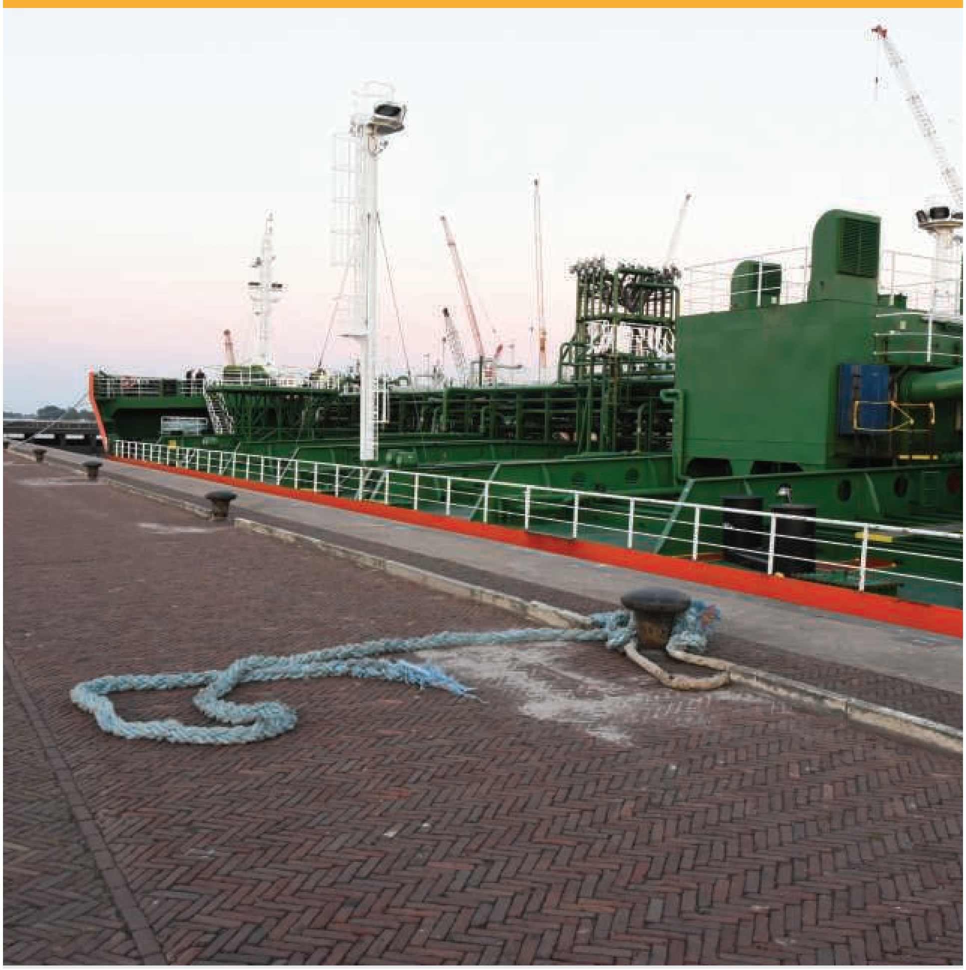
DUTCH
SAFETY BOARD

Fatal outcome following parting of mooring line

Lessons learned from the accident on board the RN Privodino



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The Hague, November 2020

The reports issued by the Dutch Safety Board are publicly available on www.safetyboard.nl.

Cover photo: Dutch Police

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RECOMMENDATIONS

The Dutch Safety Board issues the following recommendations:

With the aim of preventing the breaking of mooring lines in the lock in IJmuiden:

To the Central Nautical Management North Sea Canal area:

1. After consulting with all stakeholders, formulate an ambitious target aimed at drastically reducing the number of broken mooring lines;
2. Take control in the redesign of the procedures relating to the precise determination and reaching of the final mooring position in the lock.

In respect of good cooperation on the bridge between regular members of the bridge team and the registered pilot:

To SCF Management Services Dubai and the pilotage service:

3. Ensure that it is clear to all persons involved how the lock passage will be undertaken. Make a precise agreed and verified determination of the final position in the lock.
4. Ensure that whenever agreements are reached on board about the distribution of tasks during sailing and manoeuvres, these agreements are respected and that they do not conflict with the formal role and responsibility of the various persons involved according to their own discipline.

With regard to safe working with mooring lines on board:

To SCF Management Services Dubai:

5. Ensure that during mooring line handling, crew members only undertake tasks after they have been issued with the appropriate instructions by a superior. Ensure that a start is only made on placing mooring lines under tension following the issuing of an instruction by the ship's officer in command on the bridge.
6. Ensure that officers who are expected to physically supervise the safety of crew members are always able to give priority to this task.

With regard to safe working with mooring lines, a turnaround in thinking is also needed. Whereas at present the intention is to ensure that measures for working safely in unsafe areas are carried out as well as possible, working with mooring lines and ropes must be organized in such a way that at high risk moments, it is possible to work from a safe location and unsafe areas no longer need to be entered.

To achieve that objective the Dutch Safety Board issues the following recommendations:

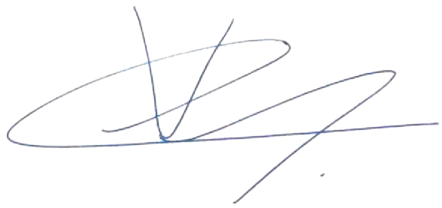
To SCF Management Services Dubai:

7. In areas with snap-back zones, identify or create safe workstations where those aboard cannot be hit by mooring lines and ropes if they snap back; mark these safe workstations in a recognizable manner and organize the work processes involving mooring lines and ropes in such a way that operations are always undertaken from these safe workstations.

To Netherlands Maritime Technology (NMT) and the Royal Association of Netherlands Ship Owners (KVNR):

8. Broadcast this turnaround in thinking as widely as possible in your national and international network, and investigate how, in practical terms, the maritime sector can contribute to achieving the objective of only working from safe workstations while handling mooring lines.

J.R.V.A. Dijsselbloem
Chairman Dutch Safety Board



C.A.J.F. Verheij
Secretary Director

1 INTRODUCTION

1.1 The accident

On 28 June 2018 at 21.02 hours local time, the chemical tanker RN Privodino entered the Noordersluis lock at IJmuiden. The vessel was en route to Amsterdam. Shortly after the port forward spring had been paid out, it unexpectedly came under severe tension. The mooring team on the foredeck was no longer able to respond adequately in good time, as a result of which the mooring line parted. The section of mooring line that was connected to the on-board winch recoiled, and struck a crew member, killing him instantly.

The incident has been classified as a very serious accident as defined in the Casualty Investigation Code of the International Maritime Organization (IMO) and Directive 2009/18/EC of the European Parliament and Council. This means that the accident must be investigated. Because the accident occurred in the Netherlands and involved interaction between the vessel and the lock, this investigation was carried out by the Dutch Safety Board. The vessel's flag state Cyprus, through the Marine Accident and Incident Investigation Committee-MAIC, participated in the investigation, as substantially interested state.

The purpose of this investigation is to answer the following questions:

1. What were the direct and indirect causes of the parting of the mooring line?
2. What learning points are revealed by the investigation into the parting of the mooring line with the fatal outcome for the crew member of the RN Privodino?

1.2 The investigation

The investigation was initiated one day following the occurrence, with the collection of information. Investigators from the Dutch Safety Board carried out their investigation on board. Interviews were held with crew members directly involved on board, with the pilot, with the boatmen[1] on the lock wall[2] and with the mobile lockkeeper. Documents have been asked for and data from the Voyage Data Recorder (VDR) have been analysed.

1 Boatmen: Boatmen are responsible on shore for ensuring that mooring lines from a vessel are made fast to bollards.
2 Lock wall: The quayside surrounding the lock.

The information available was analysed according to the Tripod Beta analysis method. Further information about analysis methods in general and the result of using the Tripod Beta method in this investigation appear in Appendix A1.

2 COURSE OF EVENTS AND BACKGROUND INFORMATION

In IJmuiden's Noordersluis lock, on the evening of Thursday 28 June 2018, a crew member of the RN Privodino was killed after being hit by a parted spring. The victim was the motorman on board the RN Privodino and was part of the mooring team on the foredeck. He was killed instantly.

Responsibilities and actors
One point for attention in all investigations by the Dutch Safety Board is the presence of safety management systems and how they work in practice. The underlying principle is that all relevant actors have responsibilities for mapping out the safety risks and ensuring that they are managed as effectively as possible, while paying constant attention to improvement and to the current state of the art in terms of science and technology.

Descriptions of the safety management systems identified and the requirements which they must satisfy in the opinion of the Safety Board appear in Appendix A2.

During this investigation, a number of actors were identified:
- Vessel and crew;
- Vessel's management company;
- The Pilotage Service and the pilot;
- The boatmen;
- Central Nautical Management North Sea Canal Area (CNB-NZKG) and the mobile lock keeper.

Vessel, crew and vessel's management company described in more detail in Appendix A3. The Pilotage Service, the boatmen, CNB-NZKG and the mobile lock keeper are discussed in the description of the course of events.

The vessel was sailing on a regularly scheduled service. The vessel had sailed from Archangelsk (Russia) and, with a cargo of 24487 tonnes of gasoil, was travelling to the Sonthaven in Amsterdam. Because the vessel had to wait until a mooring became available in Amsterdam, it had first anchored for some time at an anchorage off the Dutch coast.

Both the master and a large proportion of the crew had visited Amsterdam on numerous occasions with the RN Privodino, and had therefore often completed a passage of the lock.[3] This applied also to the boatswain and the victim, a member of the mooring team on the foredeck. The only new member of this team on board was the 3rd officer, who was in charge of the mooring team. This was his first passage of the lock at IJmuiden. Table 1 provides an overview of the relevant experience of the main persons involved in this accident.

	Experience at sea	Number of lock passages at IJmuiden	Period on board RN Privodino
Master	17 years as master	>50	Since 2011
Third officer	3.5 years at least as third officer	None	6 days
Boatswain	At least 10 years as boatswain	>50	Since 2011
Motorman/victim	At least 10 years as Motorman	>50	Since 2011
Pilot	21 years, 11 years as pilot	>1500	Multiple pilotages on board sister vessels

Table 1: Experience of persons involved in the accident.

