SUMMARY

On 18 September 2013, at 1250, an able seaman on board the chemical tanker Mitrope was seriously injured by a messenger line while casting off the tug’s towline.

At 1305, the ambulance medical team was on board and the able seaman was transported to the local hospital where his injuries were diagnosed as epidermis abrasion in the region of the left knee and traumatic amputation of the left lower leg.

The MSIU safety investigation found inadequate communication between the tug and Mitrope after casting off the tug’s towline as an important contributing factor to the accident.

The MSIU has issued three recommendations to the Company designed to ensure safe working practice through familiarization and on-board practical instructional training on mooring and towing operations.

Another recommendation has been made to the tug operators to provide tug personnel with training on appropriate communication procedures in harbour towing operations.
FACTUAL INFORMATION

The vessel

*Mitrope* is an ice class, Maltese registered chemical tanker, owned by Mitrope Navigation Limited. The vessel was built by Szczecinska Nowa Sp Z Oo in Szczecin, Poland in 1999. The vessel is classed by Polish Register of Shipping (PRS).

*Mitrope* has a length overall of 149 m, a moulded breadth of 23.0 m and a molded depth of 12.10 m. It has a summer draught of 8.55 m and a summer deadweight of 15866 tonnes.

Propulsive power is provided by a 5-cylinder B&W 5S46MC-C, two-stroke, slow speed direct drive diesel engine, producing 6550 kW at 110 rpm. This drives a single, fixed pitch propeller at 110 rpm. Service speed is about 13.50 knots.

Tug Hermes and towing arrangements

*Hermes* (length 27.71 m and gross tons 184) is a 184 gt, Polish registered tug boat, built in 1975 in Leningrad, Russia. She has a length overall of 27.71 m and is powered by two Sulzer marine diesel engines giving a speed of 10 knots. *Hermes* has a bollard pull of 18 tons. She is equipped with an 18 ton towing hook but has no towing winch. The windlass on the forecastle is used for heaving the towline.

The towing line (connected to the messenger line), which was used on *Mitrope*, was part of *Hermes*’ towing equipment. The towline was 64 m in length and 100 mm in diameter. It was made of polypropylene fibres, weighing about 4.5 kg per metre length. The 38 mm polypropylene messenger line had a length 44 m (Figure 1).

Figure 1: Messenger line of tug Hermes

The mooring team

*Mitrope* was manned by 18 crew members, all Polish nationals and duly qualified and certificated. The vessel’s manning was in excess of the number of crew members specified in the Minimum Safe Manning Certificate. The working language on board was Polish.

The mooring team at the forward mooring station consisted of the bosun, an able seaman, and an ordinary seaman. The second mate was the officer in charge.

The second mate was 60 years old and had started his sea-going carrier in 1980. He has been working as second mate with the managers of *Mitrope* for the past 18 years. He is a qualified officer in charge of a navigational watch on ships of 500 gross tons and over. He had joined *Mitrope* on 01 August 2013.

The bosun was 53 years old. He had been working at sea for 32 years and had joined *Mitrope* on 15 July 2013.

The AB was 54 years old and had been working with same company for 24 years, of which 15 years as an AB. He had joined *Mitrope* on 01 August 2013.

The 24 year old OS had been at sea for 6 months. He held a rating’s certificate issued under the provisions of Regulation II/4 of the
STCW Convention. *Mitrope* was his second ship which he had joined on 15 July 2013.

**Environmental Conditions**

On 18 September 2013, the weather was cloudy with light to moderate rain. The wind Beaufort force 4 was from the Southeast and the air temperature was 13°C. The visibility was good and the sea conditions were calm.

**Narrative**

On 13 September 2013, *Mitrope* departed from Helsingborg, Sweden for Gnieznienskie to berth at Gryfia Ship Repair Yard, Szczecin (Figure 2). The vessel was in ballast and had a forward draft of 5.27 m and an aft draught of 5.67 m. On 18 September 2013, at 0815, a river pilot boarded the vessel. *Mitrope* navigated up the river, past the port of Swinoujscie. The transit between Swinoujscie and Szczecin took about four hours.

