



DEPARTMENT OF MARINE SERVICES AND MERCHANT SHIPPING
ANTIGUA AND BARBUDA W.I.

INVESTIGATION REPORT

Into the

SERIOUS MARINE CASUALTY

Contact of a shipboard crane

on

MV "WILMA"

Flag: Antigua and Barbuda W.I., IMO No.:9147679, Off. No.: 2376, Call Sign:V2AB2

with an

overhead road bridge construction crossing the Kiel Kanal

on

December 07th, 2006

Joint investigation report in accordance with
IMO Res. A 849(20)
by the flag State Antigua and Barbuda W.I.
and the State with substantial interest,
Federal Republic of Germany



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



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OBJECTIVE

IMO RESOLUTION A. 849 (20)

CODE FOR THE INVESTIGATION OF MARINE CASUALTIES AND INCIDENTS

This Code recognizes that under IMO conventions each flag State has a duty to conduct an investigation into any casualty occurring to any of its ships when it judges that such an investigation may assist in determining what changes in the present regulations may be desirable or if such a casualty has produced a major deleterious effect upon the environment.

The Government of Antigua and Barbuda W.I. is signatory to the major international shipping conventions. In this respect marine casualties are investigated after receipt of consent by the Minister of Transport.

DISCLAIMER

This report is not written with liability in mind and should not be used in court for the purpose of litigation. It endeavours to identify and analyse the relevant safety issues pertaining to the specific accident, and to make recommendations aimed for preventing reoccurrence of similar accidents.



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**PART A
THE OCCURRENCE**

1. SYNOPSIS

(All times are local time = UTC +1)

MV "Wilma" was on passage from the Baltic port of Gdynia/Poland to Bremerhaven/Germany with transit via the Kiel Canal. The vessel was in ballast and scheduled to undergo the ten-year class survey with drydocking in Bremerhaven straight upon arrival. Some specific works in preparation to the forthcoming drydocking, for which one of the three ship's cranes was needed, had still to be done but had not yet been executed because of a rough sea state while being en-route from Gdynia to Kiel-Holtenau. The Master, the Chief Mate and the Bosun had planned in advance already to catch up with this works while passing the Kiel Canal. Because no specific local instruction and Kiel Canal passage regulation are prohibiting the performance of works on deck of a vessel in transit, as long as the safe navigation, Canal facilities, overhead cables and bridges are not affected, one of the ship's cranes should be topped straight after having left the Holtenau locks and the passage of the first two bridges.

When "Wilma" had cleared the lock on December 07th, 2006 at 17:18 hours LT with a pilot and two certified helmsmen on the bridge, she gradually increased speed while proceeding westwards. When a first bridge had been passed the Chief Mate gave instructions to lift the crane without being precise in specifying the limited height in order to safely pass the second bridge, rapidly approached by the vessel. The crane was topped too high and the derrick jib crashed into the construction of a highway bridge.

There was considerable damage on the vessel's crane, the vessel's hatch cover due to falling parts and the bridge construction. However, there were no fatalities, no injured persons and no impact on the surrounding environment. Regardless of this the succeeding traffic in the canal was stopped for some 4,5 hours thereafter.

The Antigua and Barbuda W.I. flag State Administration is in process of analysing the casual elements of this occurrence and a report will be issued. This will be jointly done in close liaison to the German Federal Bureau of Marine Casualty Investigation (BSU), being the coastal State Authority.

2. AFTERMATH

The crash resulted in no loss of lives and no personal injuries. There was no pollution or other impact that had badly affected the surrounding environment. The vessel could proceed the canal transit and had later berthed at Rendsburg to undergo a detailed damage check and class survey.



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3. DAMAGE

3.1 To the Vessel

Damage to *Wilma*, as an immediate result of the crane crash with the overhead bridge construction, was confined to the hatch covers and was caused when the topped derrick broke away from the crane pillar and smashed on top of the only partly opened covers.



View from the bridge to the aft: the torn off derrick on the hatch cover



The damage caused to the hatch cover by the fallen crane leg



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3.2 To the Overhead Bridge

The overhead bridge construction that was hit by the erected crane leg sustained substantial damage.

Because the bridge is a connecting link of a major traffic lane that is crossing the Kiel Canal the damage posed a high potential risk to the passing traffic and was consequently closed immediately. A thorough construction vetting has been conducted meanwhile and the bridge was only opened again for the traffic mid of February 2007.

4. THE ASSESSMENT OF THE OCCURRENCE

This casualty incident resulted in material damage to installations and equipment but fortunately without any harm to human beings. However, the rundown of the event mirrors a significant weakness in human behaviour – and could have turned out much more severely!

Despite improvements in technology and of training through various STCW conventions, ISM ignited Safety Management Systems etc., a majority of accidents continue to occur due to a failure of the crew in following simple principles of work planning and communicating and without a thought on potential risks associated to the work to be performed.

The character of this occurrence appears to be difficult in classifying it correctly as per the Resolution A.849 (20) definition of a “serious” or even “very serious casualty”. However, due to the essence of the case, with the lesson to learn on the ever enduring role of the human factor, the flag State classified it as “serious” and felt encouraged to examine key issues affecting the safety on *Wilma*.



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**PART B
GENERAL**

1. PURPOSE OF THE REPORT

The purpose of this report is to summarize and conclude on the findings of the proximate cause of the shipboard crane crash MV "Wilma" caused while being in transit in the Kiel Canal on December 07th, 2006, this in accordance with the requirement of SOLAS 1974 as amended by the Protocol of 1978, Chapter I Part C Regulation 21.