The vessel manager provided crews with in-company training by offering a digital module covering the mooring and unmooring of vessels. The master, boatswain and motorman had completed this training in 2014. The third officer was new to the company, and had only been on board 6 days. He had not yet completed the training.

The investigation report by the vessel's management company revealed that on 17 June 2018, 11 days prior to the accident, the crew on board had received training in mooring and unmooring, by means of what is known as a periodic Learning Engagement Tool. As part of this training, emphasis was placed on the risks of the parting of mooring lines and the necessity, irrespective of rank, to issue warnings and to intervene if colleagues carry out hazardous actions or are in dangerous positions. The master and third officer were not present during this training, because they had not yet enrolled aboard.

In the approach to the port of IJmuiden, the pilot came aboard. The weather was good. It was clear with visibility in excess of 4000 metres, with a north-northwesterly wind at sea, force approx. 4 Bft. The conditions around and in the lock were calm.

3 The investigation did not examine how often the crew in its composition as on 28 June 2018 had passed the lock.

The Pilotage Service, the pilot and pilotage in the Netherlands

The Dutch Pilotage Service is a statutory professional organization consisting of two components: the Nederlandse Loodsen Corporatie (NLC) and, as a business organisation, the Nederlands Loodswezen BV (NLBV). There are four regional maritime Pilots' corporation: Noord, Amsterdam-IJmond, Rotterdam-Rijnmond and Scheldemonden. Pilots within each region are organised in a so called Regional Pilot Corporation.

Seagoing vessels entering and leaving Dutch seaports are in principle required to take advice from a pilot. The same applies to entering and leaving Flemish ports if this requires passage through Dutch waters. The Pilotage Act states that pilotage services may only be provided by authorized and registered pilots.

The Pilotage Act specifies that the pilot advises the master or maritime traffic participant, but that, subject to permission of the master, the pilot himself may also act as the maritime traffic participant. A pilot is expected to advise the master of a seagoing vessel and:

- on board, to provide the master and crew with accurate knowledge and experience of specific local shipping routes, docks, tides, currents, jetties and quaysides, traffic control systems, traffic flows and other information relevant for safe passage;
- to reach clear agreements on who on board will act as the traffic participant;
- as traffic participant or on the instructions of the master, to guide tugboats and boatmen;
- as traffic participant or on the instructions of the master, to be responsible for communication with tugboats, boatmen, traffic controllers, other traffic and local authorities, and where necessary to translate this communication (generally in Dutch) and to adequately report on such communication to the master.

From the pilot station, the pilot acting as traffic participant, guided the vessel to the lock, after having taken note in accordance with standard procedures of the vessel's specifications, draught and load condition, among other details. As part of that process, both the Pilot card and the Master Pilot Exchange form from the vessel's Safety Management System (SMS) were used. The master had instructed the pilot that he did not wish to make use of a tugboat for the passage through the lock.

Shortly before entering the port of IJmuiden, the two mooring teams were called on deck. Earlier in the afternoon, they had received a briefing from the first officer regarding the passage through the lock and mooring in the Sonthaven. The master instructed the mooring teams via portable radio that the vessel would be mooring in the lock on the port side, with a bow line and a forward spring on the fore part, and a stern line and aft spring on the stern part. On the fore part, the spring would have to be placed first, and on the stern part, the stern line first. Figure 2 shows the planned position and mooring configuration in the lock on 28 June 2018.

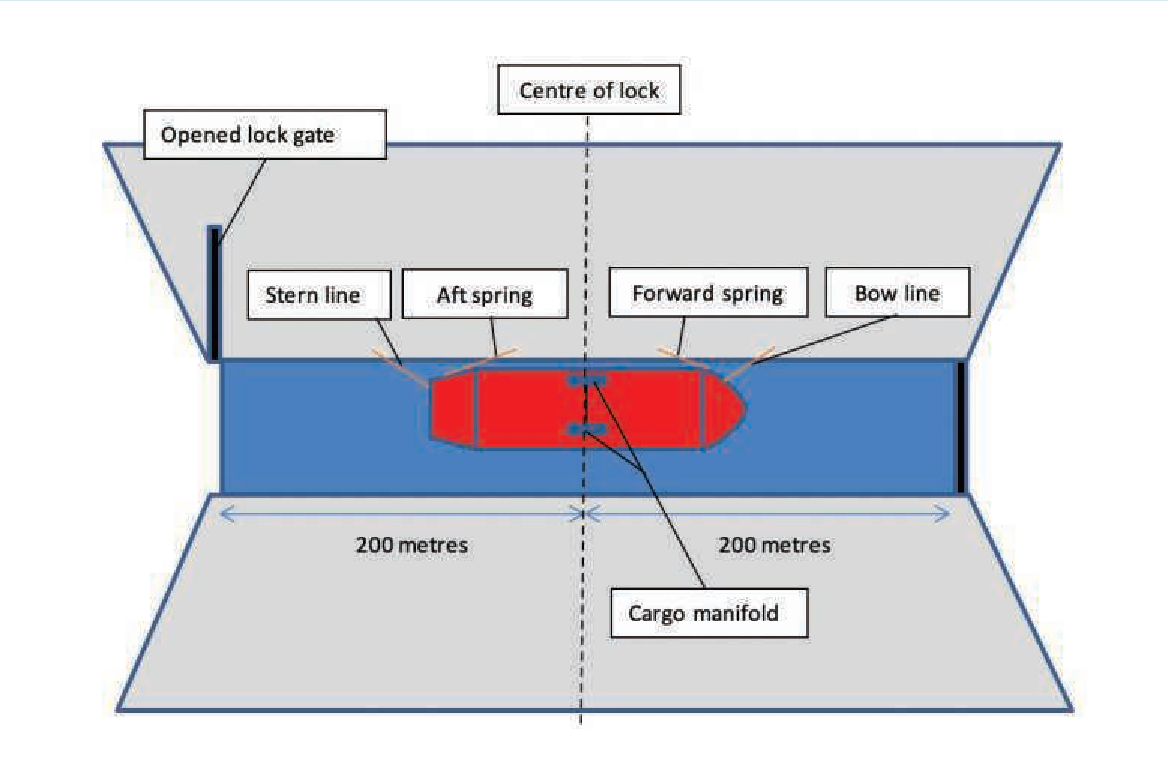


Figure 2: Planned mooring configuration of RN Privodino on 28 June 2018 at the lock in IJmuiden.

At around 20.40 hours, approximately 20 minutes before entering the lock, both mooring teams took up their positions on deck. Mooring in the lock was prepared in accordance with the procedures and check lists from the SMS. The third officer on the foredeck checked that all members of the team were wearing the prescribed personal protective equipment, held a safety briefing, pointed out to all team members the risks of mooring lines under tension, ordered a visual inspection of the mooring lines and mooring gear for damage and defects and ensured that the mooring lines, winches, guide rollers and guide winches were ready for use.

The third officer notified the master of all these aspects by portable radio. A record was made on the bridge on the relevant checklist. No shortcomings were reported.

The two mooring teams then took all the necessary preparatory measures. On the foredeck, the bow line and forward spring were flaked out on the deck in several bights, so that as they were paid out to shore, length was available. The winches and mooring line drums were engaged and prepared for use.

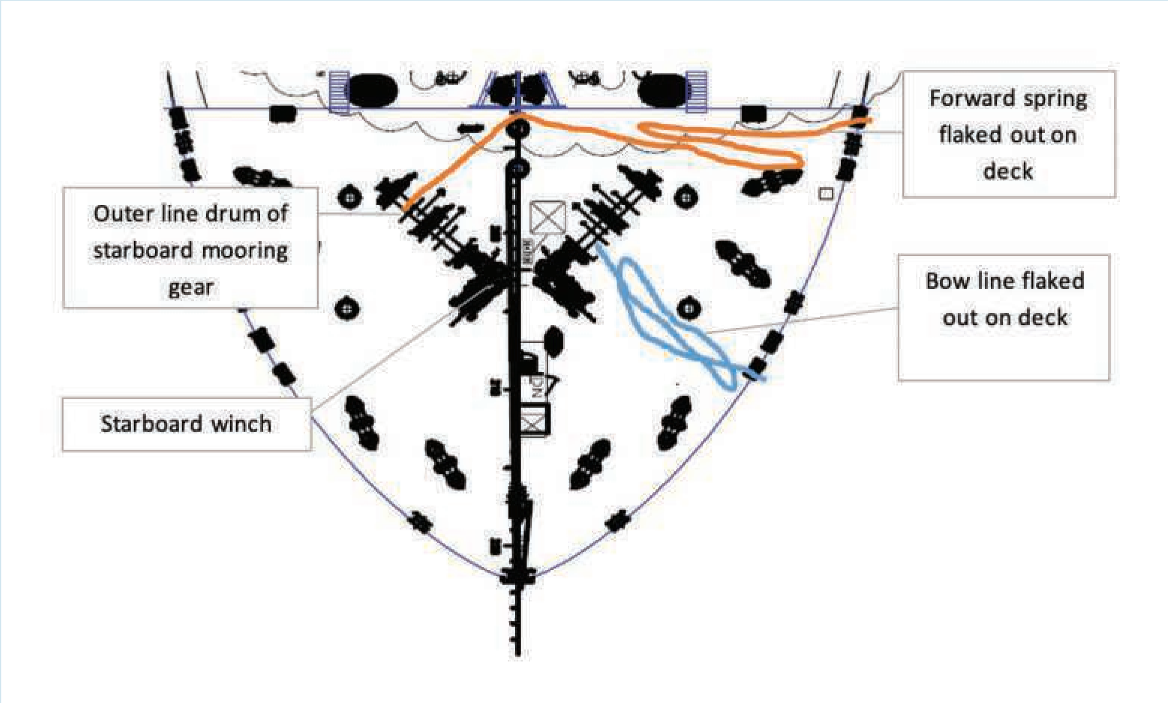


Figure 3: Situation on foredeck upon entering the lock.

