keep the situation calm and inform them of the current status, the master made an announcement to the passengers.

At 2114, the fire brigade unit's extinguishing operation on deck 4 began from the direction of the stern. Shortly after, the fire brigade unit's inspection of deck 3 began.

At 2116, fireboat 40-3 informed the BALTIC that the inspection of the shell plating of the MECKLENBURG-VORPOMMERN by means of thermal camera revealed no rise in temperature and therefore cooling was unnecessary. The boat then took up a position at the bow of the ferry. The BALTIC positioned herself at the aft section.

The fireboat was repeatedly pushed away by the running bow thrusters. Therefore, the master requested a harbour tug.

Since the fire brigade unit requested a contact person to the ship's command, the second officer was sent aft at 2119.

In the meantime, the master was informed by the operational commander of the response team about the rising water level on deck 3, which was caused by water from the drencher system. However, an inspection at the scene revealed that there was currently no danger. Nevertheless, the outlet valves of the loading decks were opened at about 2120 as a precaution.

At 2122, the fire was reported to be "under control." At that time, a decision was also taken to open the bow side door to enable the fire brigade unit to operate from there as well.

The bow side door was open at 2127. At the same time, the ventilation fans on the starboard side of deck 4 were turned off.

At 2129, the ship's command ordered one of the extinguishing team to proceed to the bow side door to direct the fire brigade unit and advance to the source of the fire with the unit.

At 2134, the steering control of the vessel was switched back to the forward bridge and the second officer moved there as well.

At 2143, disembarkation of all the passengers was finished.

From 2144, the tug FAIRPLAY V joined the operation to apply pressure to the bow of the ferry. The bow thruster was turned off.

From 2147, attempts were made to reach the forward manoeuvring station to establish a line connection to the shore there as well.

Due to the spatial restrictions, the two crew members deployed had to unbuckle their compressed air cylinders and crawl to the mooring station.

At 2148, the port of Rostock was informed that the MECKLENBURG-VORPOMMERN is to be made fast at the bow.

The first firefighter reached the bridge at about 2150.

At 2155, the fire brigade took over the entire extinguishing operation after discussing the situation with the master and the vessel's crew withdrew. Deck 4 was still filled with heavy smoke at the time of the handover to the fire brigade and the fire flared up repeatedly.

From 2200, the second officer was in the immediate vicinity of the shore-based operational commander of the fire brigade in the capacity of contact person to the ship's command.

At 2203, the fire brigade reported the fire was extinguished. At the same time, the vessel was made fast on all lines and FAIRPLAY V was released shortly after.

The drencher system was turned off at 2206.

At 2209, it was arranged between the BALTIC and the master of the MECKLENBURG-VORPOMMERN that the BALTIC would remain on standby for some time.

At 2212, the operational command ordered that the source of the fire be cleared. The relevant HGV drivers were to be fetched for that purpose.

From 2223, an articulated vehicle was driven off the vessel and two others on deck 4 moved to provide a better overview and space for extinguishing the remnants of the fire.

During an initial inspection of the scene of the fire, it was found that one of three vehicles located on a semi-trailer had ignited.

The semi-trailer itself was of the usual design for a trailer with sliding sheets and had a steel end wall and double door at the rear.

A vehicle on the semi-trailer was destroyed due to the fire (see Fig. 9). The semi-trailer and the two other vehicles were damaged (see Fig. 11).

Another semi-trailer parked adjacently was also damaged (see Fig. 13).

The MECKLENBURG-VORPOMMERN sustained damage on the ceiling above the semi-trailer affected by the fire and due to soot and smoke (see Fig. 4 and Fig. 5).



Figure 4: Scorch marks on the ceiling above the scene of the fire



Figure 5: Close-up of the scorch marks on the ceiling

No passengers or crew members were injured due to the fire or during the action taken to extinguish it.

Environmental damage was not brought to the attention of the BSU.

3.2 Investigation

3.2.1 People on board

According to the deck log book, a total of 176 people were on board during this passage from Trelleborg to Rostock.

3.2.2 Load situation

The cargo capacity of decks 3 and 4 – the two lower decks – is 56 trailers and 59 trailers respectively.

37 semi-trailers with tractor unit and five other transport units were loaded on deck 3.

