



Bundesstelle für Seeunfalluntersuchung
Federal Bureau of Maritime Casualty Investigation
Federal Higher Authority subordinated to the Ministry of Transport
and Digital Infrastructure

Investigation Report 42/15

Very Serious Marine Casualty

**Fatal accident on board
the MV ASKOE
in the Baltic Sea
on 6 February 2015**

15 June 2017

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, amended most recently by Article 16(22) of 19 October 2013, BGBl. (Federal Law Gazette) I p. 3836.

According to said Law, the sole objective of this investigation is to prevent future accidents and malfunctions. This investigation does not serve to ascertain fault, liability or claims (Article 9(2) SUG).

This report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to Article 34(4) SUG.

The German text shall prevail in the interpretation of this investigation report.

Issued by:
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1 Summary

After setting sail in Southampton, the Antigua & Barbuda-flagged dry bulk carrier ASKOE transited the Kiel Canal in an easterly direction on the night of 6 February 2015. The pilot disembarked after she sailed out of the lock at Kiel. The rating on watch secured the anchors before he was supposed to stand down for a period of rest.

At about 0730¹ on the morning of 6 February 2015, a crew member noticed an open cargo hold access cargo hold access hatch and discovered the already deceased rating on watch inside. While the crew recovered the body, the ASKOE sailed into the nearest port (Rostock), where the police, the forensic pathologist, and the BSU started to investigate the incident.

In spite of every effort made, it has not been possible to determine why the rating on watch was in this cargo hold access cargo hold access hatch or why he fell unconscious there and subsequently passed away.

¹ Unless stated otherwise, all times shown in this report are local = UTC + 1 (CET).

2 FACTUAL INFORMATION

2.1 Photo



© Hasenpusch Production

Figure 1: Photo of the ship

2.2 Ship particulars

Name of ship:	ASKOE
Type of ship:	Cargo ship
Nationality/Flag:	Antigua & Barbuda
Port of registry:	Saint John's
IMO number:	9333450
Call sign:	V2BK1
Owner:	Schiffahrtskontor Emsbroker GmbH ²
Year built:	2005
Shipyard:	Bodewes Scheepswerfen B.V.
Classification society:	Germanischer Lloyd
Length overall:	89.94 m
Breadth overall:	15.20 m
Gross tonnage:	3,183
Deadweight:	4,350 t
Draught (max.):	5.25 m
Engine rating:	1,850 kW
Main engine:	MAK 6 M 25 Caterpillar
(Service) Speed:	12.5 kts

² This is the owner at the time of the accident. Ownership has since changed.

2.3 Voyage particulars

Port of departure:	Southampton, Great Britain
Port of call:	Soedertaelje, Sweden
Type of voyage:	Merchant shipping/ international
Cargo information:	Wood pellets in bulk
Manning:	8
Draught at time of accident:	5.2 m
Pilot on board:	No
Canal helmsman:	No
Number of passengers:	0

2.4 Marine casualty or incident information

Type of marine casualty:	Very serious marine casualty; accident involving a person
Date, time:	06/02/2015, 0730 ³
Location:	Baltic Sea (Kadet Trench)
Latitude/Longitude:	φ 54°28'N λ 012°12'E
Ship operation and voyage segment:	High seas
Place on board:	Cargo hold access cargo hold access hatch at forward edge of superstructure on starboard side
Consequences (for people, ship, cargo, environment, other):	A seaman lost his life

³ This is the time of discovery. It was not possible to determine the exact time of the accident.

Extract from Navigational Chart INT 1301,
 Federal Maritime and Hydrographic Agency (BSH)