Events on the bridge of the RN Privodino and on the quayside, prior to the occurrence

Shortly before entering the lock, the operation of the rudder, bow thruster and propulsion was switched from the operating console in the centre of the bridge to the operating console on the port bridge wing. The pilot then offered the master three possibilities relating to the role of the pilot while entering and mooring in the lock:

1. The pilot moors the vessel in the lock and operates rudder, bow thruster and propulsion;
2. The master operates rudder, bow thruster and propulsion on the advice of the pilot;
3. The master operates rudder, bow thruster and propulsion subject to his own judgement and the pilot advises of any potential dangers.

The master chose option 3. The pilot instructed the master that the vessel should be moored in a position more or less in the middle of the lock. This instruction was also passed on via the portable radio to the mooring teams. The pilot added, for the master's information, that when the vessel had reached its intended final position, the cargo manifold would be in line with a parked car on the quay wall. The master did not pass this last instruction to the crew. The investigation did not reveal any clues that could led to the conclusion that the master actually took the position of this car in consideration while determining the final mooring position in the lock. Navigators normally only use fixed object for positioning purposes instead of movable objects like, for instance, buoys and vehicles.

There was sufficient space in the lock. The vessel has a length of almost 180 metres; the Noordersluis lock in IJmuiden is 400 metres long, and the RN Privodino was the only vessel to be locked. At around 21.00 hour, the RN Privodino sailed into the lock at a speed of approximately 2 knots[4]. Shortly thereafter, boatmen on the lock wall cast heaving lines onto the deck, which were made fast by the mooring teams to the forward spring line and the stern line. The master was informed by the mooring team leaders that these two mooring lines were ready to be taken ashore.

Mooring procedure in the lock at IJmuiden.
In addition to the master and crew of a vessel and the pilot on board, the following persons are involved in the passage of the IJmuiden lock:

- Lockkeeper: The lockkeeper supervises the vessel during the lock passage and determines the positioning of vessels in the lock. Operational management of the lock has been entrusted by Rijkswaterstaat to the Central Nautical Management North Sea Canal Area (CNB-NZKG). Operational tasks of CNB-NZKG are being executed by the Port of Amsterdam. The lockkeeper maintains contact with the pilot via VHF radio channel 22. The lock keeper is present on the lock wall during the passage and is therefore also referred to as the 'mobile man';
- Boatmen: Boatmen are responsible for securing and releasing mooring lines from vessels on the bollards in the lock. In an around the ports and locks at IJmuiden, the boatmen are members of the *Corps van Vletterlieden* (CVV). It is therefore common practice in this region to refer to the boatmen as *vletterlieden*. They work in regular crews in 12-hour shifts. The boatmen are only in portable radio contact with the pilot if tugs are also involved in the lock passage. In that case, contact is maintained via the channel on which the pilot is in contact with the tugboats. If there are no tugboats, the pilot normally communicates with the boatmen by means of hand signals or via the lock keeper, by portable radio. The number of boatmen deployed for each vessel depends on the weight of the mooring lines used on the vessel, among other aspects. For that reason, a record is kept for each vessel of the type of mooring lines used on board.

Due to currents in the lock normally the forward spring is the first line to be secured, so that the fore part of the vessel remains held against the side of the lock. The forward spring and stern line are generally passed ashore simultaneously. It is standard practice when paying out the forward spring that the vessel retains some forward movement. If no further instructions are issued to the boatmen about the bollard to which the forward spring should be fastened, the boatmen carrying the forward spring ,walk alongside with the vessel until they reach the first bollard, and fasten the forward spring around that bollard. The distance between bollards on the lock wall is slightly more than 12 metres.

Continued on the next page.

4 1 knot = 1 nautical mile/hour. A nautical mile equals 1852 metres.

After the forward spring has been fastened, the boatmen then fasten the stern line, aft spring and bow line on the lock wall.

This is different to the mooring procedure at a berth in the port; when the mooring lines are landed at a berth in port, the vessel is in principle in position and stationary.

With the fore part of the RN Privodino still at a distance of approximately 170 metres from the closed lock gate on the land side of the lock, the pilot issued both verbal instructions to the master and an arm signal to the boatmen that the forward spring and stern line should be paid out. No further instructions were issued as to which bollards on the lock wall the forward spring and stern line should be attached to. The boatman at the fore part took hold of the spring, walked alongside the vessel, and approximately 20 seconds after the arm signal from the pilot, placed the forward spring around the first bollard he came to.

The investigation revealed that the mooring line parted at the hawsehole it was running through. The Amidships of the RN Privodino was, at that moment still about 17 metres away from the halfway position in the lock. This distance was, as been shown in figure 4, calculated by taking together the distance between used bollard and centre of the lock, the length of the parted shore side section of the mooring line and the distance between most forward point of the vessel and the hawsehole, and compare this total distance with the half-length[5] (½ L) of the vessel. This calculation revealed that the vessel should have proceeded 17 metres more in order to let the vessel's Amidships end up more or less in the halfway position of the lock, as discussed between master and pilot.

5 Length overall .

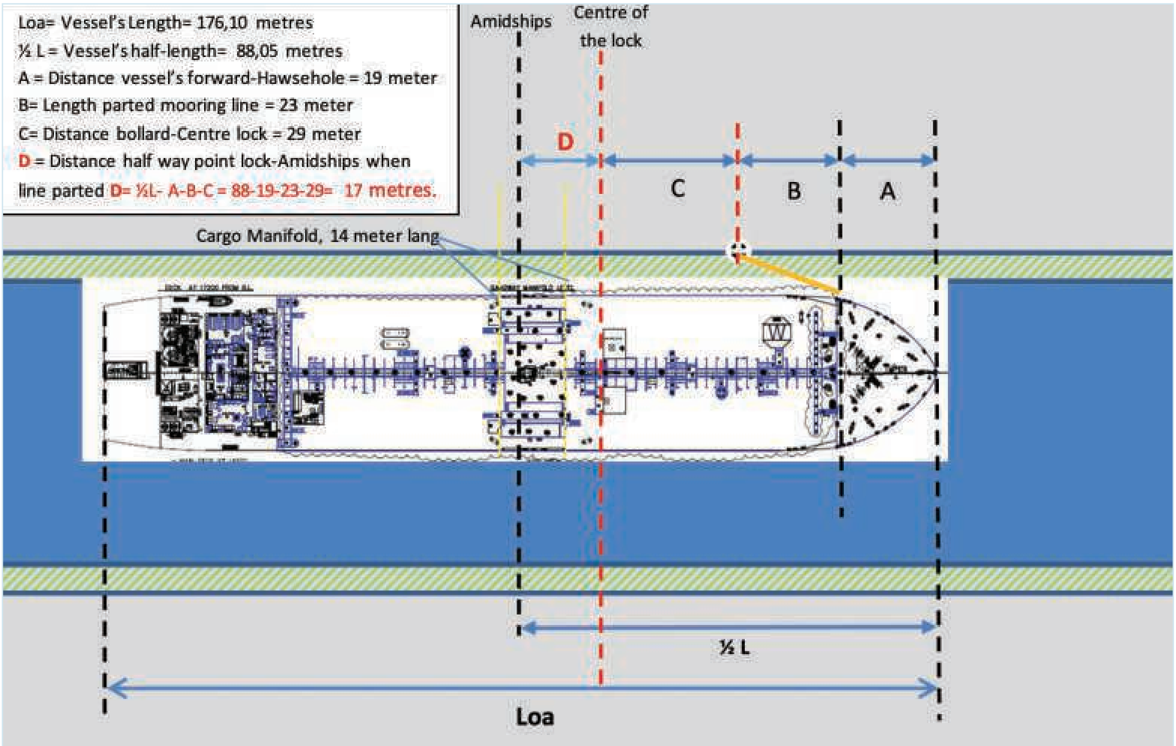


Figure 4: Position RN Privodino at the moment the mooring rope parted broke.

By using this calculations together with the data from the VDR, a timeline could be established starting at the moment the pilot let the forward spring sent to shore. Table 5 shows what distances the vessel had travelled between various moments during this period. The table also shows the distances between the vessel's amidships and the centre of the locks at these particular moments.

Timeline			Distance to centre of the lock	Distance travelled between moments 1 and 2	Distance travelled between moments 1 and 3	Distance travelled between moments 2 and 4	Distance travelled between moments 3 and 4	Distance travelled between moments 1 and 4
1	Moment the pilot let the forward spring sent to shore	21:03:19	53 metres	13 metres (+/- 1 mtr)	20 metres (+/- 1 mtr)			36 metres (+/- 1 mtr)
2	Moment the forward spring was secured on the lock bollard	21:03:40	40 metres			23 metres		
3	Moment the master started to slow down the vessel	21:03:53	33 metres				16 metres (+/- 1 mtr)	
4	Moment the forward spring parted	22:04:22	17 metres					

Table 5: Timeline, travelled distances and distances to the centre of the lock.

The pilot considered the speed of the vessel slow enough to bring the vessel to a standstill within a distance between 25 and 35 metres, and expected that the master would take this action by issuing the instruction half speed astern on the propeller at the same moment the lines were sent ashore. The vessel would then have become stationary in the position the pilot had in mind, as he stated. However, the master did not issue a half speed astern on the propeller order, and the pilot issued no further advice.

Based on this information it could be established that the pilot's mind-set on the mooring position in the lock was not corresponding with the actual centre of the lock and, therefore, was also not corresponding with the between pilot and master agreed mooring position of the vessel. The mooring position the pilot had in mind was still 17 metres away from the centre of the lock. The 14 metres long stretch of the cargo manifold was also at no point even with the centre of the lock in the mooring position the pilot had in mind. This is also shown in figure 4 where the cargo manifold is indicated between the yellow dotted marks.

A little over 10 seconds after the forward spring had been secured around the bollard, the master started to slow down the vessel by applying power astern. As shown in table 5, the vessel had, at that specific moment, travelled for about 20 metres from the moment the spring was sent ashore. At this same moment, the vessel's Amidships was still 33 metres away from the centre of the lock. This shows the master's intention to reach a final mooring position with the vessel's Amidships within few metres from the centre of the lock.