35 semi-trailers with tractor unit, one HGV with trailer, a smaller HGV and 17 unaccompanied semi-trailers were on deck 4.

33 semi-trailers with tractor unit, three smaller HGVs and five cars were situated on deck 5.

3.2.3 Loading rules

The SOLAS Convention³ provides for the transport of dangerous cargo, inter alia.

Binding provisions for that are laid down in Chapter VII – Carriage of dangerous goods. They apply in connection with the IMDG Code⁴, which also provides direction on the classification of dangerous goods.

3.2.4 Cause of the fire

In establishing the cause of the fire, two expertises could be referred to.

One of the expertises focused on the fire and was drawn up in the course of the investigations of the public prosecutor's office. The other expertise was prepared by the Gesellschaft für Sicherheitstechnik/Schiffssicherheit Ostsee mbH (GSSO) at the request of the BSU.

Due to its specialised knowledge in areas of operational ship safety as well as precautionary and preventative fire protection, GSSO was commissioned to determine the circumstances and conditions that caused the fire to break out and level of damage found.

The basis for that was the temporary seizure of the fire object – the semi-trailer – together with the vehicles on it by the BSU.

Three older used vehicles were on the semi-trailer. A VW Transporter minibus (T3) was loaded first with the front foremost in the direction of travel. The next vehicle was a Mercedes-Benz C Class saloon, which was stowed against the direction of travel. The third vehicle was a Volvo 240 estate, which was in the direction of travel. Due to the length of the cargo, the rear of the trailer was left open and the two door leafs had been folded forward and secured (see Fig. 6). According to the shipping documents, all the vehicles were destined for further transportation to Africa.

³ SOLAS = International Convention for the Safety of Life at Sea

⁴ IMDG Code = International Maritime Dangerous Goods Code



Figure 6: Load on the trailer and position of the doors

The front and the rear vehicle were fully loaded with used items, such as furniture, electrical appliances and clothing.

In addition, three used car engines were in the VW Transporter.



Figure 7: Remnants of the cargo after the firefighting operation



Figure 8: Remnants of the cargo after the firefighting operation

The fire broke out in the VW Transporter, the upper part of which was burnt out almost completely. There was also immense fire damage in the area of the cab and to the engine located in the rear. All four wheels were burnt (see Fig. 9).

Of the two other vehicles, only the rear of the middle vehicle located in the immediate vicinity of the VW Transporter showed signs of fire damage.



Figure 9: Driver's side of the VW Transporter

The expert assigned by the public prosecutor's office attributed the unusual dissipation of the fire phenomena on the VW Transporter to the fact that the action taken to extinguish the fire, i.e. drencher and firefighting operation using steel pipes,

by the crew either failed to reach or only indirectly reached the source of the fire due to the tarpaulin.

Therefore, a so-called glowing smouldering fire was able to develop inside the transporter.

The expert assigned by the public prosecutor's office identified a battery located under the passenger seat as being the probable source of ignition.

In particular, the positive terminal clamp was conspicuous. Its defective condition was indicative of a build-up of heat due to the increased transition resistance.



Figure 10: Passenger side of the VW Transporter

The expert assigned by the public prosecutor's office found no evidence of incendiary devices.

The expert assigned by the BSU stated:

"Fire research on the T3 Transporter has revealed that in the past a frequent cause of fire has been the overheating of charging cables when using two vehicle batteries.

If consumers powered by the auxiliary battery were activated when the ignition was switched off and there was no charging operation, then the starter battery attempted to compensate for the reduced state of charge. In some cases, this has led to an overloading of the connecting cable, which has resulted in overheating and cable fire. In this case, it is no longer possible to ascertain whether a second battery was installed in the vehicle."

The fire damage to the semi-trailer itself was only marginal and localised.

Damage to the side tarpaulins and roof was most severe in the area where the Transporter was parked. The semi-trailer's floor was burnt and its front wall sustained moderate fire damage (see Fig. 11 and Fig. 12). There was no fire damage on the tractor unit.



