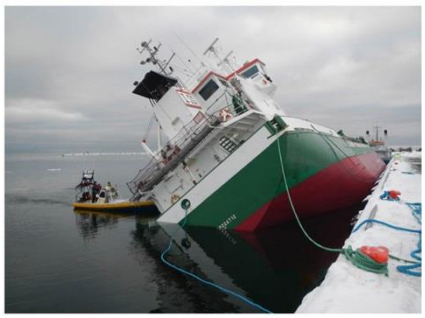
Statens haverikommission
Swedish Accident Investigation Authority



Final report RS 2016:01e

BONDEN/ ASIAN BREEZE - collision in the fairway off Malmö 16 March 2015

File no. S-37/15

22/03/2016

SHK investigates accidents and incidents from a safety perspective. Its investigations are aimed at preventing a similar event from occurring again, or limiting the effects of such an event. However, it is not the purpose of SHK investigations to apportion blame or liability, whether criminal, civil or administrative.

The report is also available on our website: www.havkom.se

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General points of departure and limitations

The Swedish Accident Investigation Authority (Statens haverikommission – SHK) is a state authority with the task of investigating accidents and incidents with the aim of improving safety. SHK accident investigations are intended to, as far as possible, determine both the sequence of events and the cause of the events, along with the damage and effects in general. An investigation shall provide the basis for decisions which are aimed at preventing similar events from happening again, or to limit the effects of such an event. At the same time the investigation provides a basis for an assessment of the operations performed by the public emergency services in connection with the event and, if there is a need for them, improvements to the emergency services.

SHK accident investigations try to come to conclusions in respect of three questions: *What happened? Why did it happen? How can a similar event be avoided in future?*

SHK does not have any inspection remit, nor is it any part of its task to apportion blame or liability concerning damages. This means that issues concerning liability are neither investigated nor described in association with its investigations. Issues concerning blame, responsibility and damages are dealt with by the judicial system or, for example, by insurance companies.

The task of SHK also does not include, aside from that part of the investigation that concerns the rescue operation, an investigation into how people transported to hospital have been treated there. Nor does it include public actions in the form of social care or crisis management after the event.

The investigation

SHK was informed on 17 March 2015 that a collision had occurred between the vessels BONDEN – with registration – OZ2111 and ASIAN BREEZE – with registration 9VYM – in the fairway off Malmö, Skåne County on 16 March 2015 at 15.20.

The accident has been investigated by SHK, represented by Mr Mikael Karanikas, Chairperson until 1 September 2015, Mrs Helene Arango Magnusson, Chairperson thereafter, Mr Rikard Sahl, Investigator in Charge and Mr Dennis Dahlberg, Operations Investigator.

Mr Erik Sandberg acted as coordinator for the Swedish Transport Agency until A 31ugust 2015, when Mr Patrik Jönsson took over. Mr Ulf Holmgren was the coordinator for the Swedish Maritime Administration.

Investigation material
Interviews have been conducted with crew members on both ships.

A meeting with the interested parties was held on 13 January 2016. At the meeting SHK presented the facts discovered during the investigation and available at the time.

SHK has also been on board both ships and interviewed both crews, as well as the pilot of ASIAN BREEZE. SHK has also spoken with other pilots in Malmö and at other pilot stations where tugboat management is common.

In addition, SHK has reviewed memos from pilot and tugboat meetings, which are a forum for pilots and tug masters to meet and discuss safety issues concerning tugboat management in harbours in the area. Furthermore, SHK has reviewed a letter written by the pilot serving on board ASIAN BREEZE at the time to his fellow pilots in Malmö after the accident.

SHK has also reviewed ASIAN BREEZE's VDR[1], a recording from BONDEN's electronic navigational chart and the Swedish Maritime Administration's radar and VHF recordings. However, there was no recording of the VHF traffic on the working channel used by the pilot and the tugboats.

SHK has also reviewed the *"Report on Safe Tug Procedures"* from April 2013. The report has been compiled by members of the International Tugmasters Association and the Nautical Institute. The aforementioned report is based on questions regarding tugboat management which were answered by 160 pilots, tug masters and ship captains.

Finally, SHK has also reviewed the Guidelines for Safe Harbour Towage Operations, which is a guide to tugboat operations issued by the European Tugowners Association.

[1] Voyage Data Recorder.

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Information on marine casualty	
Type of marine casualty	Serious marine casualty
Date and time	16/03/2015 15.21
Position and site of the marine casualty	N 55°38.7´ E 012°57.9´
Weather	Easterly wind, 7-9 m/s, good visibility
Consequences	
Injuries to persons	None
Environment	None
Vessel	Damage to both ships.

Information on BONDEN	
Flag state/Register of Shipping	Faroe Islands
Identity	
IMO number/call sign	7388669 / OZ2111
Vessel data	
Type of vessel	Tugboat, conventional
Port/year of construction	Åsiverken Åmål, Sweden NB107 / 1975
Registered tonnage	357
Length overall	32.85 metres
Breadth	10.08 metres
Draught, max	5.40 metres
Main engine, output	Pielstick 6 PC2-5L, 2868 kW
Propulsion system	1 propeller
Bow thruster	Brunvoll 186 kW
Rudder	Conventional
Ownership and management	Svitzer, Sweden
Classification society	Lloyd's Register
Minimum manning	3 persons

Figure 1. Tugboat BONDEN.

Information on the voyage	
Ports of call	Malmö
Type of journey	National
Crew	3-man

Information on ASIAN BREEZE	
Flag state/Register of Shipping	Singapore
Identity	
IMO number/call sign	8202381/ 9VYM
Vessel data	
Type of vessel	Pure Car Truck Carrier
Port/year of construction	Shin Kurushima Onishi shipyard Imabari, Japan NB 2256 / 1983
Registered tonnage	29,874
Length overall	164 metres
Breadth	28 metres
Draught, max	8.42 metres
Deadweight at max draught	11680t
Main engine, output	Mitsubishi UBE 6 UEC 60 HA, 7950 kW
Propulsion system	1 propeller
Bow thruster	Bow propeller 770kW (not functioning at the time)
Rudder	Conventional
Service speed	17.5 knots
Ownership and management	Wallenius Marine Singapore Pte Ltd.
Classification society	Lloyd's Register

Figure 2. Car carrier ASIAN BREEZE.

Information on the voyage	
Ports of call	Zeebrugge – Malmö
Type of journey	International
Crew	23-man

SUMMARY

On the day in question, tugboats BONDEN and SVITZER BJÖRN were to assist the car carrier ASIAN BREEZE, with pilot on board, to berth in Malmö's free port. ASIAN BREEZE had ordered two tugboats due to the ship's bow thruster being out of order. The ship would normally use just one tugboat connected at the aft.

When the pilot came on board ASIAN BREEZE, the ship had a speed of 7-8 knots. The pilot immediately requested a stop of the engine and then astern in order to reduce the speed and connect the tugboats before the ship came too far into fairway. It was not until this stage that the pilot received the information that the bow thruster was not functioning. The pilot knew in advance that two tugboats had been ordered instead of the normal one, but he assumed that this was due to the strong winds earlier that day.

SVITZER BJÖRN was connected to the stern, after which the connection of BONDEN forward commenced. However, the vessel was soon running short on time as ASIAN BREEZE had begun to approach the harbour entrance. The pilot therefore announced that ASIAN BREEZE would complete a full turn to starboard in order to gain time. BONDEN was connected during the turn, but was forced at an early stage to perform an emergency release of the towline.

BONDEN, which was to retrieve the released towline hanging from the central fairlead of the car carrier, proceeded to manoeuvre in close and beneath the bow of ASIAN BREEZE. At the same time, the pilot interrupted the starboard turn and commenced a turn to port instead, which was not perceived by BONDEN. At this point, the tugboat was subject to a sudden and involuntary turn to starboard, which was likely caused by the interaction between the two vessels. The tug master initiated full speed ahead and hard starboard rudder in an attempt to avoid a collision. BONDEN nevertheless collided with ASIAN BREEZE, whose bulbous bow made contact with the ship to stern and the propeller of BONDEN. The tugboat's main engine stopped and BONDEN proceeded to drift along ASIAN BREEZE's starboard side.

According to SHK, the accident was caused by a lack of planning and inadequate implementation of the connection procedure, partly due to the lack of national and standardised routines for connecting ships and tugboats.

A contributory factor to the accident was that the pilot had not been informed prior to the pilot assignment that the ship's bow thruster was out of order, meaning the pilot had far too little time together with the captain and the involved tugboats to prepare for the arrival to port. If the pilot had known beforehand that the bow thruster was out of order, he would have chosen to board the car carrier at an earlier point in time – as is standard when several tugboats are to be connected – in order to allow more time for the connecting procedure.

Another contributory factor to the accident was that the tug master did not perceive the ship's interruption of its starboard turn and subsequent immediate turn to port.

In the report, SHK also discusses the fact that the communication regarding the connection procedure between the pilot and the tug masters was held in Swe-

dish. As neither the master nor the rest of the crew of ASIAN BREEZE spoke Swedish, the conditions were not optimal for them to follow the sequence of events, despite the fact that the pilot was continuously translating what was being said. However, it has not been established that the language barrier was of crucial significance in the accident. On the other hand, SHK has not been able to rule out that the master would have been able to intervene in another manner and thus prevent the accident if he had understood the communication between the pilot and the tugboats in its entirety. If all communication on the bridge takes place in a language which all those involved understand, there would – according to SHK – be less stress on the pilot and the possibility for the master to react to and act on inappropriate practices would be considerably improved.