2. INSTRUCTIONS

Instructions to investigate into this casualty were given by the Commissioner of Maritime Affairs of the Department of Marine Services and Merchant Shipping of Antigua and Barbuda, W.I. at Oldenburg, Germany.

Captain Siegfried Ottinger, being the Chief Casualty Investigator, signs responsible for the coordination of investigations with all parties concerned and to issue a final investigation report.

In this case he had assigned Captain Jochen Schmidt to conduct the on-scene survey with the initial assessment of available evidence.

3. INVESTIGATION

The assigned on-scene inspector was entitled to investigate into this serious marine casualty on behalf of the Administration by Power of Attorney, issued on December 08th, 2006 by the Commissioner of Marine Affairs of the Department of Marine Services and Merchant Shipping of Antigua and Barbuda, W.I. at Patentbusch 4, D-26125 Oldenburg, Germany.

4. AUTHORITIES INVOLVED

It has been mutually agreed with the coastal State Germany to conduct a full investigation. The flag State ADOMS Inspection and Investigation Division (ADOMS IID) has taken the lead, fully supported in close cooperation and liaison with the coastal State Authority, the German Federal Bureau of Marine Casualty Investigation (BSU). Initial on-scene actions as well as the compilation of this final report have also involved the contribution of other local federal State Authorities and the result of their analysis of relevant causal elements is reflected here.

In particular involved in the fact finding by conducting witness hearings and providing human evidence was the Water Police office Kiel.

The Chief Casualty Investigator of ADOMS IID takes the opportunity of this report issuance to acknowledge this cooperation.



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PART C
FACTUAL INFORMATION

1. THE MV "WILMA"



1.1 Particulars of the Ship

Name of Vessel / Call Sign	WILMA / V2AB2
Company (ISM Code 1.2)	Heinrich P. 29 Bürgerei, Steinkirchen, Germany
Port of Registry	St. John's
Flag	Antigua and Barbuda W.I.
IMO Number	9147679
Type of Vessel	General Cargo, heavy lift equipped
Classification Society	Germanischer Lloyd
Year built	1997
Ship Yard	J.J. Sietas KG Schiffswerft & Co. Hamburg
LoA (Length over all)	151.63 m
BoA (Breadth over all)	20.40 mt
Deadweight	9549.000 t
Summer Draft	7.836 m
Gross Tonnage (BRZ)	8388
Net Tonnage (NRZ)	4178
Main Engine	MAN B&W Diesel / 4 stroke single acting / 9 L 48/60
Engine Power/ Speed	9450 kW
Crew	actual 18 / 14 as per MSMC
Trading Area	Intern. Voyages

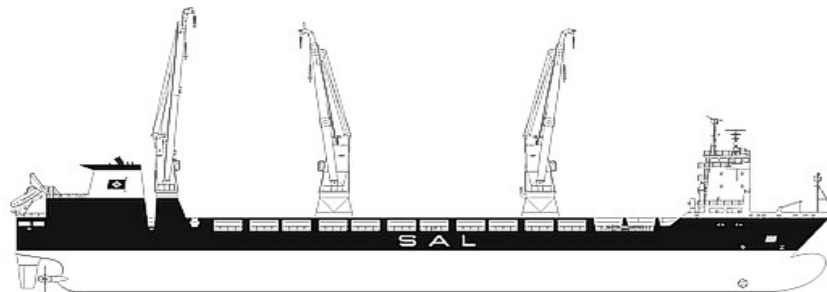


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1.2 General Arrangement

Wilma is a general cargo vessel, constructed to predominantly carry heavy lift cargo and consequently fitted with three heavy-lift cranes, two of which are mounted on port side with a lifting capacity of SWL 275 m/tons. A third heavy lift crane with a lifting capacity of SWL 150 m/tons stands on starboard side in the aft section of the vessel. Calculated on a maximal draught of 5,15 meters the air draught up to the highest point of the antenna is 30,63 meters (4 - sketch page 12).

When the crane derrick of the forward crane is erected to its highest possible position the air draught is 46,20 meters, again calculated on the maximum sailing draught of 5,15 meters.



Wilma was equipped with pontoon like twin deck steel covers which could be utilized as counterweight during heavy lift cargo operation. Filled with ballast water and positioned by shipboard crane they are used to balance excessive vessel list while handling cargo.

2. THE MANNING

Wilma was well manned with a crew of 18 comprising a Filipino Master, a Filipino Chief Mate, two Filipino Mates, and two German Engineers. The remainder of crew was all of Filipino nationality, as there was a Bosun, two deck Cadets, four deck Ratings and further three crew members for engine job functions. Finally, there was a Cook and a Steward.

A valid Minimum Safe Manning Certificate (MSMC) was issued by the flag State Administration on September 18th, 2005 and approved the vessel to be operated with a crew of totally 14, for all grades and capacities on international voyages. The surplus of 4 if comparing the actual crew with the MSMC was because of the additional Bosun, one OS, one wiper and the Steward.

The company used to employ the majority of their crews with regular successive contracts. On *Wilma* most of the crew had long lasting seniority with the company and the deck hands were all familiar with the vessel, and in particular with heavy lift handling



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and operation. The last major crew change prior the incident had been conducted in Masan/Korea on September 30th, 2006.