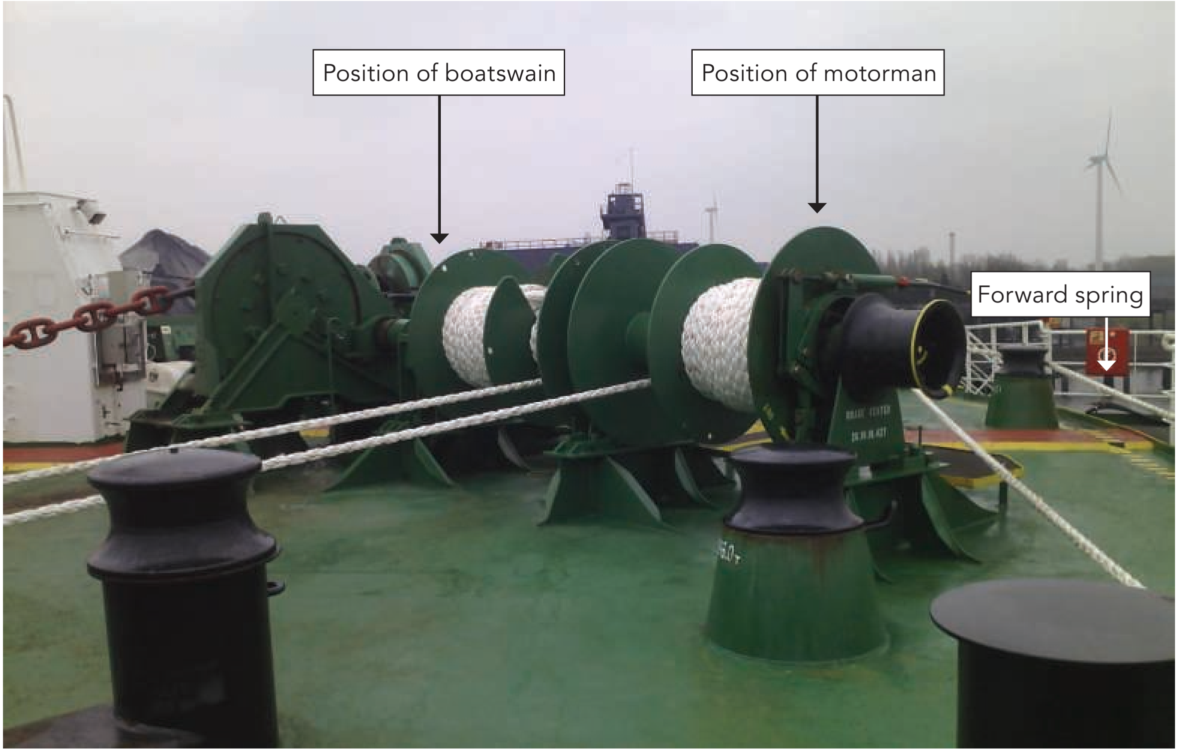
Approximately 40 seconds after the forward spring had been fastened around the bollard, the master saw that the forward spring was under tension and that no slack was being delivered from the foredeck. He warned the mooring team on the foredeck via the portable radio, but between two and three seconds later, the forward spring parted.

It took another 24 seconds before the third officer on the fore part informed the master via the portable radio that the motorman had been struck. The master then sent the first officer from the bridge to the foredeck to assess the situation. Three minutes after the accident, the pilot received a request from the master to call medical assistance, and that it was a very serious accident.

Events on the foredeck

On the fore part, the mooring team consisted of five people: the third officer, the boatswain, the motorman and two deckhands. The third officer was in charge of the mooring operation. His task description as Responsible Person contained the following: "He should, as far as possible, monitor the work of the mooring party and ensure that safety is satisfactorily addressed. He should try to maintain an overall view and should try not to become actively involved in a specific part of the operation". He was in contact with the master on the bridge via portable radio, and passed on orders received from the master. In addition, he maintained vision of the shore and passed on information to the master about the position of the fore part in respect of the closed lock gate.

When the forward spring was sent ashore, and up to the moment the accident happened, the third officer stood on a raised position near the port railing, close to the point where the spring left the vessel, via a fairlead. From that position, he had a clear view of the quayside, the lock gate, the transfer of the forward spring to shore, and the two deckhands who stood close to him, waiting until the bow line could be passed over. From this position, his view of the boatswain, who was operating the winches and who stood at a raised point, was hindered by the port mooring gear. He was able to partially see the boatswain, but could not see what the boatswain was doing. The third officer had no view whatsoever of the motorman, who was located on the starboard side of the foredeck (see photograph 6).



Photograph 6: View from the position taken up by the third officer (Source: Dutch Safety Board)

Mooring gear on the foredeck of the RN Privodino

There are two hydraulically powered winches on the foredeck of the RN Privodino using manually operated couplings. Each winch can be used to drive an anchor winch, two mooring line drums and a warping head. The fixed mooring line drums are designed to automatically maintain a mooring line at a pre-set tension. This automatic tensioning only operates if the mooring line drum is not connected to the hydraulic winch.

The mooring line is permanently stored on the mooring line drum. In other words, the mooring line is also wound around the mooring line drum when the mooring line is not in use. A long mooring line which is stored in this way will be wrapped around the winch in a large number of turns, thus creating a considerable number of layers. Because the number of layers has a major influence on the holding force of the winch, this means that it is not possible to guarantee a fixed pre-set tension. It cannot be known in advance what length of mooring line will be needed to reach the bollards on the quayside, nor how many layers will remain wrapped around the drum. The length at each berth will differ.

The mooring line drums on the foredeck of the RN Privodino are therefore each split into two separate drums. The example in photograph 7 shows that the storage drum is located on the left, with many layers of stored mooring line. The mooring line runs from the storage drum to the tension drum on the right. It is the role of this tension drum to maintain the force of the mooring line at a pre-set tension. The precondition, as shown on the photograph, is that only a single layer of mooring line may be wound around the tension drum. The tension drum is large enough for a maximum of ten turns in each layer.

Continued on the next page.

Photograph 7: Mooring line drum with split drums on the foredeck of the RN Privodino (Source: Dutch Safety Board)

The second precondition is that all force is transferred only to the tension drum. A situation must be avoided in which, due to the slipping of the mooring line on the tension drum, the section of mooring line still on the storage drum is pulled tight. If this happens, the mooring line will be drawn between the other layers of mooring line wrapped around the storage drum, and can become stuck, so that no further mooring line can run off the drum for use as required. This effect is avoided if at least four turns of mooring line remain wrapped around the tension drum. On the photograph 7, there are 8 turns of mooring line around the tension drum.

When mooring the vessel, the standard procedure is that, if necessary, the mooring line to shore is paid out from the storage drum. In this process, the mooring line drum is connected to the winch, and the winch is operated by a crew member. Once the vessel is stationary in position, several further turns from the storage drum are paid out. The mooring line is then wound back in, while another crew member manually guides the mooring line, that is not under tension, to the tension drum through the opening in the side of the storage drum. A minimum of four turns and a maximum of ten turns of the mooring line should then be wrapped around the storage drum under tension.

The boatswain was responsible for operating the various winches. He had a portable radio for contact with the master and the third officer. At the moment of the accident, he was operating the starboard winch, and the outer mooring line drum of the starboard mooring gear was connected to the winch. From his position he was able to see that the forward spring was paid out and fastened around the bollard. Because he had completed a passage of the lock at IJmuiden on more than 50 occasions, he assumed that this meant that the vessel was almost in position.

On his own initiative, without first having received the relevant orders, the boatswain therefore decided to release a further one to one-and-a-half turns of the spring line from the storage drum, before transferring the spring line to the tension drum. The motorman assisted him by guiding the spring to the tension drum manually. The motorman then stepped away from the drum and the boatswain started winding the spring in, around the tension drum. The boatswain failed to notify this action to the third officer, who from his position was unable to see what the boatswain and motorman were doing.

Photograph 8: Location where the forward spring broke (Source: Police).

After completing three turns around the drum, the boatswain observed that the spring line was becoming far too tight. While attempting to release the spring as quickly as possible, with the winch, he received warnings both in the form of a shout from the third officer and via a call from the master on the portable radio. Within three seconds of these warnings, the spring line parted at the position of the fairlead. The section of the mooring line between the fairlead and the drum whipped back across the deck and hit the motorman full in the head. Figure 9 shows the situation on the foredeck at the moment when the spring broke.

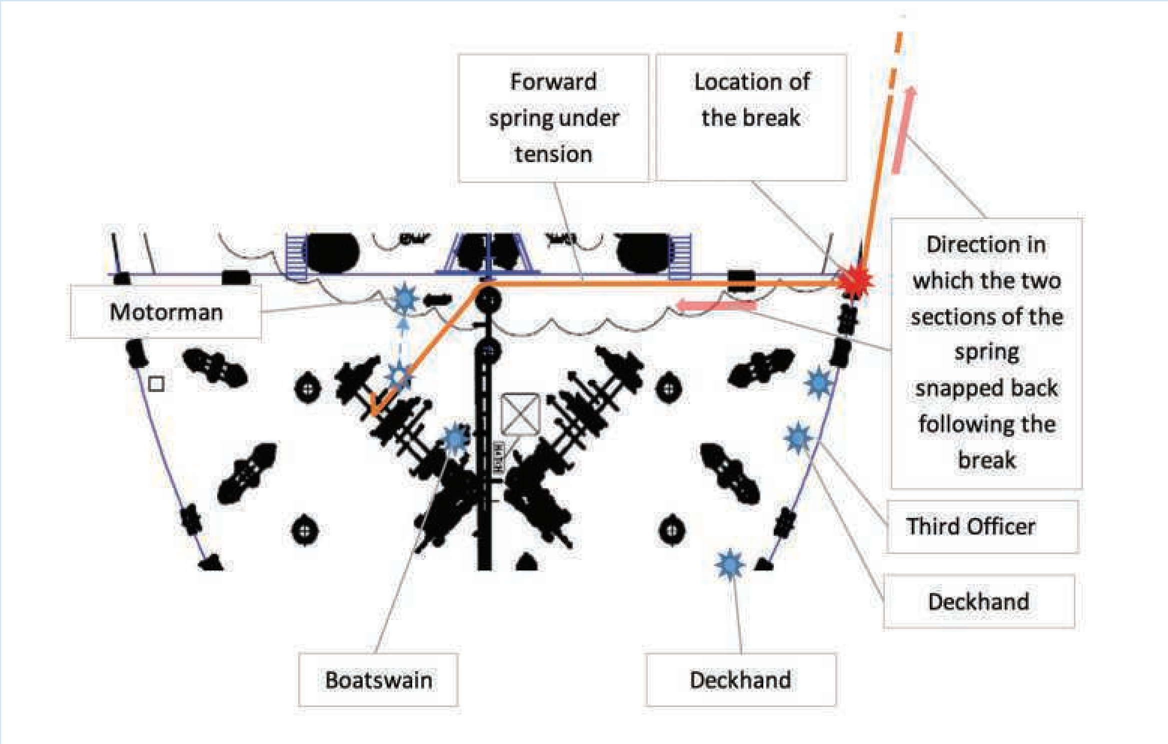


Figure 9: Situation on the foredeck at the moment the forward spring broke.