Safety recommendations

Recommendations to the Swedish Maritime Administration, in consultation with the tugboat industry:

- Introduce standardised national procedures regarding orders given between pilots and tugboat crews and develop and conduct relevant training in the area prior to implementation. See section 2.6. *(RS 2016:01 R1)*

- Introduce standardised national routines regarding connection procedures between ships and tugboats and develop and conduct relevant training in the area prior to implementation. See section 2.2. *(RS 2016:01 R2)*

- Introduce the use of English in its procedures, or another language agreed on which is understood by all parties involved, as a working language for all national pilotage including tugboat management. See section 2.5. *(RS 2016:01 R3)*

The Swedish Maritime Administration is recommended to:

- Develop systems and procedures which enable pilots to obtain all necessary and relevant information in good time prior to pilotage, including any faults and deficiencies on the ship in question. See section 2.1. *(RS 2016:01 R4)*

The Swedish Transport Agency is recommended to:

- Look into the possibility to change the wording of Chapter 4, Section 8 of the Swedish Transport Agency's Regulations and General Advice (TSFS 2012:38) on Pilotage so that the language agreed on for pilotage also covers communication with any external parties. See section 2.5. (RS 2016:01 R5)

1. FACTUAL INFORMATION

1.1 History of the voyage

The tugboat BONDEN left Helsingborg on 16 March 2015 at 11.50, bound for Malmö in order to assist the car carrier ASIAN BREEZE upon its arrival in Malmö's free port. By 14.50, BONDEN was at the buoy Malmö Redd fairway together with tugboat SVITZER BJÖRN and ready to assist ASIAN BREEZE to berth 600 in Malmö's free port. The pilot requested for the car carrier was at that time on his way from Malmö, and at 14.52 he was on board ASIAN BREEZE. ASIAN BREEZE had ordered two tugboats due to the ship's bow thruster being out of order.

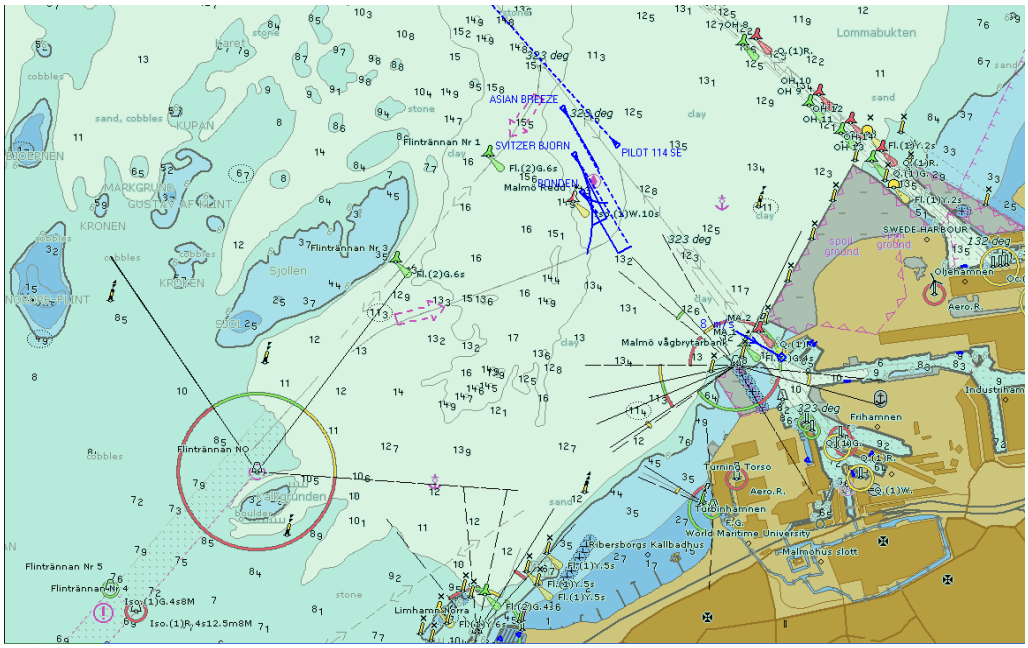

Figure 3. Pilot boat on its way out to ASIAN BREEZE. Image: AIS

When the pilot came on board at the boarding position, the ship had a speed of 7-8 knots. The pilot immediately requested a stop of the engine and then astern in order to reduce the speed so that the tugboats could be connected before the ship came too far into the fairway. Only in conjunction with this, the pilot received information from the captain of ASIAN BREEZE that the bow thruster was not functioning. The pilot knew in advance that two tugboats had been ordered instead of the normal one, but he assumed that this was due to the fact that there had been strong winds earlier that day. At the time of the incident the wind speed was 7-9 m/s.

At 14.56, the pilot announced in Swedish via VHF, working channel 8, that SVITZER BJÖRN would be connected via the central fairlead[2] aft in order to be able to brake and steer ASIAN BREEZE. BONDEN was to be coupled via the central fairlead forward with the purpose of

[2] The central fairlead for the ship's fore and aft – see figure 4 for the central fairlead forward.

steering ASIAN BREEZE's head as the bow thruster was out of order; see figure 4.

BONDEN informed the pilot that ASIAN BREEZE needed to reduce its speed to below 5 knots so that the crew of BONDEN could perform the connection. BONDEN also notified that they wanted to receive the heaving line as far astern as possible from the forecastle.

At 15.00, SVITZER BJÖRN was coupled astern via the central fairlead; see fig.5. At this point, the car carrier had a speed of 5 knots.

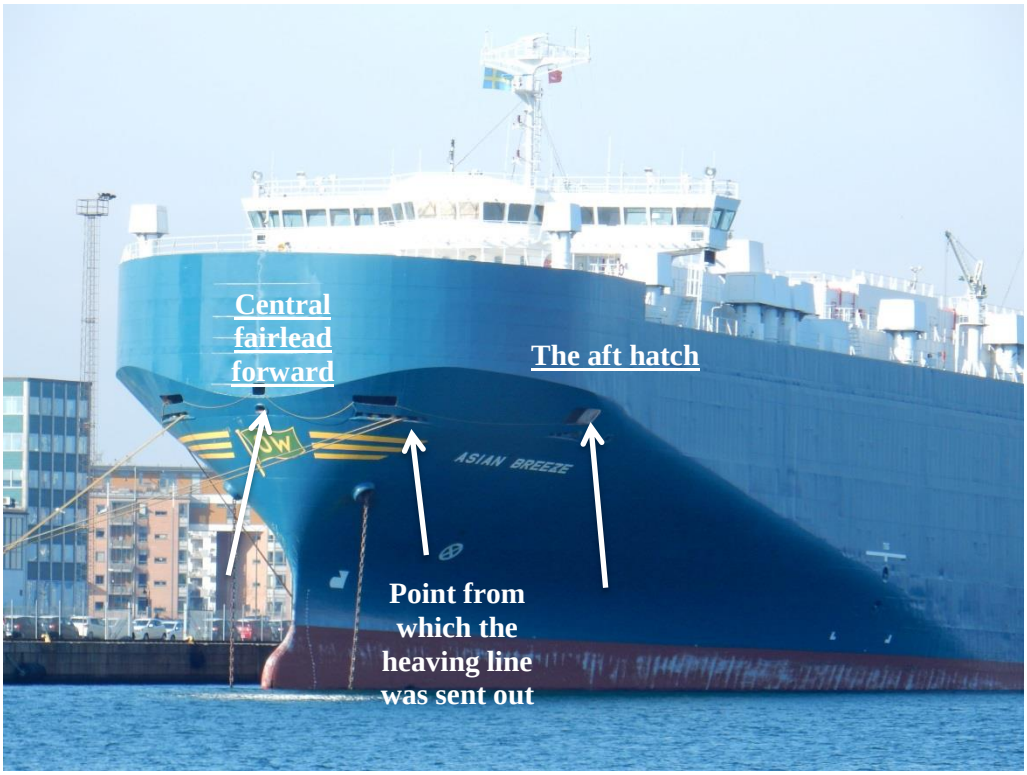

Figure 4. ASIAN BREEZE's forecastle.