Figure 11: Fire-damaged semi-trailer with VW Transporter



Figure 12: Fire-damaged semi-trailer with VW Transporter

It was not possible to clarify the cause of the fire with reasonable certainty. It can only be stated with certainty that the three cars were loaded onto the trailer about 25 km north of Trelleborg by means of a fork-lift truck at about 1300 on the day of the accident and contained various household goods (including clothing) as well as three engines. The driver did not check the contents of the vehicles separately. The trailer was driven onto the MECKLENBURG-VORPOMMERN at about 1445 in the port of Trelleborg and stowed. The driver of the HGK made no particular observations while taking over the vehicles, driving to Trelleborg or leaving the vehicle deck on board. At about 2037, the fire ignited in the VW Transporter loaded on the trailer.

3.2.5 Firefighting on the MECKLENBURG-VORPOMMERN

The vessel is equipped with a vast number of smoke detectors on deck 4 and the other enclosed decks. When a smoke detector is triggered, an audible and visual alarm is issued on the central fire alarm system in the vessel's bridge and the triggered detector is displayed. At the same time, an alarm printer prints a status report. This is what happened on the day of the accident.

In the event of an alarm signal, the necessary initial action is set in motion, which is supported by a checklist.

All the crew members are allocated to one of the following response teams beforehand for this:

- Ship's command team
- Response team
- Support team
- Passenger care team
- Reserve

The specific task of each crew member can be found in the muster list.

In addition to the alerting method 'Smoke detector', on the day of the accident the fire was also seen physically by a crew member.

While proceeding from the crew lift level with frame 109 on the port side to the entrance of the forward manoeuvring station (level with frames 157 and 168), the crew member passed the rear of the semi-trailer on which the vehicles were loaded.

He noticed dense smoke around the trailer and tractor unit.

Since the doors were open, he was also able to see the glow of a fire inside the trailer.

He informed the second officer of this immediately. He then made contact with another member of the crew, who was also on the way to the manoeuvring station and therefore on deck 4 at the time.

Both of them then ran towards the bow to approach the burning semi-trailer from the front and begin fighting the fire. They used the equipment, i.e. nozzles and hoses, in the fire extinguisher cabinet available.



Figure 13: Deck 4, articulated vehicle affected by the fire and adjacent semi-trailer damaged by the fire

Furthermore, an attempt was made to put the drencher system into operation. Analysis of the VDR⁵ data revealed that this involved a time lag of six minutes. According to information given by the shipping company, this time lag was due to a stiff valve.

After the alarm for all crew members had triggered, the members of the response team assembled at the equipment area, where they donned their protective equipment and self-contained breathing apparatus.

The response team actually consists of five crew members; however, for reasons that were initially unclear it was incomplete and went to extinguish the fire with three people, who attempted to reach its source from aft.

Since it was not possible to reach the scene of the fire from there due to the tight conditions on the deck (see Fig. 14), the response team went to the forward stairwell, starboard, deck 4 to start the extinguishing operation from the front of the articulated vehicle.

⁵ Voyage Data Recorder



Figure 14: Distance between the vehicles

They met the crew members already occupied with fighting the fire from the first operation there, who had withdrawn to this area because of increasing smoke. At the same time, they were the two missing members of the response team. They were prompted to equip themselves. Their positions were initially taken over by members of the support team.

The chief officer assumed direct command of fighting the fire at the scene and organised the supply of compressed air cylinders as well as the replacement of the deployed teams.

From the start of the extinguishing operation with respiratory protection, visibility on deck 4 was equal to zero due to the smoke caused by the fire (see Fig. 15).

The extinguishing operation was carried out on both side walls of the articulated vehicle affected by the fire using two hose lines (see Fig. 17).

The articulated vehicle itself was stowed such that the approach was not impeded further (see Fig. 13 and Fig. 17).

To ensure the stability of the vessel was not adversely affected by the extinguishing water, the valves for draining water from the loading decks overboard were opened at about 2120.

Initial contact was made with the fire brigade by the chief officer on deck 3 after berthing.

In consultation with the ship's command and fire brigade, it was agreed that the fire brigade would proceed via the bow side door on deck 4.



Figure 15: Build-up of smoke outside the vessel after the bow side door on deck 4 was opened⁶

⁶ The person highlighted with a red circle facilitates size comparison vis-à-vis the build-up of smoke.



Figure 16: Fire brigade proceeding

The firefighting units of the crew were eventually replaced by the fire brigade as they had already changed breathing cylinders three times. Moreover, despite being reinforced by two operational units from the fire brigade in the interim, there was a realistic danger that the crew members would slowly reach their limits and possibly become a safety hazard themselves. The entire operation was complicated by the very heavy build-up of smoke.