3. THE VOYAGE

On December 07th, 2006, the day of occurrence, *Wilma* was en-route from Gdynia/Poland to Bremerhaven/Germany with transit of the Kiel Canal. The vessel had sailed Gdynia the day before in the early evening hours and since the Pilot had left on 20:42 hours LT they had traversed the Baltic Sea with nothing but routine vessel watch and operation.

Wilma was scheduled for Bremerhaven to undergo a ship yard dry docking period for the ten-year class renewal. The vessel was in ballast. On departure Gdynia the draught has been 4,85 meters forward and 5,10 meters aft.

On December 07th, 2006 at 15:00 hours Lt *Wilma* had arrived at the Kiel Kanal roads and the sea-pilot boarded. Everything was arranged for a direct and fast canal passage. The draught checked at that time again was 4,40 meters forward and 5,15 meters aft.

At 16:45 hours LT *Wilma* entered the Kiel-Holtenau locks where the vessel was moored until 17:15 hours. During the lock passage the sea Pilot had left and the canal Pilot had boarded. Also the two helmsmen had embarked in the locks. At 17:18 hours the Kanal passage started.

4. WATCH AND REST DURING TRANSIT

On *Wilma* the navigational watch system was a 1-in-3 watch routine which did not include the Master. This left the Master free to conduct non-watch keeping duties. The three Mates were sharing the watch in special intervals, whereby the Chief Mate was due from 06:00-08:00 and 12:00-18:00 hours, followed by the 3rd Mate from 08:00-10:00 and 18:00-24:00 hours. The 2nd Mate's turn was that from 10:00-12:00 and finally from 00:00-06:00 hours.

Thus, also on December 07th, 2006, the Chief Mate had commenced his watch at noon at 12:00 hours, while being on the Kiel Canal approach. Before that he did have rests since the pilot had left off Gdynia the day before at 20:42 hours until December 07th 06:00 hours, and further from 08:00 until 12:00 that day.

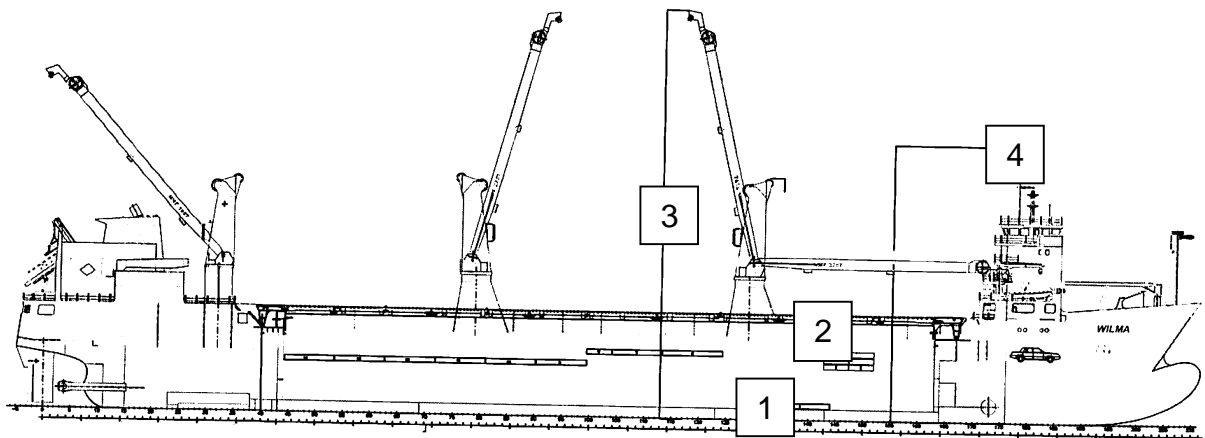


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5. THE WORK OBJECTIVE

The vessel's dry docking schedule in Bremerhaven was said to be tight and the objective was to arrive there in an almost adequate condition, allowing the wharf to immediately commence working upon arrival. One item still on the to-do list while being in transit from Gdynia to Bremerhaven was the discharge of not needed ballast, still carried in some tanks, and some water residuals that had remained in the tween deck covers.

To get this pontoon-like covers empty it was necessary to lift them by crane were there-after they naturally drained in a tilted position. In this case, it was tween deck cover No. 1 which was still flooded and due to be drained. 2



Crane derricks erected: This sketch clearly illustrates the latent risk of a potentially dangerous over height variance to the calculated air draught once the cranes are in operation.

Plan was to tilt a flooded tween deck cover by utilizing the forward crane. This crane was needed because the tween deck cover to be drained was dropped pretty close underneath the crane pillar down in the lower hold (1). For this operation not only the hatch had to be opened and a needed sling to be discovered somewhere from tween deck 2 and 3 (2) but also the derrick had to be raised temporarily pretty high (3). In advance, while planning the voyage, this work had been agreed between the Chief Mate, the Master and the Bosun to be conducted while passing the Kiel Canal. This work could not be done while traversing the Baltic Sea because of heavy winds and a relatively high sea state. Potential risks and dangers related to free surface reactions while handling the flooded pontoon should be avoided.



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A look into the hold shows the tween deck pontoon, still flooded and subject to be lifted and tilted to get drained. For doing so, it had to be lifted on its front side as the draining openings are on the after end (**see sketch: position 1**)



Below: The sling needed to lift the pontoon lid shown on the picture below. (**see sketch: position 2**)





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6. THE PRINCIPLE WITNESSES

6.1 The Master

The Master was 43 years of age. He had 24 years of seagoing experience and carried a National Philippine certificate in the capacity of a Master Mariner as per STCW 95 requirement, issued on March 09th, 2001, with an A&B endorsement of September 11th, 2001, extended on February 07th, 2006 and valid through January 2011. He had signed on on *Wilma* in Masan/Korea on May 18th 2006, almost 7 month prior the accident occurred. The Master's total seniority with the company was 14 years. There is a hearing protocol on file.