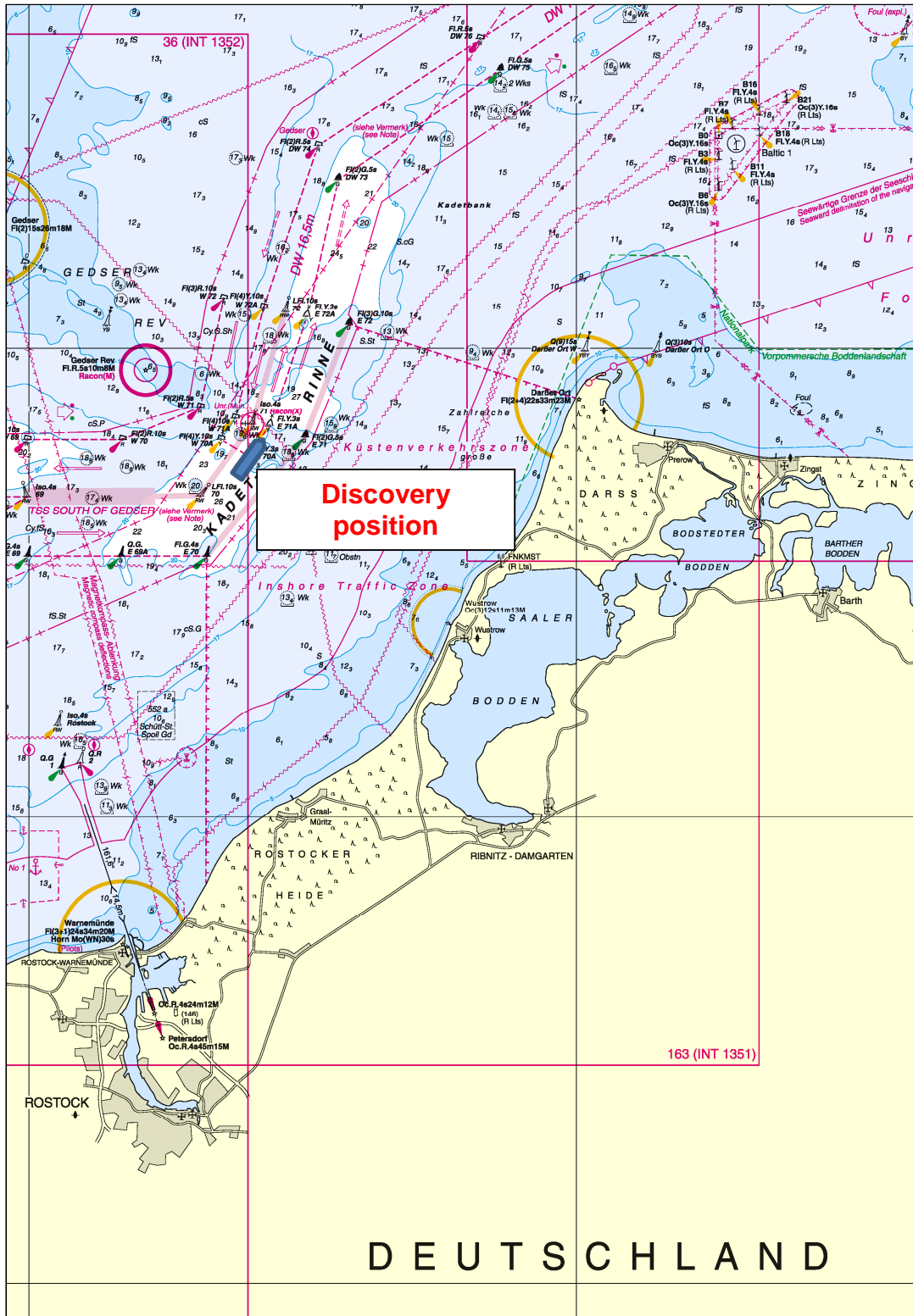


Figure 2: Extract from navigational chart showing the position of the ship at the time of discovery

2.5 Shore authority involvement and emergency response

Agencies involved: Waterway Police (WSP) Rostock,
Criminal Investigation Department (CID) Rostock

Resources used: Fire service

Actions taken: Recovery of the deceased

Results achieved: Seaman recovered dead

3 COURSE OF THE ACCIDENT AND INVESTIGATION

3.1 Course of the accident

The Antigua & Barbuda-flagged ASKOE was sailing from Southampton in Great Britain to Soedertaelje in Sweden. She transited the Kiel Canal on the evening of 5 February 2015. The pilot disembarked from the ship after she passed through the lock at Kiel at about 0100. The chief officer, who was in charge of the navigational watch, and a rating on watch were on the bridge. The chief officer instructed the rating on watch to accompany the pilot to the pilot ladder and then to lash down the anchors on the forecastle in a seaworthy manner. When the rating on watch reported on VHF that the anchors were lashed down at about 0115, the chief officer stood him down.

The weather was calm (wind at 2 Bft) and visibility was good.