The fire, which the crew had been able to contain beforehand, was then permanently extinguished by the fire brigade.

3.2.6 Evacuation of the passengers

Since the MECKLENBURG-VORPOMMERN was already nearing the turning circle of the international port of Rostock when the fire was discovered, there was no need to deploy lifeboats to evacuate the passengers. The passengers were able to walk from the vessel directly ashore.

The shipping company's information leaflet, which is available on board, should also be mentioned at this point. It provides passengers with important emergency-related information (the general alarm signal, location of the assembly station(s), advice on how to recognise crew members, the stowage areas of life jackets as well as a general explanation of symbols and advice on conduct) in four languages (German, English, Swedish and Danish).

Based on the analysis of the VDR data, it was found that during the firefighting and evacuation measures to be taken on board communication problems of a technical nature were repeatedly experienced between the crew due to the wireless technology employed and number of handheld transceivers.

At times, instructions to the passenger care team had to be made over the vessel's public address system.

3.2.7 Fire brigade operation

The report of VTS Warnemünde about the fire on the MECKLENBURG-VORPOMMERN reached the rescue coordination centre at 2045.

The fire brigade was alerted two minutes later.

The first unit of the fire brigade arrived at the berth of the ferry at 2054.

16 fire engines with a total of 81 firefighters and a fireboat were assembled for this operation.

Additional firefighting capacity would have been available on the emergency tug BALTIC.

On arrival, the fire brigade found a heavy build-up of smoke (see Fig. 18).



Figure 18: Build-up of smoke caused by the fire

It soon became clear (2120) that an extinguishing operation from the direction of the stern on deck 4 was impossible. This was due, in particular, to the distance between the parked HGVs being very small (less than 30 cm) in places, which prevented or made difficult passing through with donned respiratory protection and conventional extinguishing equipment (see Fig. 14 and Fig. 17).

After the bow side door was opened, two units of the fire brigade started to fight the fire from there at 2130.

At 2321, a fire watch from the fire brigade was deployed and the scene was handed over to the waterway police.

4 ANALYSIS

In all likelihood, the fire was due to a technical defect.

This defect was probably caused by the car battery and feed lines of the VW Transporter connected with it, which were stowed on the load space of the trailer.

The load in the VW Transporter, which consisted mostly of clothing and household items, made it easier for the fire to spread because sufficient combustible material was available.

Due to the manner in which the trailer was loaded with three vehicles, the trailer doors were secured in the folded position, which permitted a view of the load space.

Therefore, it was possible for a member of the vessel's crew to detect the fire early on and for the shipboard firefighting operation to be initiated promptly.

Due to the position of the vessel in the area of the international port of Rostock, shore-based operational units were able to reach the scene quickly and support/continue the shipboard firefighting operation.

Easy access to the position of the HGV trailer facilitated the firefighting operation in places.

With that said, the firefighting operation was complicated in general due to the small gaps between the vehicles on deck 4.

During the firefighting and evacuation operation, communication difficulties of a technical nature occurred between the ship's command, respectively, officers responsible and the crew members responsible as well as between the ship's command and shore-based operational units of the fire brigade.

The initiated evacuation of the passengers passed without incident.

When the drencher system was activated, there was a time lag of six minutes due to a stiff valve.

The drencher system's task is to limit the spatial extent of fire and prevent the flames from spreading to other combustible materials. Therefore, it must be ready for service at all times and without delays not induced by the system. The time required to trigger the permanently installed drencher system must be kept to a minimum so as to stem the fire in the development phase if possible. The drencher system on board the MECKLENBURG-VORPOMMERN is divided into 15 sections; each section can be opened separately. However, it should be mentioned at this point that no more than three sections can be operated at the same time.

Despite the high-quality handheld transceivers and the training carried out by the shipping company for the crew on means and channels of communication, internal communication deficits of a technical nature were repeatedly experienced in the course of the emergency situation. This agitated the situation further and hampered coping with the operation effectively.

As already discussed, the fire was not discovered by the crew member responsible for patrolling the vessel while making a safety patrol (due to the time the fire broke out), but by a crew member proceeding to the manoeuvring station. According to the ISM manual of Scandlines, patrols are carried out in the area of the deck immediately after setting sail. During the scheduled passage to Trelleborg, at least two complete patrols (entire vessel) must be carried out and reported to the bridge. Having said that, the master may order additional patrols at any time. What the inspection actually consists of is dealt with extensively in the ISM manual.