6.2. The Chief Mate

The Chief Mate was 53 years of age. He first went to sea in 1975 and also carried a National Philippine certificate in the capacity of a Master Mariner as per STCW 95, issued on November 24th, 2004, with an A&B endorsement issued on June 28th, 2006, valid through November 2009. He was on board of *Wilma* since June 05th, 2006, having signed on in Singapore. He has had contracts with the company since 1992 and qualified as a Chief Officer in 1999. Since then he had served successive contracts on three other company vessels, all of them heavy lift carriers of the same class like *Wilma*. There is a hearing protocol on file.

6.3 The Bosun

The Bosun was 47 years of age. He had also signed on in Singapore on June 05th, 2006, together with the Chief Mate. Nothing is known about his seniority with the company; however, after having worked on *Wilma* for about half a year prior the occurrence, one can assume that he was pretty much familiar with the vessel. The Bosun had been sailing the Kiel Canal earlier already, but never as a rating for navigational watch, so he did not know much about canal transit rules and regulations. His hearing protocol is on file.

6.4 The Crane Driver

His seniority with the company was about 13 years already. He was well experienced and held – amongst others – since July 2000 a certification confirming his capability and experience as a hydraulic crane operator.

7. THE KIEL CANAL

7.1 Regional Geography

The Kiel Canal (53°53'N., 009°08'E) is a connecting waterway between the North Sea and the Baltic Sea. Sets of double canal locks are situated at Brunsbüttel and at Holtenau. The North Sea terminal is at Brunsbüttel at the western end of the canal and the Baltic Sea terminal is at Holtenau, on the eastern canal approach. The canal has a



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length of 53 nautical miles and a least depth of 11 meters. It has a surface width between 103m and 162m and a bottom width between 44m and 90m.

The canal, which operates 24 hours a day, can accommodate vessels up to a maximum of 235m in length and 32,5m beam. The maximum permitted draft for transit of the canal is 9,5m.

The average time of transiting the canal usually requires 8 to 10 hours, which includes passing through the locks at both ends. There are fixed speed limitations, depending on the vessel's size. They are varying between 8 and 6,5 knots. Kilometre markers, standing on the banks of the canal, begin with zero (00) at the entrance of Brunsbüttel.

Vessels transiting the canal are considered to belong to one of alternatively six traffic groups, depending on size and potential hazards. Vessels must display appropriate lights and shapes related to their group. The canal Pilots are explaining the relevant details and regulations and the signals, flags, or lights required to be shown. Entry into the canal is controlled by light signals displayed at the inner and outer ends of the central wall of each pair of locks.

Several bridges and overhead cables, with least vertical clearance of 40m, span the canal. Signs are installed at locations in the canal, displaying the mandatory minimum clearance (in meters) to be observed when passing them.

Ferries are crossing the canal at several points. Some are chain driven and some are free navigating ferries. Several submarine pipelines and cables are crossing the canal and may be best seen on the chart.

7.2 Pilotage and Helmsmen

For a vessel of the *Wilma* size pilotage in the canal is compulsory. Like almost elsewhere worldwide in sensitive sea areas and local river and environments, the Pilot acts as advisor to the Master only. Additionally, vessels over 115m in length, 14m beam and draughts above 6,1m must embark a certified helmsman. For vessels with *Wilma's* measurements and draught, even 2 helmsmen had to be temporarily employed. Based on the Pilots advice the helmsmen are holding the wheel, while the vessel is in transit. Consequently, no ratings of the ships crew are needed to steer their vessel.

7.3 Canal Vessel Traffic Services

A vessel traffic service system (VTS), known as VTS Kiel Canal West and VTS Kiel Kanal East, has been established in the canal and its approaches. Participation in VTS Kiel Canal West is mandatory for all transiting vessels. Vessels entering the VTS area of VTS Kiel Canal West must maintain a continuous listening watch on appropriate advised VHF channels.

Information relevant to the safe passage of vessels through the VTS area is announced in regular broadcasts. These broadcasts include general fairway and traffic situations, local storm warnings and weather messages, information on visibility and casualties occurred, as well as dredging operations.



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7.4 Specific Transit Rules and Regulations

As per latest requirements vessels transiting the canal must have operational AIS equipment on board. The position data of all vessels in the canal will be recorded by the VTS system via AIS.

In the Kiel Canal area within clearly defined boundaries the German Traffic Regulations for Navigable Maritime Waterways (SeeSchStrO) is applicable. The International Regulations for Preventing Collisions at Sea is applicable beyond these boundaries on the eastern canal approaches only.

The German publication “Regeln für die NOK-Schifffahrt“ (Navigation Rules Kiel Canal), issued and maintained by the coastal State Authority Wasser-und Schifffahrtsdirektion Nord, available for the public and all interested parties, and a must for the vessel management of all vessels in transit, is restricted in its instructions to customary items, policies, navigational and traffic related issues. It does not contain any reference to a prohibition of works on deck, cargo handling, use of deck equipment, inclusive cranes, on vessels being in transit.

Part of Wilma’s navigational bridge equipment was the American official Nautical Manual, Pub.192 Sailing Directions (Enroute) NORTH SEA, prepared and published by the National Geospatial-Intelligence Agency of the US Government, issued 2006, Tenth Edition. Also this guide does not include any reference about performing works during canal transit.