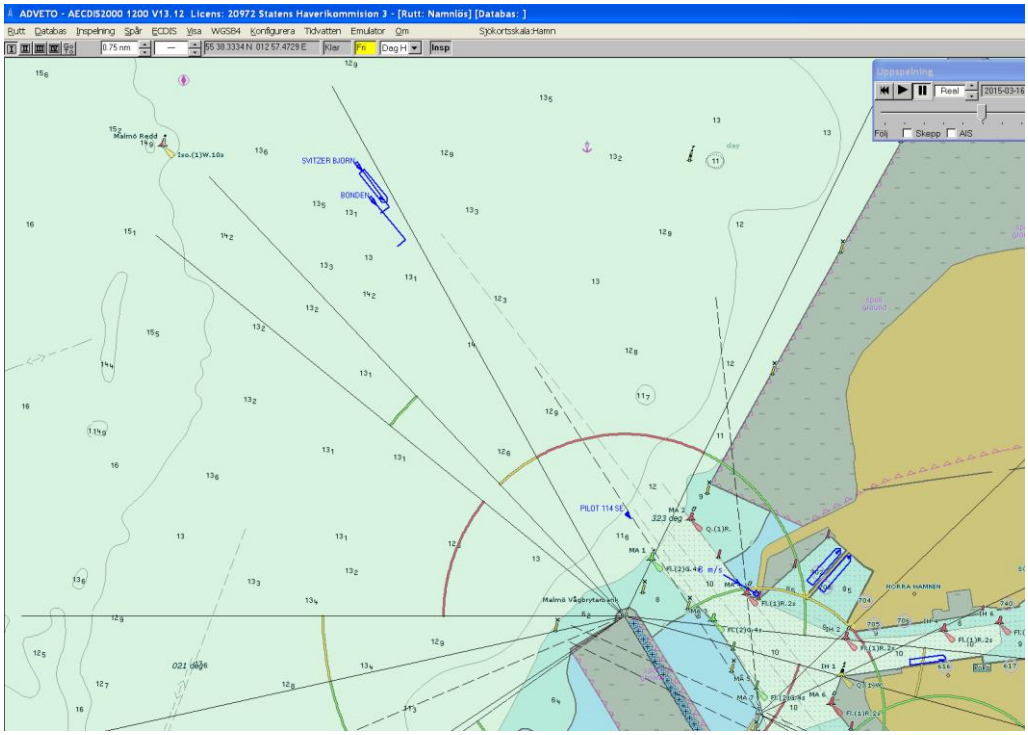

Figure 5. BONDEN on its way to couple up. Image: AIS

BONDEN then came up along the car carrier's starboard side to receive a heaving line. The intention was to attach this to the tugboat's own 45-metre line which was equipped with a messenger line[3]. The line was then to be heaved on board and secured to the mooring deck via the central fairlead.

The crew of ASIAN BREEZE attempted on two occasions to throw down their own messenger line without a sinker from the bow; i.e., from a position further forward than desired by the tugboat crew. The first attempt failed, and it was therefore agreed that BONDEN would instead go to ASIAN BREEZE's port side and make a fresh attempt from there. This time, the messenger line was successfully passed down to BONDEN, whose crew began preparing the connection. At this point, the car carrier had a speed of 2.5 knots.

When ASIAN BREEZE was approx. 0.5 M[4] from the first pair of buoys – MA1 and MA2 – the pilot decided to abort the harbour entry. The pilot announced that ASIAN BREEZE would turn to starboard; see fig. 6. Nevertheless, the tugboat's line was successfully secured shortly thereafter. The connection was thus completed during the turn.

[3] Messenger line – a thicker line than a heaving line.
[4] M - Nautical mile; corresponding to 1,852 metres.

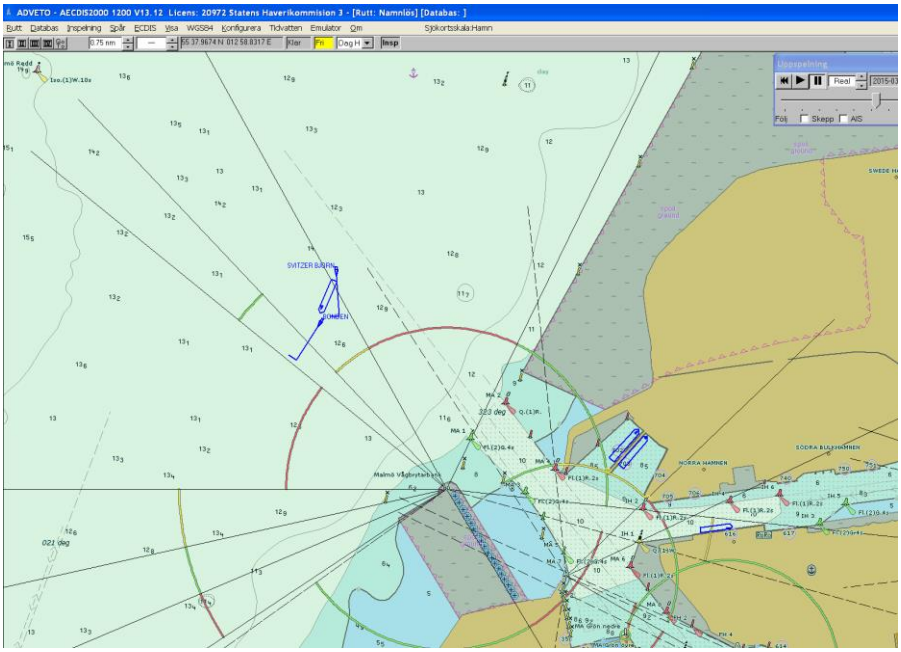

Figure 6. ASIAN BREEZE turned to starboard. Image: AIS

During the turn, however, the towline became stuck under BONDEN's own fender strip on the port side. This led the tugboat to perform an involuntary turn to port; see fig. 7. The master of BONDEN was thus forced to use the emergency release to quickly release the towline; see fig. 8.

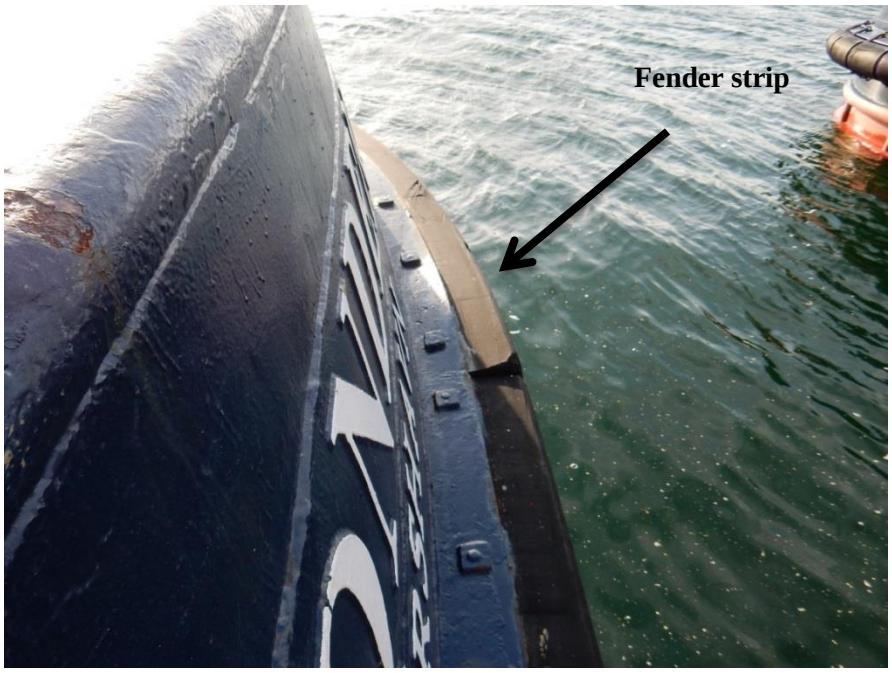

Figure 7. BONDEN's fender strip.

BONDEN informed ASIAN BREEZE via VHF that they had used the emergency release and thus released the line.

On the VDR recording, it is heard that the pilot announced at this stage that ASIAN BREEZE would once more abort the harbour entry and now perform a turn to port. However, this was not perceived by

BONDEN. Nor is confirmation of the message heard on the VDR recording.

At this point, the towline was stuck on the car carrier's bollard and hung out through the central fairlead at the bow of the car carrier. The pilot on board ASIAN BREEZE asked whether BONDEN could retrieve the line from where it was or if the crew was to send down a new heaving line. The tug master informed that they could retrieve the line but that the crew on board the car carrier would have to heave in the line so it would be just above the water surface. Taking on board a line from the ship in this situation was considered to be too difficult and heavy, as BONDEN did not have a mooring winch on its aft-deck.

The investigation has revealed that at this point, the tug master of BONDEN believed that the car carrier was still in a starboard turn. He understood very late that ASIAN BREEZE had instead commenced a turn to port.

Figure 8. Hook with emergency release on board BONDEN.

At 15.20, when a fresh attempt at connection was made, the tugboat suddenly performed a new, involuntary and quick turn, this time to starboard. This was likely caused by the interaction between the two ships. Both the chief engineer and the able seaman, who were positioned on the aft-deck in order to receive the towline, realised that the vessels were close to colliding and ran to the fore to seek protection. The tug master initiated full ahead and hard starboard rudder in an attempt to avoid a collision, but the attempt was unsuccessful. BONDEN collided with ASIAN BREEZE, whose bulbous bow made contact with the ship to stern and the propeller of BONDEN.

The tugboat's main engine stopped immediately and BONDEN proceeded to drift along ASIAN BREEZE's starboard side. On board

ASIAN BREEZE, where the crew had heard two hard bangs, the engine was stopped as a preventive measure.

BONDEN's tug master contacted the car carrier on VHF channel 8 shortly thereafter and announced that they had collided and that the main engine had stopped. He also informed SVITZER BJÖRN about what had occurred and requested that they keep clear as BONDEN was drifting out of control along the starboard side of the car carrier.

ASIAN BREEZE disconnected SVITZER BJÖRN and asked if there were any other tugboats available in the area. BONDEN dropped anchor at 15.35 and the crew proceeded to survey the damage to the boat. BONDEN then received assistance from SVITZER BJÖRN to reach berth in Malmö. At 16.50, BONDEN was moored at berth 524.

SVITZER MARS came 2.5 hours after the collision and assisted ASIAN BREEZE together with SVITZER BJÖRN. This time, the car carrier completed a normal call to berth 600, where they were moored at 18.30.