Snap-back zones

Parting of mooring lines have always been recognized as a source of danger in the shipping sector. A mooring line under tension has absorbed a huge amount of energy, and this energy is 'stored' in the line, as it were. If the mooring line breaks, this energy is suddenly released. The breaking ends of mooring lines therefore recoil or snap back violently, covering large distances at high speed. In shipping, this phenomenon is referred to as snap back. It goes without saying that being present in a snap-back zone is very dangerous, in particular if a mooring line breaks. However, during mooring and unmooring, it is impossible to not work in or in the immediate vicinity of these zones. In Figure 10, the areas marked in yellow broadly indicate the snap-back zone of the forward spring at the moment when it broke. The motorman was located within this zone. Photograph 11 shows how crew members are warned about the snap-back zones when they enter the foredeck.

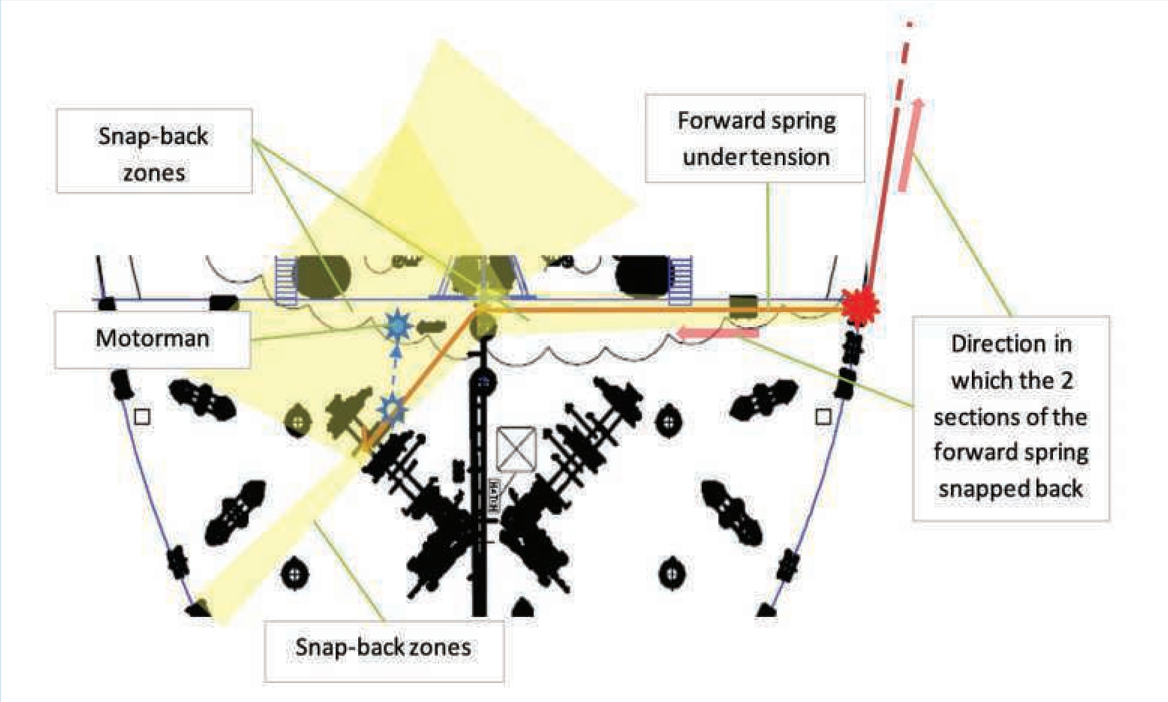
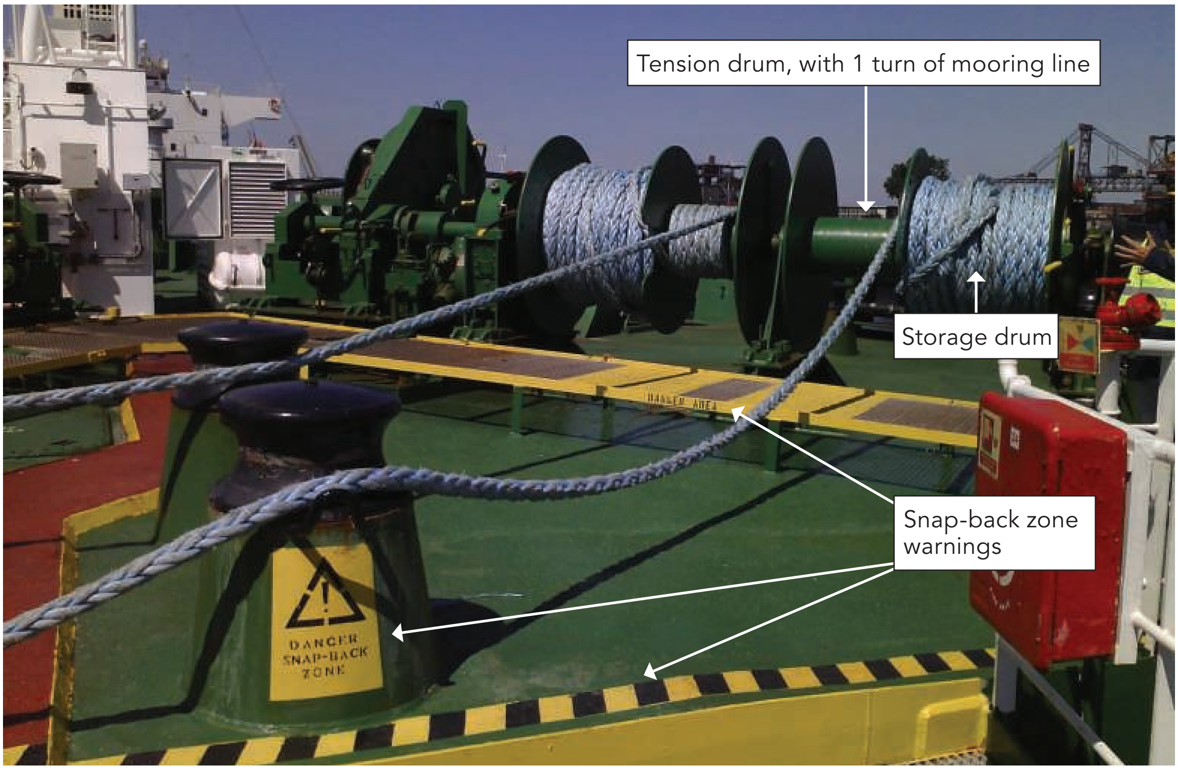


Figure 10: Snap-back zones of the forward spring at the moment when it broke.

Winch speed

Photograph 11 shows the situation of the mooring line drum at the moment the spring line broke (right-hand mooring line winch on the photograph) This shows that there was only 1 turn around the tension drum at the time.



Photograph 11: Reconstruction and snap-back zone warnings on the foredeck (Source: Dutch Safety Board)

Photograph 12 shows that the mooring line on the storage drum left a clear mark where the line was pulled tight from the tension drum, over the other layers. In addition, the mooring line had been pulled between the layers on the storage drum. It can be concluded from these observations that the mooring line was pulled very tightly around the storage drum, from the tension drum, before the mooring line broke.

Photograph 12: SStorage drum with the mooring line that was used as the forward spring (Source: Police).

The boatswain attempted to prevent the accident by releasing the mooring line *as quickly as possible*. This failed because the winch was not able to turn quickly enough to release sufficient mooring line.

The direct cause of the death of the motorman was the parting of the forward spring. The spring parted because, with the spring already wrapped around the bollard on shore, the vessel was still moving forward when the forward spring on the mooring line winch was transferred from the storage drum to the tension drum and paid in for 3 turns. After that, the forward spring could not be paid out quickly enough anymore. The transfer of the forward spring to the tension drum was executed without any given orders to do so.

The mooring team leader on the foredeck was unable to monitor the actions of the operator of the mooring line winch. The mooring team leader had no view whatsoever of the motorman. At that moment, the motorman was in a dangerous position on the foredeck of the RN Privodino, in the snap-back zone of the forward spring.

3 ANALYSIS

Accidents caused by parting mooring lines are common in the shipping industry. Within the shipping industry, safety management measures have been developed and implemented, which in terms of the Tripod Beta method are supposed to act as barriers. Figure 13 provides an overview of these barriers, and Appendix A1.2 contains a complete overview of the Tripod Beta analysis. In the case of this accident, however, these barriers either failed or were not in place. This chapter explains the failure of these barriers. This explanation provides valuable starting points for measures for improving safety.

The master's decision not to make use of a tugboat has not been identified as a failing barrier to the accident. It is impossible to conclude that the accident would have been prevented if a tugboat was being used during the passage through the lock.