8. THE OCCURRENCE SITE

As outlined above, several bridges and overhead cables are spanning the Kiel Canal. A vessel passing the canal in the westbound direction and mooring in the Holtenau locks in a stand-by position faces the first overhead bridge directly in front of the inner lock gate, only short 6 cables right ahead. Passing this bridge in transit, the next overhead bridge, which is the Levensauer Bridge pair (which she had approached in the meantime, since departure of the locks), comes up only 1,6 miles further. Considering vessel’s speed of about 7 knots it was a 13 minutes hop between the bridges only.

Actually, the Levensauer Bridge appears to be a combination of bridges, composed of a modern highway bridge and shortly parallel aside to it an old railway bridge. This is the occurrence site.



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The old and the new Levensauer Bridge. A view from west to east.

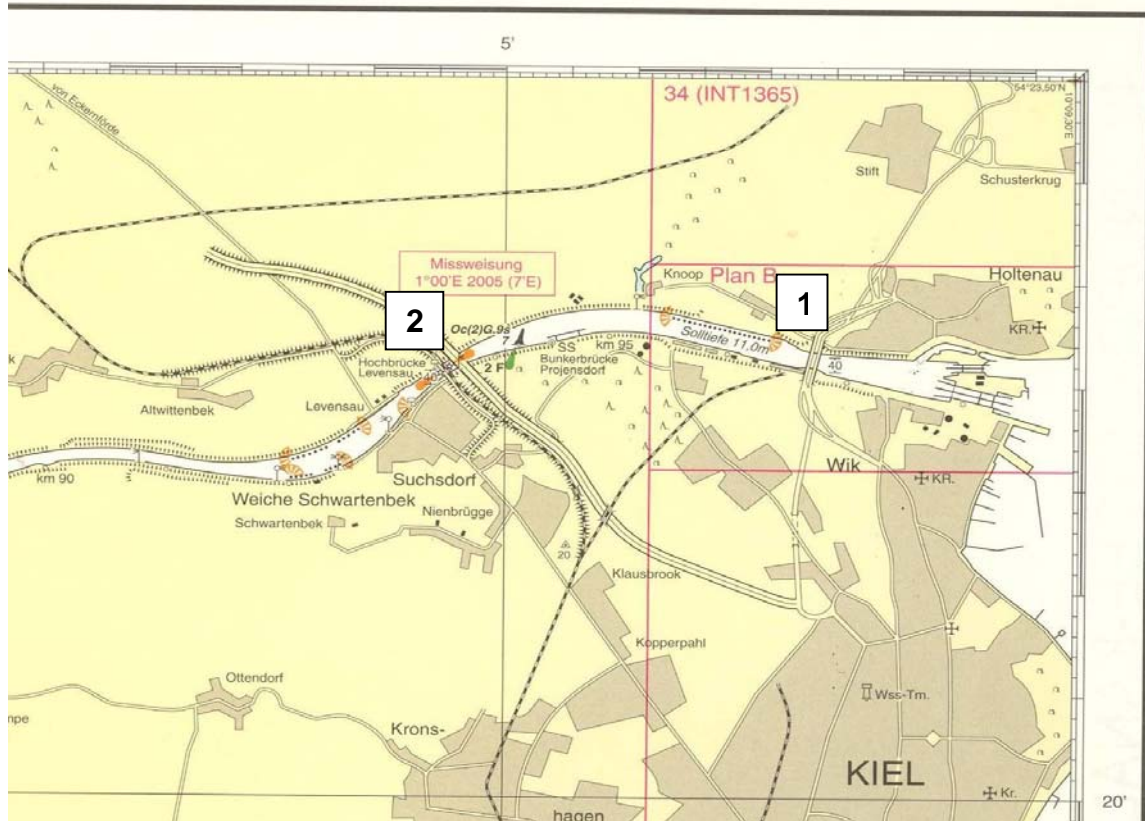


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Es muss
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MAINTAINED DEPTHS
The maintained depths charted are reduced to Chart Datum. They are intended to be maintained. It must be taken into account that they are not always present everywhere.

INDEXRAHMEN
Die durch Begrenzungslinien gekennzeichneten Karten oder Pläne größeren Maßstabs sind zu benutzen, da sie weitere navigatorisch wichtige Angaben enthalten.

LIMITS OF LARGER SCALE CHARTS
Charts or insets of larger scale marked by limits, are to be used, as they contain further important navigational details.



The bridge behind the Kiel-Canal entrance locks (1). The occurrence site (2)



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9. ENVIRONMENTAL CONDITIONS

When the incident happened at 17:35 hours LT on December 07th, 2006 sun set had been at 16:05 and moon rise was on (full moon) at 17:58. Consequently, at that season, twilight had already past and it had grown dark. The sky was one-third clouded and the visibility was good at that time. The wind was noted having been moderate from SSW, hitting *Wilma* – considering her current course of 232° at that time - on her Port side. There was slight drizzle, but that had not impacted the visibility. Air temperature was noted to have been 8,5° C. There is no tide in the canal and generally no current.

At that evening the traffic in the canal was moderate to poor and dominantly heading westbound. The overall scenario can be described to have been calm and there were no factors which could have impeded the routine canal transit of the vessel and the work of the bridge team.