At 0600, the chief officer handed over the watch to the master. At about 0715, a rating⁴ entered the bridge to discuss the day's work. When he went on deck shortly afterwards, he noticed the open cargo hold access cargo hold access hatch and found the rating on watch hanging headlong inside it lifeless. He ran back to the superstructure, where he informed the chief engineer. The chief engineer immediately called the master on the bridge and then went to the chief officer's cabin to inform him. Following that, he went to the bridge to receive instructions from the master. The master had made ready a gas detector and a VHF radio in the meantime and gave these items to the chief officer, who immediately went to the casualty. Since the gas detector did not indicate any threats, the chief officer climbed down the ladder to assist the rating on watch. He attached a line to the casualty's legs and with the help of other crew members managed to pull the rating on watch out of the companionway.

The casualty was lying on the main deck at about 0830, at which point it was unequivocally determined that he had died. The chief officer informed the master of this.

In the meantime, the master had contacted the owner, which instructed him to proceed to Rostock immediately, as this was the nearest port.

The ASKOE moored in Rostock at 1100. The police and fire service went on board immediately to investigate the circumstances of the accident.

⁴ There was no bosun according to the crew list. This rating had taken over the role, however.

3.2 Investigation

WSP Rostock notified the BSU of the incident at 0845. Since the ship did not fly the flag of Germany, representatives of the flag State, Antigua & Barbuda, were notified, which did not declare the incident as a marine casualty and therefore saw no requirement for its own investigation. It did offer to co-operate with the BSU, however.

Since the ASKOE's voyage repeatedly took her through Danish waters on the night of the accident, the BSU attempted to determine the ship's position at the time of the accident. It was only possible to confine this roughly to a period after the anchors were made seaworthy.

The BSU decided to investigate the incident because the ship is managed by a German owner and called at a German port, where the German police investigated extensively.

3.2.1 Voyage data recorder

A Rutter voyage data recorder was on board the ASKOE. Its audio recordings confirmed the statements of the crew, as described in section 3.1. There was no evidence as to why the rating subsequently found dead went to the cargo hold access cargo hold access hatch.

3.2.2 Investigation of the atmosphere

As already mentioned in section 3.1, the master and the chief officer both stated that a gas detector was used at about 0730 before the chief officer went to the casualty in the companionway. This test reportedly delivered a safe result. The chief officer was evidently not harmed by carbon monoxide in any way, either.

Besides the police, the professional fire service also boarded after the ship had made fast in the port of Rostock and found at about 1200 that the carbon monoxide (CO) value was 300 ppm and oxygen content 18% at a depth of 2 m in the companionway.

There is no set limit for the oxygen content in respiratory air laid down in state labour protection legislation. The technical rules for workplaces, ASR A3.6, define that sufficient healthy air must be provided in enclosed working spaces. This usually corresponds to the quality of air outdoors. Oxygen content is not specified, however.⁵

According to DGUV Rule 103-003 (formerly BGR 126) and DGUV Rule 113-004 (formerly BGR/GUV-R 117-1), a lack of oxygen prevails when the oxygen content at normal pressure is lower than the oxygen content in natural respiratory air of approximately 20.9% by volume. Inhalation of heightened oxygen concentrations below 50-60% by volume at normal pressure is safe for adults.

⁵ <http://www.gefaehrdungsbeurteilung.de/de/gefaehrdungsfaktoren/arbeitsumgebungsbedingungen/ertrinken/grenzwerte>
(Website of the Federal Agency for Occupational Safety and Health(BAuA)).

Decreasing oxygen content in air gives rise to severe effects:

O₂ content in respiratory air	Risk and effect of decreasing oxygen concentration
21-18% by volume	Affected parties are unable to detect any identifying symptoms
18-11% by volume	Physical and mental capacities are impaired without affected parties noticing.
11-8% by volume	Possible loss of consciousness within a few minutes without warning. Lethal risk at less than 11%.
8-6% by volume	Rapid loss of consciousness. Resuscitation possible if carried out immediately.
6-0% by volume	Immediate loss of consciousness. Brain damage even if rescued.

CO obstructs the passage of oxygen in blood due to the extent to which it attaches to haemoglobin. Loss of consciousness and death by suffocation is possible after only a few inhalations. Due to this effect of internal suffocation (poisoning), this material must be rated a hazardous substance.