When ASIAN BREEZE was finally moored, the pilot from ASIAN BREEZE visited BONDEN in order to speak with the tug master about what had happened and enquire as to the physical and mental wellbeing of the crew.

1.2 Injuries to persons

No physical injuries to persons arose.

1.3 Damage to the ships

1.3.1 Damage to BONDEN

BONDEN received extensive damage to the propeller, propeller shaft and exhaust pipe, sheet metal damage to the aft hull and damage to a cord for a light. The damage was attended to in a visit to a shipyard.

Figure 9. BONDEN, damage to exhaust pipe and light.

1.3.2 Damage to ASIAN BREEZE

ASIAN BREEZE received a tear in its bulbous bow, close to the fore-peak, which is a ballast tank. The tank was empty at the time of the accident; see figure 10. The damage meant that the ship had to go to a shipyard for repairs later.

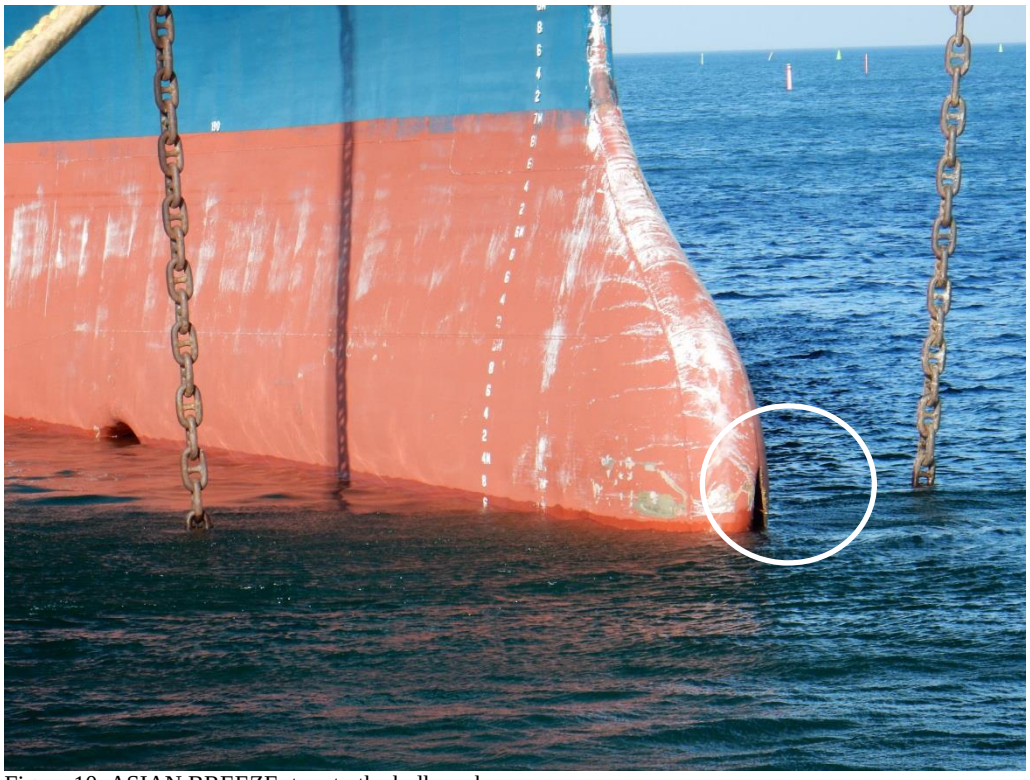

Figure 10. ASIAN BREEZE, tear to the bulbous bow.

1.4 Accident area

The majority of car carriers approaching Malmö from the north take on a pilot north of Helsingborg by buoy M1. However, the captain of ASIAN BREEZE had been in Malmö a number of times and was very familiar with its fairway. He therefore did not take on a pilot until the ship reached Malmö Redd; see figure 11. When connecting several tugboats, it is standard procedure for the pilots to embark earlier and at a point further out than the boarding position marked out in the navigational chart.

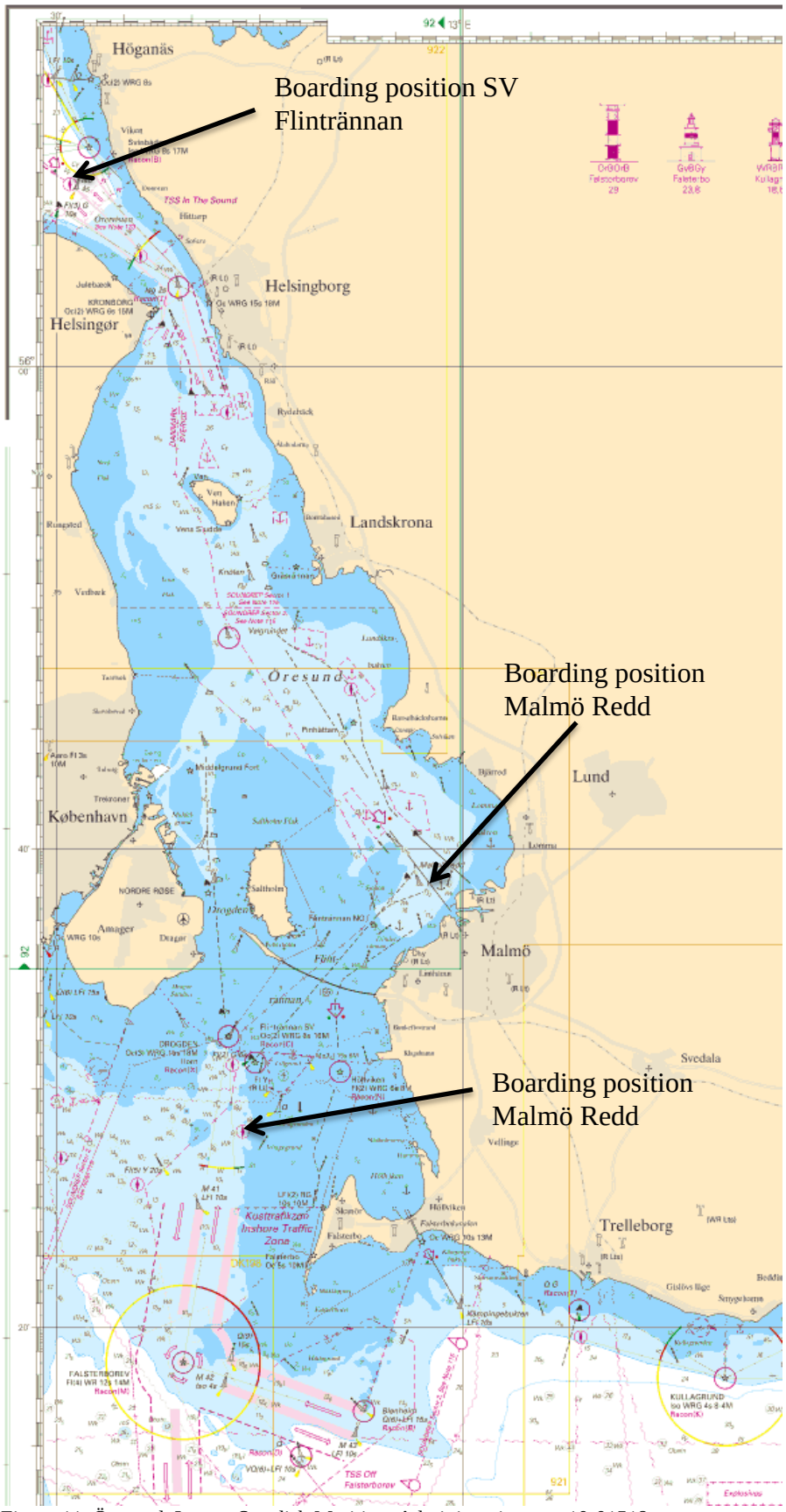

Figure 11. Öresund. Image: Swedish Maritime Administration no.: 10-01518.

The distance from the pilot boarding position marked in the navigational chart to the first buoy pair MA1 and MA2 is 1.4 M. The pilotage line runs between the positions 55˚37.56N 012˚58.15E and 55˚38.00N 012˚58.95E.

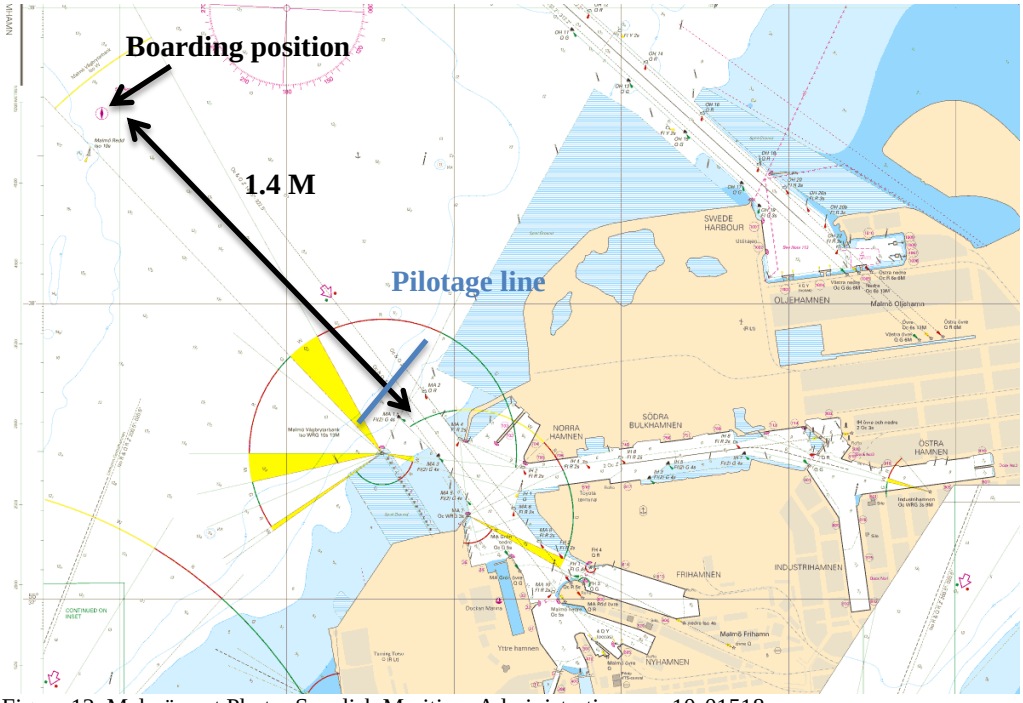

Figure 12. Malmö port Photo: Swedish Maritime Administration no.: 10-01518.