PART D ANALYSIS

1. THE BRIDGE TEAM

1.1 The Master

On December 07th, 2006 at 14:30 hours LT the Master had taken over command from the Chief Mate, while *Wilma* was approaching Kiel roads to pick up the sea Pilot. Since that time he was present on the bridge all time. At 16:45 *Wilma* entered the locks and left it again at 17:18. The waiting time in the locks had been utilized by the Master and the Chief Mate to reach agreement on works in progress and those to be performed on deck during the canal transit. The Master had agreed to the plans of the Chief Mate to do some crane operations, however, subject to the Pilots agreement and only after the first two sets of bridges at the beginning of the canal had been passed. As per Master's view this did include the Levensauer Bridge as well and he was sure that the Chief Mate had the same understanding. They both had passed the Kiel Canal at least tree times together. The Master stated later that he was familiar with the specific requirements on the safe height of the bridges, after having transited the canal with high loaded deck cargo on previous voyages already.

When the canal Pilot had boarded the Master handed out the Pilot card to him and both communicated on routine matters and standard formalities, without referring to the deck works which were pre-planned with the Chief Mate.

Shortly after they had left the locks and had passed the first bridge (Holtenauer Bridge) the Master handed over command back again to the Chief Mate, who was still the OOW as per plan.

The Master remained on the bridge and began to handle some ballast pumping actions. For this he used a special ballast operation panel, which was located in the Port quarter aft of the bridge. He stayed there in this section fully concentrated and focused on some ballast operation, without interfering in the navigation, now performed by the Pilot and



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the Chief Mate and one of the external helmsmen, who hold the wheel. While being in process to operate the ballast system, the Master incidentally looked out of the aft bridge windows and saw that the crane operation with crane No. 1 had started. At that time, all the decks light had been switched on.

Because the Master had not followed up the traversing process of *Wilma* in the canal after they had left the locks the Master thought that the 2nd bridge had been passed already and got consequently not alerted when he glanced the erected crane derrick.

1.2 The Chief Mate

On December 07th, 2006 at 12:00 hours LT the Chief Mate had relieved the 2nd Mate on the bridge and commenced his afternoon watch duties. The vessel at that time was approaching Kiel to enter into the canal. When the Master took over two and a half hours later at 14:30, the Chief Mate remained on the bridge all the time, until they finally had berthed in the locks.

Prior the canal Pilot arrived the two certified external helmsmen had boarded during the lock stay. The Chief Mate welcomed them and their communication was restricted to the usual exchange of general information needed to make them familiar with *Wilma* and her particulars. Additional information directed to one of the helmsmen was that of the Chief Mate, that crane operations were intended to be performed during the canal transit. The helmsman had responded that this would be none of a problem as long as they would stay below 40 meters, because of the bridges. Contrary to what the Chief Mate had agreed with the Master earlier, he did not address his subject to the Pilot once he arrived on the bridge.

During all the time after they had left the locks until the accident some 14 minutes later occurred, the Chief Mate stood on the bridge on Starboard side in front of the chart table, right from the Pilot. The vessel's two radars were both in operation. There was an x-band 3 cm unit switched to a low range display (not precisely defined later in the Chief Mates witness protocol) and there was 10 cm unit operating on a short range (0,5 or 0,75 nm), whereby the vessel in the canal and the bridges could clearly be seen once they entered the range.

Because the rear curtains between the front part of the bridge and the rear compartments had been closed the Chief Mate could not look through the rear bridge windows to see what was going on deck. He primarily was focusing ahead.

From the charts on the table ahead of him the Chief Mate knew about the bridges the vessel had to pass during the next hour. He also was aware that the Levensauer Bridge was due to come. It was his intention to only give order to the Boson once the Levensauer Bridge had been passed.

When the Master informed the Chief Mate that he would be starting now to do some ballast operation, the Chief Mate had interpreted this being the handover of command to him, in particular, because it was still his normal watch cycle.



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The Chief Mate had instructed the Bosun already prior the 1. bridge (the Holtenau bridge, see chart clipping ahead) had been reached and passed that he could now commence with preparations, necessary to do the work planned. However, crane movements were advised to be exempt until the bridges had been passed. But he did not expressively advise about the next set of bridges to come.

When they finally had passed the 1. bridge, the Chief Mate by radio gave order to the Bosun to now start lifting the crane. This order however, was given only with the intention to raise the crane jib to the extend needed to open the hatch covers and not to lift as high as needed for doing the works inside the hole.

1.3 The Helmsman

The external helmsmen who are attendants to the Pilots on vessels passing the Kiel Canal are all experienced seafarers with a larger scope of licenses and certificates. They are in general as much familiar with the local environment as the Pilots are, however, assigned with different functional accountabilities. They are part of the bridge team during the transit. Though they may give service and assistance to the vessel's crew, they are subordinates of the Pilot and as such subject to directives received.

When *Wilma* had left the locks at Holtenau the two helmsmen had spoken to the Chief Mate on internals and the Chief Mate had asked about the crane utilization on the passage. As from now the helmsmen in charge of the first passage interval set in the wheelhouse chair on the Portside of the bridge. He was steering the vessel as per Pilot's instruction.

1.4 The Pilot

The Pilot, who had boarded while *Wilma* was berthed in the locks, stood in the centre of the bridge directly behind the two wheelhouse chairs, of which the left one was occupied by the helmsman. The Pilot had taken the conning position from which he had a free and clear view ahead of the vessel and where he could operate the pitch control by his own. From this position he could also take a look on the electronic chart device, mounted ahead in front of the Starboard wheelhouse chair and which was a connected system to the S-band radar.