CO concentration in the atmosphere⁶	Inhalation period and toxic symptom development
30 ppm/0.003%	Maximum admissible concentration in eight hours of work
200 ppm/0.02%	Mild headache within 2-3 hours
400 ppm/0.04%	Frontal headache within 1-2 hours, spreading throughout head in 2.3-3.5 hours
800 ppm/0.08%	Dizziness, nausea and jactitation in 45 minutes, loss of consciousness in 2 hours
1,600 ppm/0.16%	Dizziness, nausea and headache in 20 minutes, death in 2 hours
3,200 ppm/0.32%	Dizziness, nausea and headache in 5-10 minutes, death in 30 minutes
6,400 ppm/0.64%	Dizziness and headache in 1-2 minutes, death in 10-15 minutes
12,800 ppm/1.28%	Death in 1-3 minutes

Since 300 ppm was measured in the case at hand, CO poisoning is unlikely.

⁶ https://de.wikibooks.org/wiki/Erste_Hilfe/_Kohlenmonoxidvergiftung of 27 February 2017 in ppm (parts per million).

3.2.3 Forensic examination

A forensic pathologist had already carried out a preliminary examination of the deceased on board the ASKOE. The Institute of Forensic Medicine at the University of Rostock performed an autopsy a few days later. This examination found that the casualty died of non-natural causes arising from suffocation due to the combination of position and an apparent lack of oxygen.

There were no effects of traumatic violence, nor was the blood saturated with CO. No evidence of poisoning or the effects of alcohol was found.

The forensic pathologists assume that a headlong slide into the shaft would have resulted in a fall to the bottom of the shaft. Accordingly, they believe it is reasonable to assume that a gradual lateral toppling, most likely due to reduced oxygen concentration in the respiratory air, with an ensuing reduction of consciousness occurred while remaining or being trapped in the discovery position, as recorded.

3.2.4 Safety measures of the ship's command

The master stated that formal information about the dangerous goods class MHB⁷ Group B was handed over together with this special timber cargo when the ship was loaded. Accordingly, any points of entry to the cargo hold were secured with padlocks after loading. All the crew members were aware of the combination of the locks in case of emergency, however. The chief officer briefed the crew at length on the dangers associated with this cargo. In addition, rules of conduct were displayed in all public spaces of the ship and warnings were attached to the cargo hold access cargo hold access hatches.

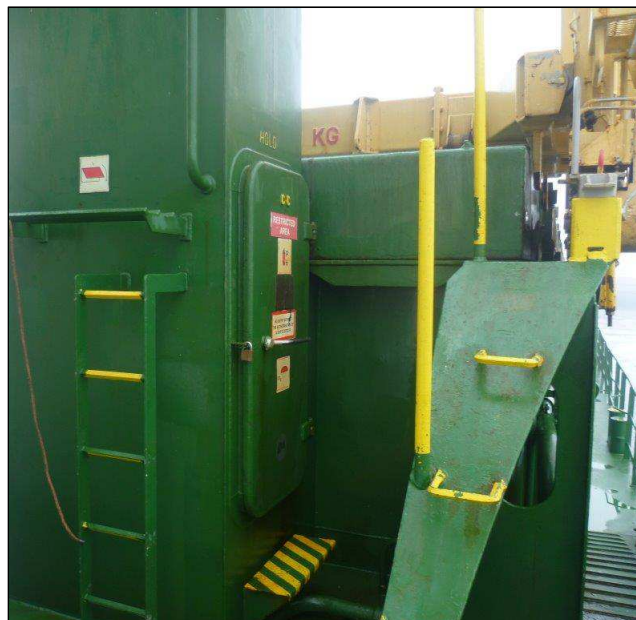


Figure 3: Cargo hold access cargo hold access hatch with warnings and padlock

⁷ MHB: Materials hazardous only in bulk (provisions of the International Maritime Solid Bulk Cargoes (IMSBC) Code) when carried at sea.

CARGO INFORMATION

This form meets the requirements of SOLAS 1974, chapter VI, regulation 2 and the IMSBC Code 2012