However, while evaluating the existing ISM manual, it was noted that there is no provision for the crew member responsible for patrolling the vessel to make a physical inspection of the space between vehicles in heightened swell for reasons of safety. On this point, a purely 'visual inspection' is referred to (the crew member responsible for patrolling the vessel does not enter the space between vehicles and trailers for reasons of safety). Based on the length of the vehicle decks as well as possibly existing light conditions and way shadows are cast, this could prove to be quite difficult.

Regarding the issue of the vessel's stability due to discharged extinguishing water in conjunction with scuppers clogged by fire debris, Scandlines stated that although this scenario was not taken into account in advance, the vessel's drainage systems were tested regularly. There is also the possibility of making a calculation using the stability program (MACS) if need be.

During the investigation, it was found that within the scope of sufficiently probable emergency situations, which do not oppose general experience, both the Hafen-Entwicklungsgesellschaft (port management company) Rostock and the Brandschutz- und Rettungsamt der Hansestadt Rostock (fire and rescue office of the Hanseatic City of Rostock) are well prepared for the evacuation, care, and accommodation of people. However, primary competence starts at the edge of the quay. The fire and rescue office keeps special protection plans specifically for such scenarios. Amongst other things, these plans earmark certain units of the medical and rescue service for the establishment of treatment and care facilities. These are the medical and care team of the DRK (German Red Cross) as well as the rapid response unit. Moreover, the danger prevention plan of the Rostock port management company deals with the evacuation of people and is based on previously agreed scenarios. Furthermore, emergency accommodation and transportation are provided for with the collaboration of the public transport service. Last but not least, under the operational control of the German Central Command for Maritime Emergencies (CCME), the fire protection and rescue office of the Hanseatic City of Rostock provides for a rapid response unit; however, this was not deployed in the present case.

These operational units are also trained for operations that involve firefighting and providing technical assistance on board.

5 CONCLUSION

Regarding this incident, several factors favoured a positive outcome and prevented more severe damage from being sustained.

At this point, reference is made to similar incidents of the recent past; some of these involved the scale of damage being significantly greater:

- COMMODORE CLIPPER 16 June 2010
- LISCO GLORIA 8 October 2010
- PEARL OF SCANDINAVIA 17 November 2010

In the three incidents mentioned, fires broke out on the vehicle decks due to technical defects associated with the cars, trailers and tractor units carried as well as the connected shipboard power supply.

In the present case, the fire was detected by technical means early on, respectively, while it was still in the development phase and noticed by a crew member and reported. The discovery of the fire at this early stage was a coincidence that was brought about by an operating procedure associated with making fast in the international port of Rostock. Secured in the open position, the rear doors of the trailer enabled the crew member to obtain an overview quickly and identify a glow, which was probably an open flame, in addition to the smoke.

It was possible to launch the shipboard firefighting operations quickly.

With respect to the operational firefighting on board the vessel, no training-related deficits can be identified.

The professional management of the situation and prevention of more severe damage by the crew are, alongside the fortunate circumstances, with a reasonable degree of probability also attributable to the exercises carried out in relation to firefighting and evacuating passengers on board. The latest exercise before the emergency situation was carried out on 25 October 2010 and involved practically the same crew as on the date the damage was sustained.

However, the internal communication problems between the ship's command, the officers responsible and the crew members responsible due to the means and channels of communication used should be mentioned at this point. Despite the presence of high-quality transceivers and the training of crew members on the topic of channels and means of communication, communication deficits of a technical nature occurred during parts of the operation.

After the shore-based fire brigade arrived at the scene, communication difficulties between the ship's command and operational units of the fire brigade also occurred. From 2059, the ship's command tried to make contact with the fire brigade but was unable to via the VHF radio equipment used, respectively, via marine radio. Only at 2119 was it possible for the second officer to make contact with the fire brigade. The

first official responsible for the fire brigade did not reach the bridge of the MECKLENBURG-VORPOMMERN to discuss the situation until 2150.

Consultation on the firefighting operation of the fire brigade already launched was complicated by this.