1.4.1 Communication between pilot and tugboat

The communication between the pilot on board ASIAN BREEZE and the crew of the tugboats was conducted in Swedish via VHF channel 8. The pilot progressively explained in English to the captain of ASIAN BREEZE what had been said and what was to be done.

According to what has emerged in discussions with pilots in both Malmö and other Swedish ports, the communication between pilots and tugboats is normally conducted in Swedish when operating in Swedish harbours. The investigation has revealed that the same applies elsewhere in Europe; communication between pilots and the crew of the tugboats is normally conducted in the local language. This differs from the ships' communication using the current VTS[5], which is normally conducted in English.

As there is no national, standardised procedure for giving orders, it is not uncommon to find that local and even individual procedures are developed and used in communication between pilots and tugboat crews.

There was no recording function on the working channel used in the communication between the vessels (VHF channel 8).

[5] VTS- Vessel Traffic Service.

1.4.2 The vessels

BONDEN

BONDEN is a conventional tugboat with a propeller and a bow thruster and a bollard pull of 38 tons. Conventional tugboats are not uncommon in the area in question. Conventional tugboats have less manoeuvrability and are less stable when towing compared with a tractor tug[6] or an ASD[7] tug. At the time, BONDEN was being used as a support vessel and was moved between different ports as required.

Figure 13. BONDEN - The bridge.

1.4.3 Crew of BONDEN

The crew of BONDEN consisted of a tug master, a chief engineer and an able seaman, all of whom spoke Swedish.

The master of the tug had been employed by Svitzer since July 2014, when he began as an officer on BONDEN. After a training period as officer, he became tug master in October 2014. During the training period, the ship operated in the area around Svalbard. When BONDEN began operating along the west coast of Sweden in mid-December 2014, the tug master also had a mentor with him who provided training, advice and support. The mentor accompanied him on board the vessel until late January 2015. Thereafter, a mentor was to accompany him if BONDEN was to perform unusual tasks or call at ports that were new to the tug master; all in accordance with Svitzer's training plan.

[6] Tugboat with propulsion in the forward part.
[7] ASD – Azimuth Stern Drive

At the time of the incident, the tug master had previously served as deck officer on different types of vessels since 1996 and served as tug master on conventional tugboats for a total of four winters in Swedish ports, though this work consisted primarily of icebreaking. This was the first time the tug master was to assist a car carrier on its way in to Malmö's free port. He had previously assisted vessels in Malmö port, though not to the free port. The tug master had however previously assisted car carriers in ports other than Malmö.

The chief engineer had 20 years of experience as an engineer officer and had been BONDEN's chief engineer since January 2013.

The able seaman had 3 years' experience in his position. He had been with BONDEN since February 2014.

1.4.4 ASIAN BREEZE

ASIAN BREEZE is a PCTC[8] with a capacity of 3,242 passenger cars. The vessel was equipped with a 770 KW bow thruster which was not functioning at the time. The vessel and the construction of the bridge mean that the bridge crew has limited opportunities to see objects close to the ship's bow. ASIAN BREEZE operates primarily within northern Europe and had called at Malmö a number of times.

Figure 14. ASIAN BREEZE, view from the bridge.

[8] PCTC- Pure Car Truck Carrier

1.4.5 Crew ASIAN BREEZE

The crew of ASIAN BREEZE consisted of 23 persons. Of these, the master, the chief officer and an able seaman were on the bridge. In addition to the crew members, the bridge was also manned by a Swedish-speaking pilot. The working language on board was English. The crew is originally from Asia and they did not understand the Swedish language.

At the time of the incident, the master had experience serving as deck officer on different types of ships since 1985 and in car carriers since 1999. Since 2008, he had served as master on board Wallenius "BREEZE" vessels. At the time of the incident, the majority of the master's calls to Malmö had been with ASIAN BREEZE.

At the time of the incident, the chief officer had served as deck officer for over five years; the last year of which as chief officer. He had been in Wallenius' employ since 2007 and worked on board ASIAN BREEZE for one year.

1.4.6 Pilot ASIAN BREEZE

The pilot who was piloting ASIAN BREEZE at the time of the incident had worked as a pilot in Malmö since 2007, and before this, ten years as a master on various ships.

1.5 Meteorological information

16 March 2015 at 15.00 hrs according to SMHI:

Wind: East 7-9 m/s decreasing

Visibility: > 6 M

Air temperature: 10˚C

Water temperature: 4˚C

1.6 Rescue operation

None of the vessels were the object of any rescue operation as a result of the incident.

1.7 Regulations and supervision

Exchange of information, agreed language and communication on the bridge

In accordance with Chapter 4, Section 6 of the Swedish Transport Agency's Regulations and General Advice on Pilotage (TSFS 2012:38), the master and the pilot shall exchange information concerning all circumstances relevant to the ship's safe navigation before the pilotage or pilot assistance begins and, where necessary, review a Voyage Plan/Passage Plan. In order to ensure a safe journey, the pilot,

master and bridge personnel shall endeavour to maintain effective cooperation in terms of communication, the exchange of information and the mutual understanding of one another's duties and responsibilities. As part of this cooperation, they shall also be mindful of the ship's systems and the equipment available to the pilot (Chapter 4, Section 7). Communication on the bridge between pilot, master and bridge personnel shall be conducted in a language agreed upon for the bridge. This language shall be English or another which is spoken by the parties on board who need to be able to participate in the communication as a matter of the safe navigation of the ship. The pilot, the master or one of the bridge personnel must immediately communicate what has been said, if the communication with parties not on board the ship is conducted in a language other than the language agreed upon for the bridge (Chapter 4, Section 8).

In accordance with the Swedish Transport Agency's General Advice to Chapter 4, Sections 6-7, the exchange of information between captain and pilot must encompass the following as a minimum:

1. a written summary of the ship (Pilot Card) with the following information: the vessel's speed at certain specified propeller RPM; draught forward and astern; length; breadth; mast height; turn rate at different speeds; turning radius; stopping distance; squat effect[9]; other appropriate information,

2. an overall agreement regarding planning and procedures for the impending journey, including an action plan for unforeseen events,

3. information on circumstances concerning weather, water depth, tidal currents and other marine traffic which can be expected during the voyage.

4. information on any deviations in terms of handling characteristics and any limitations in machinery, navigation equipment or crew that could affect the ship's operation, management or safe manoeuvring,

5. information regarding quay and mooring arrangement and how, where appropriate, tugboats will be used.

Information when ordering a pilot

Section 10 of the Swedish Maritime Administration's regulations on the provision of pilots, ordering of pilots, assignment of pilots and pilot fees (SJÖFS 2014:9) states the following: In connection with both preliminary and final ordering of a pilot, the vessel’s master or an authorised representative must submit all information of the vessel necessary for pilotage and the calculation of pilotage fees.

[9] The squat effect is a phenomenon which occurs when a vessel is passing through shallow waters or fairways and in channels, and causes the ship to have a greater draught.

Contingency for first aid and crisis support

According to Section 5 of the Swedish National Board of Occupational Safety and Health's regulations on first aid and crisis support and general advice on the application of the regulations (AFS 1997:7), every workplace should have the contingency and the procedures for first aid and crisis support which is necessary in consideration of the nature and scope of the activities, as well as any special risks associated with them. When planning, the necessary contacts shall be made with concerned local public institutions. It must be ensured that the employees are aware of how first aid and crisis support are organised in the workplace. They should also be kept up-to-date with the applicable procedures.

1.7.1 Guidelines in Malmö regarding the number of tugboats

The following guidelines applied at the time of the accident:

- For ships with a length exceeding 100 metres, 1 tugboat of type ASD/tractor tug.
- For ships with a length exceeding 130 metres, 2 tugboats, at least one of which must be a tractor tug.
- For ships with a length exceeding 170 metres, 2/3 tugboats, 2 of type tractor tug, or otherwise 3, though at least 1 of these must be a tractor tug.
- For ships with a length exceeding 200 metres, 3 tugboats, 2 of type tractor tug and one conventional.
- For ships with a length exceeding 240 metres, 3 tugboats of type tractor tug.

For ships with a bow thruster, Becker Rudder, pod system or two aft propellers, the number of tugboats can be reduced. The guidelines apply provided that normal weather conditions, in terms of visibility, wind and currents prevail. The assigned pilot determines whether normal weather conditions prevail.