Bulk Cargo Shipping Name (BCSN)			
The cargo described in this document is in the process of formal classification. Upon completion of this process a BCSN will be allocated. The prime chemical hazard, i.e. oxidation leading to depletion of oxygen and increase of carbon dioxide in cargo and adjacent spaces, is comparable to that for WOODCHIPS already entered in the IMSBC Code 2012 and this entry should be consulted.			
Shipper SITA UK SITA House, Grenfell Road Maidenhead, Berkshire SL6 1ES United Kingdom		Reference number(s)	
Consignee EFO AB Kungsgatan 50 S-111 35 Stockholm Sweden		Carrier	
Name of vessel ASKO	Port of departure Southampton	Port of destination Soder talle	
General description of cargo WASTE: Chipped recycled wood as biomass fuel for use in the generation of electricity and/or heat.			
Gross mass metric tons 2134,809	Stowage factor About 115 ft ³ or 3.26 m ³ /metric ton	Angle of repose Not applicable	Trimming procedures Reasonably level
Potential hazard May be subject to oxidation leading to depletion of oxygen and increase of carbon dioxide in cargo and adjacent spaces. Low risk of self-heating.		Class MHB	Group B
Additional certificate(s) No additional certification required.			
Declaration We hereby declare that the consignment is fully and accurately described and that the given specifications are correct to the best of our knowledge and can be considered as representative for the cargo to be loaded.			
Name of signatory Paul Joseph Signed at (place)	Status Ports & Shipping Manager Signed on (date)	Company/organization SITA UK Signature on behalf of shipper	

Figure 4: Cargo documents

4 ANALYSIS

All the crew members were aware that the cargo of wood pellets was dangerous in that it could produce CO while oxygen is consumed at the same time.

An analysis of all the information available neither explains why the rating was in the cargo hold access cargo hold access hatch, nor how he lost his life there. He had not been instructed to enter the cargo hold access hatch and nothing was found that could explain his actions. The companionway was empty and nothing indicated precipitating circumstances (smuggled goods such as alcohol, cigarettes or the like). Moreover, no toxins were found in the body of the deceased. There were no switches that would need to be operated to make the ship ready for sea operation, either. Light switches for the deck crew, switches for the cargo hold fans or the like were not located in this companionway.

For whatever reason he descended, the CO content in this companionway was not so high that he would have lost consciousness within a few minutes.

To what extent the oxygen content (O_2) was reduced significantly and therefore allowed for a (rapid) consciousness could not be ascertained in retrospect (due to the mixing of the air when the door of the companionway was open) with certainty. The measurements of the professional fire department carried out at 1200 at least revealed indications for a reduction of the O_2 -concentration. It is not known how long the casualty stayed in the companionway. He would have had to spend an extremely long period of time in the companionway to lose consciousness for this reason. Moreover, a heightened CO value or insufficient oxygen content was explicitly not found by the autopsy.

The position in which he was found is also inexplicable. It is difficult to imagine that his unconscious body would have been able to rotate in the confined space to the extent that his head would finally hang downward. On the other hand, a headlong fall into the vertical passage is unlikely because the body would then have probably dropped through to the bottom (or the lateral deceleration would have caused injuries at the very least but no such injuries were found). Moreover, the ship sailed through an extremely calm weather zone with only two wind forces during the period of the accident. In all likelihood, the ship hardly moved at all. Consequently, there was nothing to cause him to lose his balance.

Only the cause of death seems to be conclusive. For lack of the possibility to demonstrate otherwise, position-induced suffocation has been cited. The involvement of a third party has been ruled out by the forensic pathologist and the CID.

5 CONCLUSIONS

The ship's command was aware of what hazards the cargo involved. It had briefed the crew and secured the access points with locks. In the case at hand, it would have been better if not all crew members had known the combination for the padlocks. Having said that, it cannot be proven that toxic air was the cause of this accident, either. Hypothesising is encouraged due to the difficulty in demonstrating the course of events leading up to and during this marine casualty. The statutory task of the BSU is to determine deficiencies in safety without drawing attention to personal fault. Therefore, the BSU is dispensing with more theories and recommends that the ship's command provide fewer crew members with access to such dangerous cargo hold access hatches in the future.

6 Action taken

The safety recommendations included in the draft of the investigation report addressed to the ship's command and owner of the AKSKOE, recommending that the ship's command of the ASKOE limit the number of crew members with access to locked holds to that absolutely necessary in the future, was already implemented by the ship's owner.

Therefore the safety recommendation was removed from the final investigation report.

7 SOURCES

- Investigations of WSP Rostock
- CID Rostock
- Autopsy report of the Institute of Forensic Medicine at the University of Rostock
- Written explanations/submissions
 - Ship's command
 - Owner
 - Classification society
- Witness testimony
- Navigational charts and ship particulars, BSH
- Official weather report of Germany's National Meteorological Service (DWD)
- Documentation from the Ship Safety Division (BG Verkehr)
 - Accident Prevention Regulations (UVV-See)
 - Guidelines and codes of practice
 - Ship files