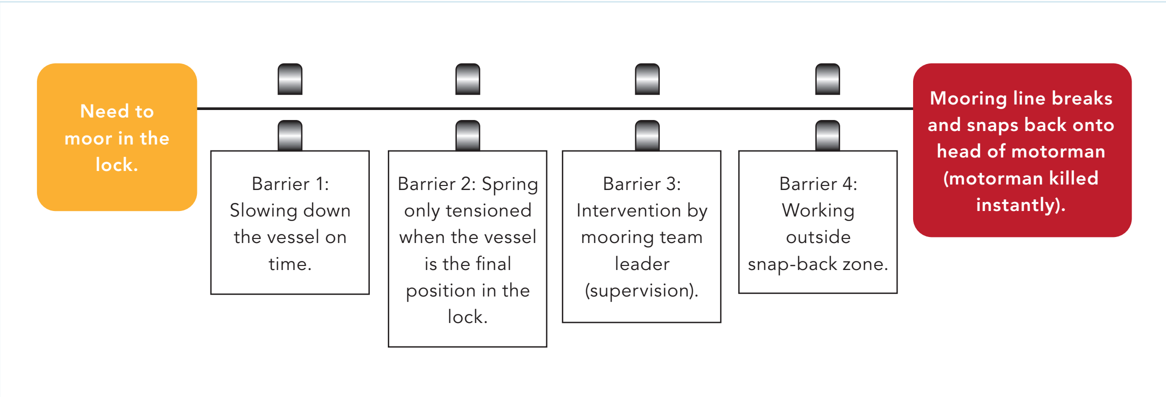


Figure 13: Overview of failed barriers.

Barrier 1: Slowing down the vessel on time

According to his statement the pilot expected the master to start slowing down the vessel at the moment he (the pilot) indicated that the forward spring could be sent ashore. In that case, the vessel would have been practically stationary in the position in which the forward spring broke during the occurrence, which was also approximately the mooring position the pilot had intended. Instead, the master did not start slowing down the vessel until it had travelled approximately 20 metres further.

The investigation revealed that the vessel should have continued sailing around 17 more metres to be more or less in the centre of the lock, as had been discussed between the pilot and the master.

The investigation failed to explain clearly whether the master of the RN Privodino had seen that the forward spring had been placed around a bollard, immediately after being sent ashore. It was however determined that he had not been informed by the pilot of this standard working method. It was also determined that the master took no action to prevent the forward spring being placed immediately around a bollard, despite the fact that at that moment, the vessel still needed to travel 37 metres more to reach the centre of the lock. Finally, it emerged that no further agreements had been reached between pilot and master concerning the choice of the bollard or the moment at which the forward spring was placed around a bollard. Although the master had informed the pilot that he himself would complete the entire lock passage, the master issued no further instructions about the bollard around which the forward spring should be placed. As a consequence, the forward spring was placed around a bollard at a moment when the vessel was still 37 metres away from the centre of the lock.

In principle, the pilot and the master were working together to pass the vessel safely through the lock. Specifically because they were working together, it should have been made clear in advance who would do what, and what information they needed from one another, to ensure that the passage was completed safely. To create that clarity on the role of each of them, prior to entering the lock, the pilot offered the master three choices:

1. The pilot moors the vessel in the lock and operates rudder, bow thruster and propulsion;
2. The master operates rudder, bow thruster and propulsion on the advice of the pilot;
3. The master operates rudder, bow thruster and propulsion subject to his own judgement and the pilot advises of any potential danger.

The master chose option 3. This option also implicated that the master himself would be responsible to, among other things, determine the moment could be sent ashore, because the pilot indicated that he would only advise of any potential threats.

Irrespective of that choice, both master and pilot were responsible for the lock passage. The master always remains responsible for his vessel, it's crew and cargo, the environment and other traffic. The pilot, on the other hand, always have a duty and responsibility as advisor, also in situations with no potential threats actually present. It was therefore necessary that both should have had access to the same information and shared the same vision on the manoeuvre. The investigation revealed that the pilot and master did not share the same vision on the lock manoeuvre.

a. The pilot and the master had a different vision on the mooring position in the lock. There was a degree of consultation on this point, but the agreed mooring position was insufficiently precise resulting in an over 15 metres difference in expectations.
b. The master was not fully conversant with the lock procedure. According to his statement the pilot expected the master to bring the vessel to a hold within 25 to 35 metres after the pilot's order to send the forward spring ashore, and, as a result of that order, was secured to the next bollard. The master did not do so. The master started to bring the vessel to a hold after the vessel had travelled more or less 20 metres more with the vessel still 33 metres away from the centre of the lock.

It must nonetheless be recognized that the risks of the factors referred to in a. and b. only led to an accident after the pilot had decided when the mooring line could be send ashore, contrary to the agreement with the master to only issue advice in the event of a potential threat, and when this action taken by the pilot was not prevented by the master. The pilot gave no advice about immediately bringing the vessel to a hold.

At the same time, it has been noted that the choice made by the master in favour of option 3 is uncommon. On vessels of a size comparable to the RN Privodino, or larger, normally the pilot handle's the mooring of the vessel and operates the rudder, bow thruster and propulsion. As a consequence there was less routine in handling this particular option, causing the associated risks being undetected or not assessed.

With the addition to the bridge team of a pilot, management of a lock passage becomes the joint responsibility of several people. That shared responsibility made it essential that the members of the bridge team all had the same information, so that any decision by individual members of the team could be based on the same information and unexpected or even wrong decisions could be quickly addressed between the members of the bridge team. Besides that, it is important that this information is shared in a professional way, keeping in mind duty and responsibility aside of any allocation of tasks that have been agreed. For a master this means that he needs to ask questions to the pilot, in order to get as much relevant and detailed information as possible. For a pilot it means he needs to provide solicited and unsolicited both information and advice to the master. Finally, is it necessary that all members of the bridge team respect the allocated tasks that have been agreed within the team. Actions based on assumptions and expectations must been ruled out.

The accident was a consequence of unclearity about the final mooring position in the lock resulting in different expectations about this mooring position between master and pilot. This was in combination with, on one hand, actions not in line with the agreed allocation of tasks and without these actions being challenged. On the other hand incomplete exchange of information and lack of advice have been contributing factors to the accident.

Accidents involving mooring lines

None of the parties involved in the lock keep records on the number of occasions on which mooring lines break during the lock passage. The investigation to the accident on board RN Privodino has revealed, however, that a mooring line breaks on an almost weekly basis in the locks at IJmuiden. Generally speaking, the mooring line in question is the forward spring.

The investigation has not considered in any further detail the differences between mooring in a lock and mooring at a berth in the port. In most cases, a berth in port is precisely determined in advance on the basis of availability, or the presence of loading and unloading facilities on shore. In the case of a (large) lock, the mooring position is generally determined less frequently by the circumstances. A long quayside (lock wall) is often available, with numerous bollards positioned close together. This fact makes it even more important to accurately determine the final position in the lock.

Continued on the next page.

The sea lock in Terneuzen is handling also seagoing vessels of considerable size and dimensions, although it is approximately 100 metre less long than the lock in IJmuiden. One noticeable fact, however, is that a mooring line only breaks on a few occasions per year in the sea lock in Terneuzen. For that reason, it is interesting to refer to the lock procedure with regard to determining the final position in the lock in Terneuzen.

Final position in the sea lock in Terneuzen
In the sea lock in Terneuzen, it is the task of the lock keeper to precisely specify the final position of the vessel in the lock before the vessel enters the lock. In order to ensure that the bridge team on board, including the pilot, the boatmen on the lock wall and, if applicable, all tugboat crews are aware of this information, the lock keeper provides a running commentary by VHF radio in increments of how many more metres the vessel must travel before it reaches the final position. He starts with increments of 10 metres. As the vessel approaches the final position, those increments become shorter.

According to this working method, there is no uncertainty for any of the participants in the mooring process about the final position of the vessel.

Barrier 2: Only place the spring under tension when the vessel reaches its final position in the lock
On the tension drum, the turns of the mooring line were laid in the first layer around the winch. Transferring a mooring line from the storage drum to the tension drum is part of the procedure for tensioning the mooring line. This was evidence that at the moment of the occurrence, a start had been made on the foredeck on applying tension to the forward spring.

The speed with which the mooring line winch can rotate depends on two elements:

1. The winch setting. The winch can be adjusted to three settings:
   - Low Speed, at which a maximum of 20 metres of mooring line can be paid out per minute.
   - High Speed, at which a maximum of 45 metres of mooring line can be paid out per minute.
   - Automatic setting, whereby without load (no tension on the mooring line) the winch operates at High Speed, and as the load increases, the winch switches automatically to Low Speed.
2. Setting of the winch operating handle. The speed of the winch increases as the handle is pushed more, until the maximum speed referred to above is reached and depending on the winch setting.

The specified maximum number of metres that can be paid out applies to the turns of the mooring line in the first layer, around the winch. If there are more layers around the winch, the diameters of the turns increase, and more mooring line is paid out with each rotation of the winch.

At the moment of the accident, the diameter of the outer turn on the storage drum, as a result of the number of layers of mooring line around the storage drum, was at least two times as great, so that with each rotation, two times as much mooring line could be paid out. Based on the data from the Voyage Data Recorder (VDR) of the vessel, it was possible to calculate the speed of the vessel in the last three seconds prior to the breaking of the spring. This made it possible to conclude that:

1. The winch was operating at Low Speed setting, because at High Speed setting, the speed with which the mooring line had been paid out would also have been higher on the tension drum than the speed of the vessel. At Low Speed setting, this was not the case;
2. Both in Low Speed setting and High Speed setting, the speed with which the mooring line on the storage drum was paid out would have been higher than the speed of the vessel.

It can be concluded from the above that the paying out of the forward spring in the last few moments before the forward spring broke could not be carried out fast enough, because the forward spring was laid on the tension drum. For that reason, it is essential that the vessel must be stationary in the final position before a start is made on all the actions necessary for tensioning the mooring lines.

No procedures or work instructions had been laid down on board to guarantee that no start was made on tensioning the mooring lines until the vessel was actually stationary in the final position.

As a consequence, the placing of the forward spring around the bollard on the lock wall became a crucial moment. For the boatswain, it was the signal to start tensioning the forward spring by transferring the forward spring line from the storage drum to the tension drum, because he assumed that the final position in the lock had almost been reached at that moment.