The guidelines thus state that a vessel such as ASIAN BREEZE, which is 164 metres long, should normally be assisted by two tugboats, at least one of which must be a tractor tug. With a functioning bow thruster, however, the number of boats could have been reduced to one in the case of ASIAN BREEZE, conditions permitting.

1.7.2 The Swedish Maritime Administration's guidelines for pilots

The Swedish Maritime Administration has no written national instructions for how the connection of tugboats and the communication between tugboats and the vessels requiring assistance should be conducted.

1.7.3 The Swedish Maritime Administration's deficiency reporting system

Pilots, boatswains, pilot ordering personnel and other personnel who are alerted to an accident or incident or discover a shortcoming in safety are responsible for ensuring reporting is done in the Swedish Maritime Administration's deviation system C2 (PRIS)[10].

1.7.4 Advance information for pilots regarding ship deficiencies

In the Swedish Maritime Administration's internal procedures for the exchange of information between pilot-operator and pilot, it is not clearly stipulated that the assigned pilot shall be provided with information in advance regarding any non-functioning equipment on board the ship which has ordered a pilot. However, the master is responsible for providing such information in conjunction with ordering a pilot. It does however occur that the shipping company or cargo owner's representative at the port orders a pilot at the master's request. On the basis of this information, the Swedish Maritime Administration makes an assessment of whether an extra tugboat is necessary, for example, on the grounds of reported faults and shortcomings. This assessment is however not necessarily made by the pilot who is to pilot the vessel.

Once the pilot is on board, it is the responsibility of the master to inform the pilot of any conditions which deviate from what the pilot can expect. The result of the information not being submitted until this stage can in some cases be that the pilot does not pilot the vessel into port until an additional tugboat has been ordered, for example. This can of course lead to delays for the ship.

In the pilot order made electronically from ASIAN BREEZE, there is no mention of the bow thruster not functioning. Only the fact that two tugboats had been ordered is mentioned. The Swedish Maritime Administration's electronic pilot ordering system lacks an obligatory field in which the party ordering a pilot must state whether or not the vessel has deficiencies that will affect the pilotage.

1.8 Training of tug masters in Svitzer

The training plan for a new master in Svitzer consists of a theoretical part and a practical part. The theoretical part follows a checklist containing the individual tasks which are to be carried out. Herein, the risks of interaction are discussed. Interaction is a matter of the pressure and suction effects which occur along the ships' immersed hulls. The practical part consists of training on board. A log is kept of the

[10] PRIS- Pilots Report Incident System

tugboat work carried out. There is no written plan for training on board. The log is evaluated orally.

1.9 Company organisation and management

1.9.1 Svitzer

Svitzer is part of the Maersk Group. Svitzer has around 4,000 employees and 430 vessels, some 50 of which are conventional tugboats and over half are of the ASD type. Svitzer operates across the world and carries out around 125,000 port tug operations per year.

1.9.2 Wallenius Marine

Wallenius Marine Singapore is part of Wallenius Lines. The entire group of companies controls around 170 vessels of type PCTC[11] and LCTC[12]. These vessels operate in over 220 ports around the world. Wallenius Shipping has around 1,100 employees.

1.10 Policy - taking care of personnel involved in accidents

Shipping operations in general, and particularly port tug operations, are always associated with certain risks. Neither Svitzer nor Wallenius Marine had any written procedures at the time of the accident for taking care of personnel or relatives involved in or affected by an accident. Pilots are also at risk of being involved in accidents in their work. Unlike the shipping companies involved, the Swedish Maritime Administration had documented and implemented procedures for this purpose at the time of the accident.

1.11 Types of tugboats

There are several different types of tugboats. Here, the Swedish Accident Investigation Authority (SHK) has chosen to describe only the types mentioned in the guidelines for the port of Malmö.

1.11.1 Conventional tugboat

This type of tugboat is equipped with one or two propellers astern and a rudder. Some are also equipped with a bow thruster. Conventional tugboats are the most demanding when it comes to manouvering i.e., the capacity to quickly move the tugboat in different headings. Conventional tugboats have great efficiency in forward position but changes in heading must be made via the rudder and, in the case of tugboats equipped with two propellers, by using these as well.

[11] PCTC – Pure Car Truck Carrier
[12] LCTC – Large Car Truck Carrier

1.11.2 ASD

This type of tugboat is equipped with two thrusters[13] astern and some are also equipped with bow thrusters. The thrusters can be turned through 360 degrees, which allows for the propellers thrust to be directed in any heading. This type of tugboat has excellent manoeuvrability, even for movement sideways, but the disadvantage is that these tugs have their propulsion system mounted astern. When the tugboat is moved sideways, the thrusters are facing an almost opposite position, in order to create sufficient power astern to pull the tugboat sideways through the water. This manoeuvre will considerably reduce the pull on the towline.

1.11.3 Tractor tug

Tractor tugs have their propulsion mounted in the forward part. There are several different types, such as those with a vertical propeller blade system – a "Voith Schneider" propeller – and those with thrusters which can be turned through 360 degrees. This type of tugboat has excellent manoeuvrability, even for sideways movement. As the propulsion is mounted forward of the midship[14], the power can be applied more directly, but even in this case the power will decrease during sideways movement due to the increasing power required to move the tugboat hull sideways through the water.

1.12 Coupling of tugboats to the bow – interaction

At the bow of a ship, the water pressure varies drastically. There is an overpressure ahead of the ship where the water is pushed aside. Where the water begins to run away by the side of the ship, the pressure reduces whilst the speed of the water increases. The higher the speed of the vessel, the greater the pressure differences acting on the bow.

Another contributory factor to the pressure differences is the tugboat's propulsion. The water that flows through the tugboat's propeller will cause a further rise in the water flow between the tugboat and the assisted ship and can thereby cause or increase the interaction between both hulls.

Due to the risks which arise as a result of the interaction between the tugboat and the vessel, it is customary for conventional tugboats working at the bow to insist that the heaving line be sent down from the ship's shoulder; somewhat astern of the forecastle, rather than far forward.

[13] Somewhat simplified, a thruster is a propeller which has a control action in that it is turnable.
[14] The midship is the middle point of the ship.

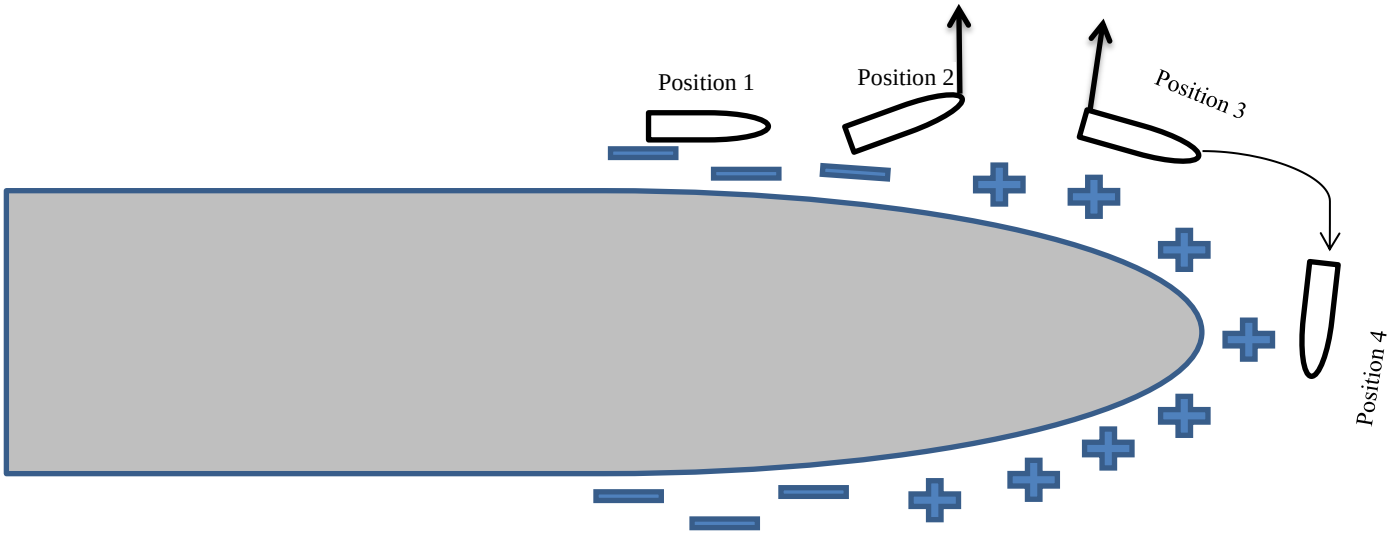

Figure 15. Interaction along the ship's exterior.

Position 1: The same conditions prevail all the way along the side of the ship. If the tugboat comes too close to the ship, it can be dragged in towards its side.

Position 2: In this position, the tugboat is working close to the side of the ship and is in an area of both pressure and suction. The fore will be pushed outward and the aft will be drawn in towards the side of the ship.

Position 3: When a tugboat is working close to the bow, it can position itself somewhat ahead of the pressure zone at the bow of the ship and thereby feel a very strong pressure on the stern and the rudder. This will produce a similar effect to setting the rudder hard towards the bow of the assisted ship, and the tugboat can suddenly cut across its path. If the interaction forces are strong, the tugboat may find itself in position 4 alarmingly quickly.

Position 4: This position, i.e. ahead of the bow, is naturally hazardous due to the risk of collision and should be avoided.