According to statements given by the fire brigade and various crew members, the existing gaps between the HGVs and trailers on deck 4 caused another problem. These amounted to only about 30 cm in places and with donned self-contained breathing apparatus and firefighting equipment could only be passed through under difficult conditions. The small gaps between vehicles facilitated the spread of flames, respectively, the fire. Operationally usable access lanes are usually not present in the current stowage plan and when parking capacity is fully utilised.

Because of this, firefighting was possible only to a limited extent.

However, due to the favourable slot position of the burning trailer at the front parking position of the rightmost parking lane to starboard on deck 4, the issue of spatial restrictions did not have any dramatic consequences.

The drencher system largely prevented the trailer's tarpaulin from opening as well as the entire trailer from igniting and associated spread to the adjacent trailer. This possibility would not have existed in the area of the open weather decks because of the lack of permanently installed extinguisher system there. Furthermore, manual containment of the fire would have been unlikely because of the gaps between the trailers, which are also tight there.

In spite of the presence of two expertises, the cause of the fire cannot be clarified with absolute certainty. As already discussed, with a reasonable degree of probability there was a technical defect.

5.1 Actions taken

5.1.1 Scandlines

Based on experience gained in relation to firefighting on board the LISCO GLORIA (DFDS Seaways) and the MECKLENBURG-VORPOMMERN, Scandlines has invested, inter alia, in the procurement of new firefighting technology (see Fig. 19 and Fig. 21).

This new technology enables firefighting units not only to select the type of extinguishing jet (see Fig. 20), but also to determine the type of extinguishing agent most effective (water, extinguishing foam, carbon dioxide foam, carbon dioxide) directly at the source of the fire.



Figure 19: Use of a new type of extinguishing pistol due to the spatial restrictions