After all, as was in principle always the case in the lock in IJmuiden, that moment had been determined by the pilot, and initiated by issuing the instruction that the forward spring and stern line could be send ashore. The pilot did not issue an explicit instruction to the boatmen on the lock wall about the bollard to be used for the forward spring, which, in accordance with the locking procedures, automatically meant that with a vessel moving forward slowly, the next bollard the boatman reached was used.

The boatswain had completed more than 50 lock passages in IJmuiden. The investigation revealed that it was not routine on board during mooring and unmooring for instructions to be issued from the bridge about when the mooring lines could be tensioned. This was the case despite the fact that the moment of tensioning can in fact only be determined by the bridge team, because the vessel is being sailed from the bridge. Nonetheless, in this case, the moment was determined by the boatswain himself.

Barrier 3: Intervention by mooring team leader (supervision)
Another important barrier that failed to function relates to intervention by the mooring team leader, whose task was to supervise the work. He could have intervened at the moment that the spring was placed under tension, and he could have warned the motorman to take up a position outside the snap-back zone. The investigation revealed that there were a number of circumstances that explain why these actions were not taken, namely:

1. the restricted visibility of the boatswain and motorman for the mooring team leader during the work;
2. the considerable workload for the mooring team leader;
3. the mooring team leader was not being informed by both boatswain and motorman about any actions they were executing.

Maintaining an overview of the operation and keeping an eye on the members of the mooring team, including supervising safety, was the task and responsibility of the third officer and mooring team leader on the foredeck. However, his view of the boatswain and motorman was partially obstructed; in addition, neither explained what they were doing, as a consequence of which he was unable to intervene when the forward spring line was transferred to the tension drum too early, nor to prevent the dangerous position of the motorman. It should be noted that at that moment he was also responsible for a number of other tasks, such as monitoring the transfer to shore of the forward spring line and the bow line, and passing on the distance to the closed lock gate. As long as the vessel was still moving, and was not in position, this latter task still had to be carried out.

It was not possible to determine from the instructions issued to the mooring team leader according to the SMS which of these tasks did or did not have priority. In effect, he was required as well as he possibly could to attempt to maintain an overview of the mooring operation, and to monitor the work of members of the mooring team and to supervise safety. It should be noted that there was no single location on the foredeck from which he could have successfully carried out all these tasks simultaneously.

Barrier 4: Working outside the Snap-back zones
During a high-risk phase of the process (tensioning the forward spring), the motorman was located in a very dangerous area that was specifically made dangerous due to the risk of the mooring lines breaking.

Crew members received preventive training on board, backed up by digital instruction tools. In addition, before each arrival and departure at a port, a briefing was held, and shortly before the start of the mooring operations the mooring team leader always held a safety briefing. The danger of snap back was a fixed element of that safety briefing.

One important barrier for preventing accidents due to a breaking mooring lines involves working with snap-back zones. Snap-back zones are marked zones within which broken mooring line can whip backwards. However, these zones were not marked as such on the deck. Instead, the entire foredeck was identified as a hazardous zone and marked accordingly. The vessel manager supported this approach in the SMS by arguing that due to the various different possibilities for passing a mooring line to the winches and the fact that multiple mooring lines are (or are placed) under tension at any one time, snap-back zones would in fact have to be marked out on large parts of the deck. Because of the many different situations, this would not provide increased clarity for the crew members at work on the deck, and in the judgement of the vessel manager, a false sense of safety would be created. For that reason, the decision was made to identify the entire foredeck as a potential snap-back zone, and to mark it accordingly.

Marking out unsafe areas is a correct procedure from the point of view of safety. At the same time, it must be noted that any form of marking out unsafe areas in fact contradicts practice as long as work has to be carried out in those areas during operations. Moreover, the larger the marked-out area, the more difficult it becomes for crew members to determine what is or what is not a safe area at any given moment. As a consequence, it is difficult to identify a safe position from which certain tasks should be carried out. In addition, the mooring lines in use and how they are guided across the deck change the areas that are actually dangerous. The resultant risk increases if a situation suddenly becomes dangerous, and it becomes necessary to rapidly seek a safe position.

It is not known whether the motorman was aware that he was located at a very dangerous position at that moment. It can however be stated that he had a lot of experience, that he had followed all the training provided by the vessel manager, and that he had been present during the safety briefing prior to mooring in the lock in IJmuiden.

4 CONCLUSIONS

The direct cause of the death of the motorman was the breaking of the forward spring. This broke because, with the spring already wrapped around the bollard on shore, the vessel was still moving forward when the forward spring on the mooring line winch was transferred from the storage drum to the tension drum, at which time the forward spring could no longer be paid out quickly enough. This transfer was carried out without the relevant instructions being issued.

The mooring team leader on the foredeck was unable to monitor the actions of the operation of the mooring line winch and was also not informed of those actions. The mooring team leader had no view whatsoever of the motorman. At that moment, the motorman was in a dangerous position on the foredeck of the RN Privodino, in the snap-back zone of the forward spring.

As part of the analysis of the accident, four missing or failing barriers were identified. As a consequence, the following conclusions can be drawn:

Barrier 1: Slowing down the vessel on time
It can be concluded from this accident that lock procedures must be a fixed element of the information exchange between pilot and crew members that form part of the bridge team. The intended final position in the lock must be precisely agreed on, and any individual vision on that position must be verified among the members of the bridge team. A critical attitude towards each person's role and responsibility with respect to sharing information and issuing advice, the personal task agreed on within the bridge team and the fulfilment of that task by other members of the bridge team, is a precondition for smooth cooperation on the bridge. This conclusion naturally applies to all members of the bridge team, including the pilot.

The accident was able to happen due to a lack of clarity and as a consequence different expectations about the final position of the ship in combination on the one hand with actions that were not in line with the agreement and which were not corrected, and on the other hand insufficient mutual information exchange and advice. Acting on the basis of expectations and assumptions also played a role.

Barrier 2: Only place the spring under tension when the vessel reaches its final position in the lock
When mooring ships, it is crucial that the ship be stationary in the final position when the instruction is given to tension the mooring lines. This could prevent similar accidents. That moment can only be determined by the bridge team, because the ship is being sailed from the bridge. The signal to start safely tensioning the mooring line may therefore only be issued by the bridge team.

There were no procedures on board to guarantee this situation. In practice, the moment of issuing a signal was regularly determined by the crew on the foredeck. In this case, it was determined by the boatswain, for whom the placing of the forward spring around the bollard was the signal to start placing the mooring line under tension.

Barrier 3: Intervention by mooring team leader (supervision)
It can be concluded that the implementation of tasks by crew members whose role is to supervise safety should not be hindered by burdening them with other tasks. This must be guaranteed by the safety management system, and the processes must be structured in such a way that timely signals are issued if bottlenecks occur, and by identifying the measures to be taken.

The workload on the mooring team leader could not be reconciled with the importance of supervising all crew members on the foredeck from the point of view of safety, because the mooring team leader was required to *simultaneously* carry out multiple tasks, while no order of priority had been allocated to those tasks in the SMS.

In response to occurrences previously investigated by the Dutch Safety Board, the importance of good physical supervision on board was discussed in a thematic piece about safety during loading operations in the Shipping Occurrences Report (SOR)[6]. This importance also applies to mooring and unmooring.

Barrier 4: Working outside the Snap-back zones
During mooring and unmooring, large parts of the foredeck of the RN Privodino were considered unsafe working areas and marked accordingly. Because the areas that were actually dangerous changed depending on which mooring line was used and how it was guided over the deck, in the sudden occurrence of a dangerous situation, it was no longer possible to rapidly determine where a safe position could be sought. In addition, it was not possible to determine from which safe position the work could be carried out. During the accident, the motorman was located in the so-called snap-back zone of the breaking mooring line.

6 Shipping Occurrences Report November 2018 – May 2019

5 RECOMMENDATIONS

The Dutch Safety Board issues the following recommendations:

With the aim of preventing the breaking of mooring lines in the lock in IJmuiden:

To the Central Nautical Management North Sea Canal area:

1. After consulting with all stakeholders, formulate an ambitious target aimed at drastically reducing the number of broken mooring lines;
2. Take control in the redesign of the procedures relating to the precise determination and reaching of the final mooring position in the lock.

In respect of good cooperation on the bridge between regular members of the bridge team and the registered pilot:

To SCF Management Services Dubai and the pilotage service:

3. Ensure that it is clear to all persons involved how the lock passage will be undertaken. Make a precise agreed and verified determination of the final position in the lock.
4. Ensure that whenever agreements are reached on board about the distribution of tasks during sailing and manoeuvres, these agreements are respected and that they do not conflict with the formal role and responsibility of the various persons involved according to their own discipline.

With regard to safe working with mooring lines on board:

To SCF Management Services Dubai:

5. Ensure that during mooring line handling, crew members only undertake tasks after they have been issued with the appropriate instructions by a superior. Ensure that a start is only made on placing mooring lines under tension following the issuing of an instruction by the ship's officer in command on the bridge.
6. Ensure that officers who are expected to physically supervise the safety of crew members are always able to give priority to this task.

With regard to safe working with mooring lines, a turnaround in thinking is also needed. Whereas at present the intention is to ensure that measures for working safely in unsafe areas are carried out as well as possible, working with mooring lines and ropes must be organized in such a way that at high risk moments, it is possible to work from a safe location and unsafe areas no longer need to be entered.

To achieve that objective the Dutch Safety Board issues the following recommendations:

To SCF Management Services Dubai:

7. In areas with snap-back zones, identify or create safe workstations where those aboard cannot be hit by mooring lines and ropes if they snap back; mark these safe workstations in a recognizable manner and organize the work processes involving mooring lines and ropes in such a way that operations are always undertaken from these safe workstations.

To Netherlands Maritime Technology (NMT) and the Royal Association of Netherlands Ship Owners (KVNR):

8. Broadcast this turnaround in thinking as widely as possible in your national and international network, and investigate how, in practical terms, the maritime sector can contribute to achieving the objective of only working from safe workstations while handling mooring lines.