1.12.1 Coupling of tugboat to the bow – heaving line and speed

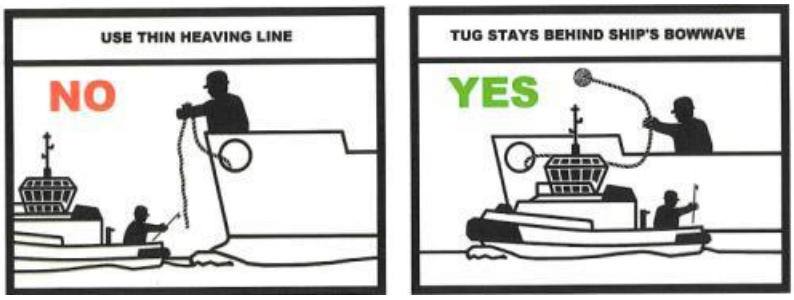

Figure 16.

According to the Guidelines for Safe Harbour Towage Operations, a heaving line with an appropriate weight should always be used and

thrown down to the tugboat as far astern as possible from the bow; see figure 16. According to the guidelines, it should also be checked beforehand – preferably via VHF – whether the tugboat has a messenger line on its towline. The weight attached to the heaving line should be made of leather, woven fabric or plastic and filled with a maximum 0.2 kilos (approx.) of sand so that it does not entail a risk of injury to the tugboat crew. The ship's speed should only be 2-6 knots through the water and a steady course should be pursued.

2. ANALYSIS

2.1 Fundamental conditions of the assignment

When BONDEN headed towards Malmö, the crew had not received information on the type of assignment to be carried out. The only thing they knew was that they were to assist ASIAN BREEZE in its approach to Malmö's free port. The crew on board BONDEN was thus not given good enough conditions to plan and prepare themselves for the task.

The pilot was aware that two tugboats had been ordered, but was not informed in advance that ASIAN BREEZE's bow thruster was out of order. This information he received from the master once he arrived at the bridge. The investigation has revealed that the pilot's original plan was only to connect one tugboat astern and use BONDEN as an additional resource, without being connected. If the pilot had known beforehand that the bow thruster was out of order, he would have chosen to board the car carrier at an earlier point in time – as is standard when several tugboats are to be connected – in order to have more time at his disposal.

The distance from the pilot's boarding position to the port entrance was 1.4 M. With ASIAN BREEZE's speed of 8 knots, this distance would take just 10.5 minutes to traverse. Despite the fact that the pilot immediately when he came on board stopped the engine and even ordered astern, this allowed far too little time to go through the planning of the entry and connect the tugboats before reaching the pair of buoys MA1 and MA2. However, if the bow thruster had been functioning and only one tugboat was to be connected to the aft – which was what the pilot had presupposed – the time for connecting and planning would likely have been fully adequate.

As clarified above, when ordering a pilot, the master or their representative must also inform of any faults or defects in the ship which may affect the pilotage. The electronic pilot order made in this case does not, however, specify that the bow thruster was not functioning. It was however specified that two tugboats had been ordered. SHK's opinion is that it is of the highest importance that faults and defects

are reported at as early a stage as possible. Shipping companies should therefore ensure that their masters always report faults and defects already when ordering a pilot. If the shipping companies use representatives to order a pilot, they should when possible endeavour to ensure they report any relevant faults and defects in the ship.

However, it is equally important that the information provided in conjunction with the ordering of a pilot is forwarded to the pilot assigned to pilot the ship in order for the latter to have the best possible conditions in which to carry out their assignment in a safe manner. According to SHK, there is a deficiency in the current arrangement in that there is no mandatory field in the electronic pilot order form regarding defects on board. Another shortcoming is that there is no functioning internal procedure within the Swedish Maritime Administration which ensures that the pilot concerned receives information on reported faults and defects in the ship in good time before embarking.

2.2 Connecting of tugboats at the bow

In this case, a messenger line without a weight was thrown down from the bow of ASIAN BREEZE. As the messenger line did not reach BONDEN's aft-deck, BONDEN manoeuvered close to and beneath the bow in order to catch the messenger line.

ASIAN BREEZE should in this case have checked to see whether the tugboat had a messenger line attached to its towline, which would have been fully possible via VHF. The ship's crew should also have used a heaving line with a weight attached to the end; one which was appropriate and safe for both crews. This should have been thrown down from the ship's shoulder, as far astern as possible, and not – as in this case – from a position further forward on the bow.

For its part, BONDEN should not have accepted the crew of ASIAN BREEZE only throwing down a messenger line without a weight. In this situation, it would have been preferable if the tugboat had first communicated with the pilot and notified that the ship must use a heaving line fitted with an appropriate weight. This was not done in this case, and the first attempt to throw down the messenger line failed. Furthermore, the messenger line was thrown down from ASIAN BREEZE's bow and not, as BONDEN wished, from a position further astern. The result was that BONDEN manoeuvered in towards the ship's bow in order to retrieve the dropped messenger line. This is a very hazardous position for the tugboat. The decision to retrieve the messenger line was however likely influenced by the fact that the crew of BONDEN were also aware of the need for haste in connecting the towline, as they were at this stage close to the port entrance. This fact likely instilled a certain stress factor in all those involved, which may have had an impact on the decisions made.

When BONDEN connected for the first time, ASIAN BREEZE was in a slight starboard turn. As previously mentioned, the crew had to perform an emergency release of the towline almost immediately, as it

fastened beneath its own fender strip. As BONDEN had initiated the emergency release, the tugboat was to retrieve the towline which was hanging out through ASIAN BREEZE's forward central fairlead. At this point, ASIAN BREEZE had interrupted its starboard turn and instead commenced a turn to port. As previously mentioned, however, the tug master of BONDEN was not aware of this. Nor did he notice this until quite late; likely as a result of a lack of visual references from the tugboat in this position in order to assess ASIAN BREEZE's lateral movements.

In summary, the position beneath the assisted ship's bow – above all considering the tugboat's safety – should be avoided. This is partly because this position entails greater difficulty in perceiving the assisted ship's sideways movement, and partly due to the powerful interaction between the ships which the tugboat is at risk of being subjected to in this position.

SHK also considers that the procedure of connection via the bow, not least where conventional tugboats are concerned, should be performed as far astern as possible, at low speed and on a steady course. The connection between ASIAN BREEZE and BONDEN was in any case performed at low speed. ASIAN BREEZE was however in the middle of a turn and BONDEN was positioned far forward. Had there been standardised connection procedures in place as support for decision-making, the crews would likely – as SHK sees it – have acted differently in this situation and the accident could potentially have been avoided.

2.3 After the accident

After the mooring of ASIAN BREEZE in Malmö's free port, the pilot paid a visit to BONDEN's crew. The pilot also wrote a letter thereafter to his fellow pilots in Malmö with conclusions and advice regarding the connection of tugboats. In brief, these entail holding a steady course, connecting in good time, maintaining a low speed during connection and using clear communication. The pilot's actions indicate an advanced awareness of safety and a willingness to share his experiences with the purpose of preventing future accidents. As far as SHK is aware, however, no internal deviation/incident report has been produced within the Swedish Maritime Administration. This could have, if distributed nationally, contributed to valuable insights for other pilots in other ports in Sweden for similar duties.

2.4 The Swedish Maritime Administration's Pilot Report Incident System

The fact that the Swedish Maritime Administration has a national incident and deviation system in which pilots across Sweden can read about and learn from others' incidents and accidents is very favourable. However, the investigation has revealed doubts as to the scope and extent to which the Administration's personnel actually report deviations and incidents in PRIS. It is SHK's understanding that the

employer – i.e., the Swedish Maritime Administration – should do more to follow up and endeavour to ensure more commitment to reporting in PRIS.

2.5 Working language for tugboat handling

According to the investigation, Swedish is the language primarily used between pilots and tugboat crews, both in Malmö and throughout Sweden. Even if the pilot translates for the master what is communicated in Swedish, it is difficult for a bridge crew, which does not understand the language, to follow the events; especially when a stressful situation arises. The fact that the pilot and the tug masters communicate with one another in Swedish is of course understandable. It is more comfortable and is likely perceived as safer. There is however a risk that the masters misses out on important information, especially in stressful situations, despite the fact that they are the ones who bear ultimate responsibility on board the ship. In addition, additional stress is placed on the pilot when in addition to the pilotage itself they must also translate and explain what has been said in the communication between the tugboats and the pilot to the crew on the bridge. If instead all communication on the bridge takes place in a language which all those involved understand, there would be less stress on the pilot, and the possibility for the master to react to and act in the event that something seems unclear or incorrect would be considerably improved.

In this case, the communication between pilot and tug masters was conducted in Swedish. As neither the master nor the rest of the crew of ASIAN BREEZE spoke Swedish, the conditions were not optimal for them to follow the sequence of events and react to any improper practices, despite the fact that the pilot was continuously translating what was being said. Admittedly, it can not be said that it has been established in the investigation that the language barrier was of crucial significance for the accident. On the other hand, it has also not been possible to rule out that the master would have been able to intervene in another manner and thus prevent the accident if he had understood the communication between the pilot and the tugboats in its entirety.