He also had been made familiar with *Wilma's* particulars and a pilot card had been handed out to him. However, since he was on the bridge the crane operation has not been an issue they had talked about. In particular, he had not been asked and informed by the Chief Mate on the projected "crane works" during the canal transit.

When the Master had backed out to start with the ballast operation he had only informed the Chief Mate about it, without consulting the Pilot first.



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2. THE GROUP ON DECK

2.1 The Bosun

The Bosun was part of the team that had agreed in advance on crane works to be done during the Kiel Canal transit. As other crew members he had sailed the Kiel Canal various times before, however, never before crane works had been ordered by the vessel management while being in transit. He knew that specific precautions would be necessary during the work process and that precise timing was part of it. He knew from the Chief Mate about the bridges crossing the canal, but he was not aware of all details, in particular not how much in a row they had to pass.

2.2 The Crane Driver

One of the ABs was most experienced in crane handling. Therefore he was the crane driver. He did all related work most of the time. He was also included in the works to be done.

Already after *Wilma* had left the Holtenau locks, he had climbed up into the driver's cabin to prepare himself and to wait for further orders.

3. THE COURSE OF INITIAL EVENTS

3.1 Events on Deck

When the Chief Mate had instructed the Bosun to begin with the work preparations, the Bosun had asked to energize the deck and had then switched on the deck and floodlights. Shortly after that the Pilot had asked the Chief Mate to switch off this lights again since he had been called by his colleague on the vessel in his wake to do so because they got blinded by it. The Chief Mate gave related orders down on deck and the lights were shut down. Only the spotlights on top of the crane derricks remained on.

After the vessel had passed the 1. bridge and the Chief Mate had instructed the Bosun to commence the works, the Bosun took the initiative and closely communicated with the crane driver (AB) and an OS when they lifted up the crane to open the hatch covers. Without a further consideration of the passing local environment and without an explicit lookout for further bridges to come, the deck team step by step proceeded with the works to be done. The Bosun at that time did not expect to receive additional orders or permissions to further erect the jib of the crane as works carried on.

3.2 Communication

Since beginning of the action the Bosun was standing by on deck, together with the AB, who was the crane driver. All team members were equipped with hand held radios, switched to an agreed internal communication channel, were all on the ship could speak and listen in.



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The crane driver who had meanwhile climbed up in the cabin listened into the radio communication between the Chief Mate and the Bosun and was consequently always aware of the status.

Also the crane driver had communicated via radio, shortly after the 1. bridge was passed and got the approval from the Chief Mate to now to start with the crane lifting.

3.3 The Accident

The crane driver had opened the hatch covers with the crane derrick erected to the extend necessary to open the hatch cover. When the hatch covers were completely open he proceeded to lift up the crane derrick higher and swung it to the place where the slings had been deposited. He picked up the slings, lifted it and proceeded to further top the crane derrick. Finally, he swung the crane towards the position of the tween deck lid. With it, almost all action steps had been conducted in line to the initial work plan necessary to finally tilt the pontoon for draining. The crane derrick was now in its highest position erected. Nobody had further watched the vessels current position and the 2. set of bridges to come.

When the Bosun was just on his way to the Starboard manhole to get down into the lower hole for picking up the pontoon, the Chief Mate gave abrupt orders to lower the derrick. His order was, quote: boom down, boom down, full speed, unquote. All further orders and instructions hurried over the radio now came all too late and were in vain. The crane derrick of vessel crane No. 1 crashed into the bottom profile construction of the overhead highway bridge, the 2. bridge after the vessel had left the Holtenau locks only some 14 minutes before.

After a quick first survey after the incident had revealed no injuries or other serious consequences the Pilot communicated with the local VTS and finally agreed with the Master to proceed to Rendsburg and to temporarily berth there for a further thorough damage assessment.



A view from the aft bridge windows back on deck into the working area. At the time of the occurrence they were shaded to not impact the performance in the wheelhouse.



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**PART E
FINDINGS**

1. THE AIM

The purpose of this investigation is to determine the contributory causes and circumstances of this casualty as a basis for making recommendations to prevent similar occurrences in the future.

2. THE COMPANIES SMS SYSTEM

During the on-scene investigation it was found that the Company has developed, implemented and maintained a safety management system in accordance to defined Company's safety management objectives. This objectives are meeting the demands of the ISM Code to a large extend. However, in some areas vulnerabilities have been discovered. The shipboard SMS manual provides almost all functional requirements to ensure a safe operation on the ship by relevant instructions and procedures, but in some areas it appears to be not specific enough. Not all potential risks had been identified; in particular not in the area of the ship's crane equipment and handling. The shipboard SMS manual did not provide safeguards associated with the erection of crane jibs.

Shipboard Instructions (Section A Shipboard Operation/14. Ready for Loading/Discharging, Revision 2 of 20.12.02.

- Page 2 (of 6) outlines that "especially when handling heavy lift cargo, a number of safety aspects shall be observed". This may be interpreted as being relevant for the cargo as well as for the cargo handling equipment. No details or specifications are following what safety aspects to be observed.

Shipboard Instructions (Section A Shipboard Operation/14. Ready for Loading/Discharging, Revision 2 of 20.12.02.

- Page 4 (of 6) specifically refers to the vessel's crane, but again fails to be specific. It is said: a). "The cranes and the cargo shall be ready for use and fit for purpose by carefully maintaining, rigging, greasing and preserving".
- b). "The preparation of cranes shall be carried out by crew members only who are familiar with it".
- c). "As long as the vessel is on safe anchorage all cranes shall remain in a sea-position".
- In particular, sentence c). can be understood that cranes should be operated only while in port, not on anchorage – and particularly not at sea and while making way.