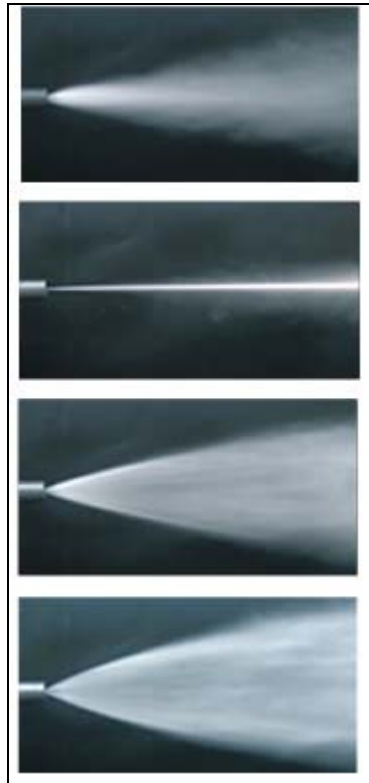


Figure 20: Choice of extinguishing jet and extinguishing agent

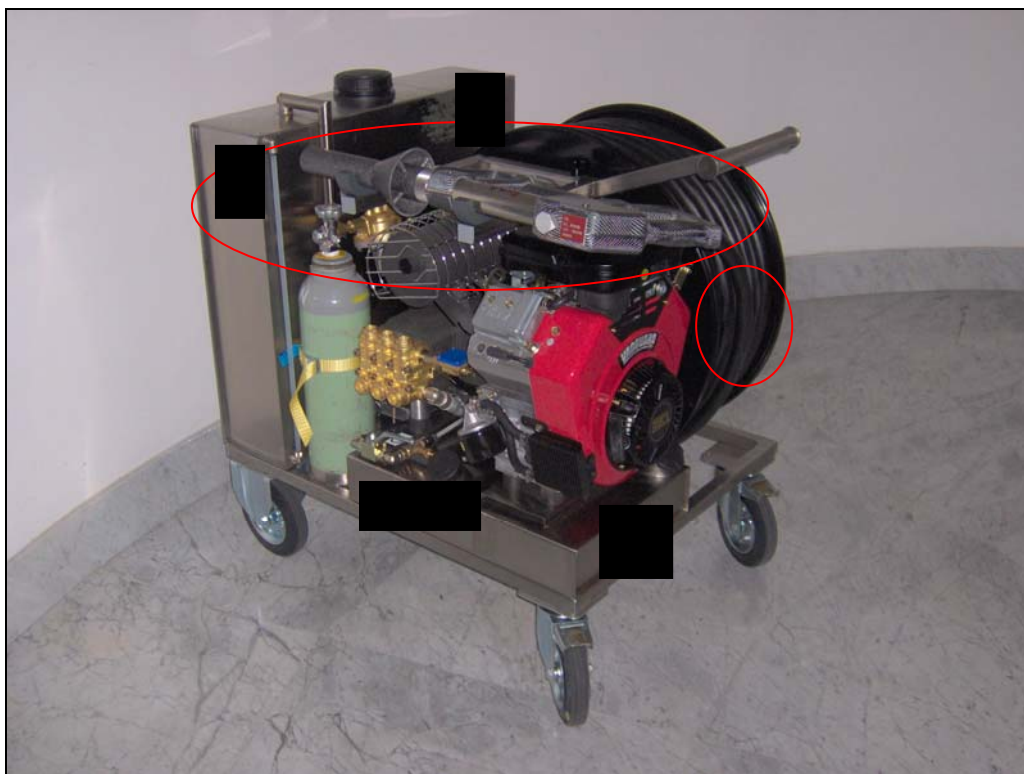


Figure 21: Extinguishing unit with extinguishing pistol and hose connection

The extinguishing unit has a 100 metre high pressure hose (see Fig. 21). This version is portable and mounted on wheels.

Due to its size, this unit can be transported very easily using the shipboard lifts.

Compared to conventional extinguishing technology (pressure hoses, such as c-hose with c-tube), the length, width and flexibility of the hose, the option of selecting the extinguishing agent as well as the size, weight and shape of the extinguishing pistol enable more effective use in confined conditions.

The extinguishing device is ready for operation within a few seconds.

Setting up or, depending on the extinguishing agent, converting the extinguishing distance is eliminated.

Depending on the combustible material, it is then possible to select the most effective extinguishing agent directly at the source of the fire.

Due to the fine atomisation of the water under pressure and the thus increased larger surface of the water molecules/water particles, less water is needed than for conventional extinguishing devices.

Secondary extinguishing damage is reduced and the fire exposure time is shortened.

In cooperation with the Gesellschaft für Sicherheitstechnik/Schiffssicherheit Ostsee mbH in Rostock (GSSO), a training session was developed for the response teams on board; its subject matter focuses specifically on the issue of trailer fires in enclosed and open ro-ro cargo decks.

The first response teams have already completed this training activity.

On the topic of direct firefighting, a firefighting exercise was carried out during a passage to Sweden. This involved the CCME, the GSSO, the Hanseatic City of Rostock Fire Brigade and the response teams on board. Exercise trailers were taken on board especially for this.

On the technical side, in addition to the regular operation of the drencher system, all the valves will be tested in the future to ensure free movement. Furthermore, all the crew members have been reinstructed in the correct operation of the system.

5.1.2 Fire and rescue office of the Hanseatic City of Rostock

Based on the internal evaluation of the operation by the fire and rescue office of the Hanseatic City of Rostock and related findings, two handheld marine radio transceivers have now been purchased for the operational units responsible.

The communication deficits that occurred in the present case can thus be prevented or minimised in future emergency situations.

6 RESULT

Since the shipping company as well as the Brandschutz- und Rettungsamt der Hansestadt Hamburg (fire and rescue office of the Hanseatic City of Rostock) already took adequate actions regarding the safety risks identified within the scope of the investigation on their own account, the BSU could refrain from issuing safety recommendations.

7 SOURCES

- Marine Accident Report – PEARL OF SCANDINAVIA – Division for Investigation of Maritime Accidents – Danish Maritime Accident Investigation Board
- Investigation Report 445/10 – LISCO GLORIA – Federal Bureau of Maritime Casualty Investigation
- Accident Report 24/2011 – COMMODORE CLIPPER – Marine Accident Investigation Board
- BSH Ship Information System (BISS)
- Various documents from Scandlines
- Reports by the ship's command and crew members responsible
- Report by the fire and rescue office of the Hanseatic City of Rostock
- Investigation file of the public prosecutor's office of the Hanseatic City of Rostock
- Report by the criminal investigation department of the Hanseatic City of Rostock
- Expertise on the cause of a fire on behalf of the waterway police department of Rostock
- Expertise on the cause of the fire by the GSSO
- Relevant legislation