According to the Swedish Transport Administration's regulations (see Chapter 4, Section 8 TSFS 2012:34), the communication on the bridge between pilot, master and bridge personnel must be conducted in a language agreed upon for the bridge; one which is spoken by all parties. However, it would appear that the provision applies only to the language used on the bridge. It therefore does not apply to the communication with other parties who can have an influence on the navigation or manoeuvre ring of the vessel, such as VTS, other vessels or tugboats. According to SHK, the Swedish Transport Agency should look into the possibility to change the wording of Chapter 4, Section 8 of the Swedish Transport Agency's Regulations and General Advice (TSFS 2012:38) on Pilotage so that the language agreed on for pilotage also covers communication with any external parties. The Swedish Maritime Administration, however, should immediately begin to

introduce the use of English in its procedures, or another language agreed on which is understood by all parties involved, as a working language for all national pilotage including tugboat management.

2.6 The giving of orders between pilot and tugboats

At present, the Swedish Maritime Administration has no written instructions regarding the giving of orders from ship to tugboat. It therefore seems to be of crucial importance for how well a cooperation functions that both pilots and tug masters have previously worked together and are therefore familiar with how they act and express themselves. The investigation has revealed large individual variations in the communication between pilots and tugboat crews. The cause may be, or is likely to be, the lack of written instructions in connection with tugboat management. In this incident, the tugboat and its tug master were on a temporary assignment in Malmö. As the pilot and the tug master had not worked together previously, the conditions for them to carry out the assignment well and safely were from the start worse than for pilots and tug masters that had worked together before.

SHK's opinion is that pilots, ship masters and tug masters would be afforded better conditions for carrying out their respective tasks if a standardised and national system for the giving of orders between ship and tugboats was introduced. This would constitute – preferably in combination with common, specially tailored communication courses for pilots and tug masters – a safety-enhancing measure.

It is however positive that already at this point regular meetings are being held in the area between pilots and tugboat crews.

2.7 Tugboat BONDEN

BONDEN is a conventional tugboat with limited manoeuvrability. In other words, it is more difficult to manoeuvre than an ASD tugboat or a tractor tug. During connecting and manoeuvering with a tugboat, it is important to know which type of tugboat is used and what characteristics it has. The interviews conducted by SHK have however revealed that those involved in this case were familiar with the differences in manoeuvrability. Nor has there been any indication that the position of the towboats (SVITZER BJÖRN at the central fairlead aft and BONDEN via the central fairlead forward) would have been inappropriate under the prevailing conditions.

2.8 Other observations

2.8.1 Recording of VHF traffic or extended requirements for VDR recording

As the tugboats were not equipped with VDR and as the VHF traffic on the working channel used for piloting was not recorded, SHK has been unable to check whether the pilot's information to the tugboat regarding the turn to port went over VHF. If a requirement for boats of the type in question to have VDR were to be imposed, or if all pilot-

age areas were to have agreed on common working channels on VHF in advance and conditions are provided to record the VHF traffic, more lessons could of course be learned from incidents and accidents such as the present case, both in the Swedish Maritime Administration's own safety investigations and those of external bodies. The interest in improving the basis for safety investigations of accidents and incidents in connection with piloting and towing in this way must however be weighed up with e.g. the privacy interests of the parties that would be subject to recording. SHK finds no cause, in light of this accident, to further investigate the matter. There may however be cause for the Swedish Transport Agency and the Swedish Maritime Administration to further investigate the need and potential for expanded opportunities to record the communication between the bridges in conjunction with pilotage.

2.8.2 Taking care of personnel who have been involved in an accident

Neither Svitzer nor Wallenius had a written policy at the time of the accident concerning the matter of taking care of personnel involved in an accident. The Swedish Maritime Administration, on the other hand, had well-developed procedures in the form of a checklist, which also contained advice on how the work should be carried out. The investigation has revealed, however, that Svitzer has now taken measures in this area; see section 4.

Shipping operations in general, and particularly port tug operations, are always associated with certain risks. In the event of accidents, strong psychological stress for those directly involved can affect the latter's suitability for continued service on board the respective vessel immediately after the event. Furthermore, in conjunction with accidents, pre-established written rules are often a prerequisite and a support for effective, responsible rehabilitation work; not least for the shipping company's headquarter ashore.

SHK establishes in other investigations – e.g., RS 2015:04 – that it is of great importance that employers continuously follow up on their personnel's health status for an extended period following a serious accident. Initially, this can be said to be a work environment matter. In the long term, however, it may also be significant to safety on board that the affected personnel are taken care of and that the measures are followed up. The shipping company's contingency for handling the consequences of a serious accident can also reflect, to a certain extent, the safety culture on board.

2.8.3 Tugboat management, international perspective

Several of the deficiencies highlighted in this investigation appear to be general deficiencies in tugboat handling during pilotage; even in a European, and possibly global, perspective[15]. It has been found that the preferred language of communication is the mother tongue, despite

[15] See e.g., Report on Safe Tug Procedures and Guidelines for Safe Harbour Towage Operations; mentioned above on page 6 of this report.

the fact that the ship master will not speak this language in all cases. Activities are also characterised internationally by individual variations and sometimes shortcomings in the giving of orders between pilot and tugboat crew. Finally, it appears that even on an international level there is room for improvement where procedures for connecting tugboats are concerned. This is not something which SHK is able to examine in greater detail within the scope of this investigation, but there may be cause for both the Swedish Maritime Administration and the Swedish Transport Agency to keep abreast of the matter in international forums.

3. CONCLUSIONS

3.1 Findings

a) The wind was easterly, 7-9 m/s and decreasing.
b) There is no mandatory field in the electronic pilot order form in which defects in the ship which are of significance to pilotage operations must be specified.
c) The pilot was not informed in advance that ASIAN BREEZE's bow thruster was out of order. He was however aware that two tugboats had been ordered.
d) The boarding position for pilots in Malmö was 1.4 M outside of the port entrance.
e) The tugboat was of an older, conventional model – and thereby relatively difficult to manoeuvre.
f) The pilot and the tug master had not previously carried out port tug operations together, as the tugboat and its crew was moved from one harbour to another as required.
g) The crew of the car carrier sent down a messenger line to the tugboat, instead of a heaving line from the bow.
h) The connection of BONDEN took place during a turn.
i) There are in Sweden no national, standardised procedures regarding the giving of orders between tugboat and pilot.
j) There are in Sweden no national, standardised procedures regarding the connection procedure between tugboat and vessels.
k) The communication between pilot and tugboat is normally conducted in Swedish, irrespective of the language skills of the rest of the bridge personnel.
l) The pilot has to translate all relevant communication to English for members of the bridge personnel who lack Swedish language skills, even in stressful and pressing situations.
m) The existing regulations allow for communication in Swedish between pilot and tugboat.
n) The Swedish Maritime Administration does not have the facility to record the working channels on VHF used for tugboat operations in Sweden.

o) Reporting in the Swedish Maritime Administration's deviation system was not carried out after the accident.
p) Involved shipping companies lacked relevant and standardised procedures for taking care of personnel involved in accidents.
q) The Swedish Maritime Administration had well-developed procedures for taking care of personnel who had been involved in accidents.
r) Deficiencies in and the lack of standardised procedures between pilot and tugboats in terms of the giving of orders, coupling procedures and working language seem to be an international problem as well.

3.2 Causes

The accident was caused by a lack of planning and inadequate implementation of the connection procedure, partly due to the lack of national and standardised routines for coupling ships and tugboats.

A contributory factor to the accident was that the pilot was not informed in advance that the ship's bow thruster was out of order before the pilotage assignment commenced. Had he received this information, he would have chosen to board the ship at an earlier point in time. In this case, he received far too little time together with the captain and the tugboats involved to prepare the arrival.

Another contributory factor to the accident was that the tug master did not perceive the ship's interrupted starboard turn and subsequent immediate turn to port.

4. MEASURES TAKEN

Following the incident, Svitzer has implemented a programme for taking care of personnel who have been involved in an accident. In addition, the shipping company has implemented a new procedure for retrieving a dropped line, which applies to the company's conventional tugboats.

Wallenius Marine has since the incident implemented new procedures which ensures that the ship informs agents, pilots and ports of any faults and defects which may affect the navigation of the ship.

5. SAFETY RECOMMENDATIONS

Recommendations to the Swedish Maritime Administration, in consultation with the tugboat industry:

- Introduce standardised national procedures regarding orders given between pilots and tugboat crews and develop and conduct relevant training in the area prior to implementation. See section 2.6. *(RS 2016:01 R1)*

- Introduce standardised national routines regarding connection procedures between ships and tugboats and develop and conduct relevant training in the area prior to implementation. See section 2.2. *(RS 2016:01 R2)*

- Introduce the use of English in its procedures, or another language agreed on which is understood by all parties involved, as a working language for all national pilotage including tugboat management. See section 2.5. *(RS 2016:01 R3)*

The Swedish Maritime Administration is recommended to:

- Develop systems and procedures which enable pilots to obtain all necessary and relevant information in good time prior to pilotage, including any faults and deficiencies on the ship in question. See section 2.1. *(RS 2016:01 R4)*

The Swedish Transport Agency is recommended to:

- Look into the possibility to change the wording of Chapter 4, Section 8 of the Swedish Transport Agency's Regulations and General Advice (TSFS 2012:38) on Pilotage so that the language agreed on for pilotage also covers communication with any external parties. See section 2.5. *(RS 2016:01 R5)*

The Swedish Accident Investigation Authority respectfully requests to receive, by **22 June 2016** at the latest, information regarding measures taken in response to the recommendations included in this report.

On behalf of the Swedish Accident Investigation Authority,

Helene Arango Magnusson Rikard Sahl