Shipboard Instructions (Section A Shipboard Operation/7 Voyage Planning, Revision 4 of 01.06.06.

- Page 2 (of 7) specifically refers to the utmost importance to carefully plan the voyage and the mandatory application of the STCW-Code, Chapter VIII/Sect. A VIII/2, Part 2.



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- As stated by the Master, the Chief Mate and other principal witnesses, originally the work had been planned to be executed while traversing the Baltic Sea. However, the plan was waived due to very high sea state. It was contrary to the defined safety objectives to alternatively postpone the work into the Kiel Canal transit period.

Shipboard Instructions (Section A Shipboard Operation/7 Passage Plan, Revision 0 of 01.05.05.

- Page 1 – 3 contained departure information (last port Gdynia) and arrival information (port of call Bremerhaven), all on a sophisticated basis, including draught and air draught information on departure and on arrival. However, it did not include relevant information for the Kiel Canal transit. This part of the voyage did not appear at all.

Shipboard Instructions

- Pilot Card: contained information on current draught when handed out to the Kiel Canal Pilot, however, it did not contain an information on the current air draught, based on it. It also did not include written information on possible temporarily changes in this figures, due to
 - ballast pumping
 - crane jib lifting.

The vessel diagram on the Pilot Card is restricted to *Wilma's* dimensions, without referring to the 3 deck cranes. The cranes are even not shown on the graph. Because the crane derricks in an erected position are representing a high risk potential they should be shown on the graph (see sample on page 10 of this report) to provoke additional safety thoughts.

3. THE SAFETY CULTURE

The implementation and existence of the Company's SMS system as found on *Wilma* is recognized by the Administration. However, on *Wilma* the impression emerged that an in depth appreciation of the system was not yet mature. A gradient appeared to exist between the safety requirements as per the ISM objective and the real daily safety behaviour of the crew involved in this incident. With a more grown safety culture this accident could have been avoided.



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4. INVESTIGATION SUMMARY AND CONTRIBUTORY FACTORS OF THE CASUALTY

4.1 General

This accident did happen because of human failure. The responsible vessel management did not act with due diligence as per their qualifications and experiences and accountabilities assumed in regard to safe operation of the vessel. Ignited however, was the occurrence due to an extensive weakness in communication between all persons involved.

In general however, the investigation revealed adherence to all major relevant international rules and regulations and flag State legislation.

The German Water Police had initiated field sobriety tests from the bridge team shortly after the fact, of which all revealed negative.

Measures taken after the accident were all professional and in compliance to the requirements.

4.2 Safety Issues

Working actions with heavy lift cranes and plans to lift hatch pontoons while being at sea on a vessel making way should be ruled out, if not to be performed in an emergency case. Commercial pressure is not an argument to consider.

Working with erected crane derricks should not be performed in the darkness if visual upwards safety monitoring and height limitations are crucial. Spotlights on the crane jibs will affect the vertical visibility of involved personal and does not allow a rapid visual assessment of the prevailing conditions.

Ballast operations while being in transit with a Pilot on the bridge should be avoided, without having received his understanding and acceptance. It may change the draught, the air draught and affect the manoeuvre characteristics of the vessel. Changes will also result in discrepancies to the original Pilot Card handed out.

A crewmember, who has assigned accountability for a variety of important tasks, particularly if these tasks are safety related, should not perform more than one task at the same time, to be able to fully concentrate on the performance of the selected one. In the *Wilma* case, the Chief Mate was the OoW on the bridge with a Pilot in the team, and at the same time he was needed on deck to manage an important task. Either he should have been relieved from his bridge watch duties, or the deck works should have been postponed to a later time. Sharing attention contains a high risk potential.

Having a Pilot on the Bridge does not allow the Master to draw back and to get intensively engaged in non vessel command related activities. Also in the Kiel Canal the Pilot gives service and advice to the Master only, without absolving him from his duties.



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The situation on the bridge of *Wilma* while she passed the Kiel Canal reflects an under-developed, non-professional Master and Pilot relationship. Beside the poor communication, the Master as well as the Chief Mate has taken it for granted that the Pilot manoeuvres the vessel and operated the pitch control. The Master, with his thoughts occupied with different tasks, would not be able to respond appropriately in an emergency/safety situation.

5. RECOMMENDATIONS

The Chief Casualty Investigator recommends that the company revises its current Safety Management System with regard to experiences made in the *Wilma* incident. In particular, reference should be taken to safety issues outlined in this report. One recommendation is to expand the statement made in the Shipboard Instructions (Section A Shipboard Operation/14. Ready for Loading/Discharging, Revision 2 of 20.12.02. on page 3 , item 3 (Responsibilities):

- The Master shall be responsible for safe cargo operation. The preparation for loading and discharging may be delegated to the respective officer.
in round terms:
- Unusual operations, in general, should be supervised by an officer on the scene to keep on control. Therefore, at least an officer has to stay on deck to supervise crane operations.....

It is further worth to be considered by the local German Federal Coastal State Authorities, responsible for the issuance of the rules and regulations for shipping in the Kiel Canal, if deck work performances with vessel's own equipment like cranes and derricks should not be banned while vessels are in transit.

Signed by:

Captain Siegfried Ottinger
Chief Casualty Investigator