APPENDIX A

BACKGROUND INFORMATION

A.1 Analysis

A.1.1 Method

A large number of different methods have been developed for analysing accidents and safety risks. The large number of methods available means that accidents can be analysed in many different ways. The majority of methods are very similar, but use different jargon or are adapted to a specific sector. Methods for analysing accidents can broadly be divided into two categories.

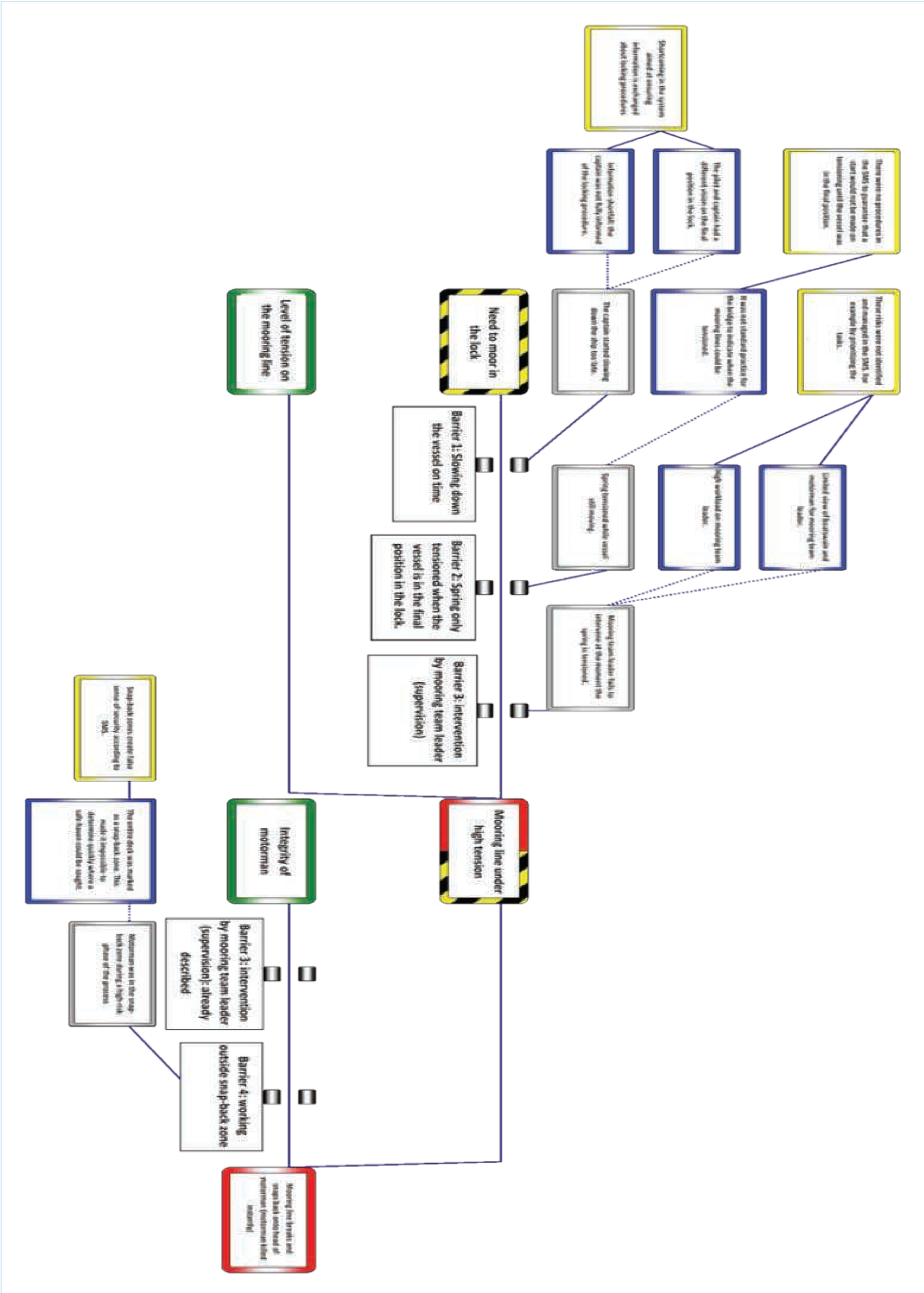
1. Linear-causal models
2. Systemic models

The majority of the analysis methods available are linear-causal methods. These methods start with the direct causes of the accident and work back to identify underlying causes. They do this for example by chronologically examining which causal events and/or circumstances preceded the accident, by considering barriers that failed and then studying the causal path to the underlying causes. Another technique examines human errors, classifies these errors and causal errors at a higher level, or applies a flowchart/decision-tree-based system.

The systemic methods view accidents as a symptom of an unsafe system. The aim of these techniques is to examine the interactions and feedback loops within and between the components that make up the system. The assumption is that by identifying and analysing shortcomings of this kind within the system, safety can be improved. These methods barely refer to causes of accidents or accident factors, but instead discuss mechanisms and functions of the system.

The Tripod Beta analysis method used in this investigation belongs to the linear-causal category.

A.1.2 Method



Need to moor in the lock
Level of tension on the mooring line
Barrier 1: Slowing down the vessel on time
Barrier 2: Spring only tensioned when the vessel is in the final position in the lock.
Barrier 3: intervention by mooring team leader (supervision)
Mooring line under high tension
Integrity of motorman
Barrier 3: intervention by mooring team leader (supervision): already described
Barrier 4: working outside snap-back zone

A.2 Safety management

A.2.1 General

The Safety Board expects businesses and organizations that undertake and/or facilitate high-risk activities to do more than merely comply with the legislation and regulations and (international) guidelines. The Safety Board primarily considers the following elements:

1. Is there a sufficient level of understanding of the risks;
2. Is there a demonstrable and realistic safety strategy, whereby an industrial hygiene strategy for safety at work is employed that in the first instance assumes an approach to tackling risks at the source, followed by collective measures, then individual measures to minimize exposure, and finally that requires the use of personal protective equipment if all the above measures have resulted in an insufficient mitigation of risks;
3. Is this safety strategy adequately implemented and enforced;
4. Is there a process for learning from accidents and a system that guarantees continuous improvement of the safety strategy;
5. To what extent is management involved;
6. Is there a culture at work in which members of the workforce call each other to account for unsafe behaviour and in which accidents are reported without employees fearing punishment for any involvement in such accidents.

A.2.2 Safety management on board seagoing vessels

For seagoing vessels in excess of 500 GT[7] and seagoing passenger vessels, the international SOLAS Convention requires that a safety management system is operated on board that satisfies the requirements laid down in the International Safety Management Code (ISM-Code) developed for that purpose.

The ISM Code specifies that a 'company' is formally designated to take over the obligations and responsibilities imposed by the ISM Code from the owner of the vessel. In the Netherlands, instead of the word 'company', the term 'vessel manager' is commonly used. The way in which work is carried out on board a vessel in respect of (environmental) safety must therefore be an integral part of the safety management system (SMS) drawn up and implemented subject to the responsibility of the vessel manager. This includes developing, implementing and maintaining procedures, plans and work instructions aimed at guaranteeing the safety of crews, the vessel and the environment and ensuring that tasks are allocated to qualified personnel. It should be noted that the ISM Code does not provide a precise description of the term qualified personnel. Instead this is described in the STCW Convention.[8]

7 GT= Gross Tonnage
8 International IMO Convention on the standards of training, certification and watch duty for seafarers.

A.3 Actors

A.3.1 Vessel and crew

Vessel

Vessel data	RN Privodino
	
Call letters:	5BYQ2
IMO number:	9384459
Flag State:	Cyprus
Type of vessel:	Oil/chemical tanker
Classification society:	DNV GL
Year of construction (handover):	2010
Vesselyard:	Navantia Carenas Cadiz
Length overall (Loa):	176.10 m.
Length between perpendiculars (LPP):	169.93 m.
Breadth:	29.8 m.
Actual draught:	92 dm
Gross Tonnage:	19994 GT
Engines:	MAN
Propulsion:	1 propeller - variable speed, 1 bow thruster
Maximum propulsion capacity:	10803 kW, bow thruster 1000 kW
Maximum speed:	15 knots
Vessel certificates:	All valid

Crew

On board the RN Privodino, the requirements laid down in the Minimum Safe Manning Document were satisfied. The jobs and nationalities of crew members appear in Figure 13.

Position	Nationality
Master	Russian
First officer	Russian
Second officer	Russian
Third officer	Russian
Fourth officer	Russian
Chief engineer	Russian
Second engineer	Russian
Third engineer	Russian
Fourth engineer	Russian
Electrical engineer	Russian
Boatswain	Russian
Deckhand (AB)	Russian
Deckhand (AB)	Russian
Deckhand (AB)	Russian
Deckhand (AB)	Russian
Deckhand (OS)	Russian
Pumpman	Russian
Fitter	Russian
Motorman	Russian
Cook	Russian
Steward	Russian
Officer trainee	Russian

Figure 13: Position and nationality of crew RN Privodino

A.3.2 Vessel owner

Name:	Rubio Holdings Limited
Established in:	Dubai
IMO number:	5460694
Owner since:	09-04-2012

A.3.3 Vessel's management company

Name:	SCF Management Services Dubai
Established in :	Dubai
IMO number:	5897756
Vessel manager since:	26-03-2016

APPENDIX B

COMMENTS ON DRAFT REPORT

A draft version of this report, with the exception of the summary, consideration and recommendations, was submitted to the parties directly involved. These parties were requested to check the report for any factual inaccuracies and ambiguities. The draft report was submitted to the following parties:

- *Central Nautical Management North Sea Canal area;*
- *SCF Management Services Dubai*
- *The pilotage service*

Also *Cyprus Marine Accident and Incident Investigation Committee* was given the opportunity to comment on the draft version of the report.

The Board has taken note of the responses received. The responses and explanations are listed in a table which is available on our website www.safetyboard.nl.

All comments that were considered relevant by the Board, have been incorporated in the report. Comments that have not been incorporated in the report are also listed in the aforementioned table together with an explanation on the Board's decision.