At 1200, a berthing pilot boarded the vessel. Two harbour tugs were on stand by. At 1220, tug *Hermes* and tug *Euros* secured *Mitrope* with the tug’s towlines fore and aft respectively.

At the forward mooring station (Figure 2), the tug’s messenger line, attached to the towline, was hauled in through the centreline Panama chock mounted on the bulwark. The eye was looped over the aft bollard of the starboard ‘twin bollard’ bitts. The messenger line was coiled on the deck, behind the bitts.

After turning in the river with the assistance of tugs, *Mitrope* approached Gnieznienskie berth. At 1240, the fore and aft spring lines were sent ashore. By 1250, the vessel was about 10 to 15 m from the berth (Figure 3).

The berthing pilot instructed the skipper of *Hermes* to drop the towline and re-position on the starboard side to push the vessel to the berth. At about the same time, the second mate was instructed to release the towline. At that moment, the bosun was handling the spring, thus the release of the towline was coordinated between the second mate, the AB and the OS.
Tug *Hermes* eased off the towline until it was slack and floating in the water and the second mate manually pulled it up. The AB lifted the towline eye and placed it next to the bitts. After belaying a couple of turns of the messenger line on the aft bitt, he stepped back a metre or so from the bitts. The OS was on his left behind the aft bitt holding the free end of the messenger line, which lay between him and the AB (Figure 4).

The second mate was standing on his right near the bulwark and the bosun was at the windlass controls (Figure 5 and 6).

---

**Figure 3:** *Mitrope* berthing at Gryfia ship repair yard with tugs *Hermes* and *Euros*

---

**Figure 4:** Close-up view of forecastle deck showing starboard mooring double bitt and simulated position of second mate, AB and OS holding messenger line

---

**Figure 5:** Accident scene with simulated position of mooring crew
Meanwhile, the tug’s crew started making preparations on deck. They attached a shackle with roller to heave in the towline. At 1252, *Hermes* reported to the pilot that the towline was out. At this point the messenger line was still on board the ship. Using the windlass located on the bow, *Hermes* commenced heaving in the towline and moving towards the ship’s side as directed by the pilot.

It was reported that as soon as the AB had stepped back, the towline came under load. The second mate rushed over the starboard bulwark. The tug was heaving the towline and moving away at right angles to the vessel’s bow. He waved and yelled at the tug to stop pulling but got no response.

He then called the bridge on his portable VHF radio to instruct the tug to stop.

At about this point, the bosun felt a sudden sharp pull on the vessel. He looked back and saw the towline eye running towards the Panama chock. The OS also felt the messenger line (pulled by the towline) coming under tension with sudden force and let go the messenger line. The second mate looked back and at that very moment, the messenger line tightened around the AB’s left leg. The pilot immediately called *Hermes* and informed the skipper that the messenger line had snagged on board and instructed him to stop.

The second mate reported the accident to the bridge and at 1254, the pilot called the yard’s
traffic controller, who arranged an ambulance for the injured AB.

At 1305, the medical team was on board and by 1320, the injured AB was transferred from the vessel to the local hospital. At 1330, Mitrope berthed port side alongside Gnieznienskie berth at Gryfia Ship Repair Yard in Szczecin.

**Injuries**
The medical team at the hospital diagnosed the AB’s injuries as traumatic amputation of the left lower leg at the height of upper ankle joint and epidermis abrasion in the region of the left knee.

**ANALYSIS**

**Aim**
The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, and to prevent further marine casualties or incidents from occurring in the future.

**Cooperation**
During the course of this safety investigation, MSIU received all the necessary assistance and cooperation from the Polish State Commission on Maritime Accident Investigation.

**Fatigue and Alcohol**
The crew were well rested for mooring duties. There was no evidence to suggest that the effects of fatigue, alcohol or drugs on Mitrope contributed to this accident. Following the accident, the mooring crew tested negative in the breathalyser test conducted by the police.

**Accident dynamics**
It is apparent from the voice communication captured on the VDR (Table 1) that the berthing operation was not straight forward. When Mitrope was almost alongside the quay, the boatmen requested the pilot to move the vessel ahead by 30 m. The subsequent use of ship’s engines and pilot manoeuvres resulted in frequent severe load on the spring lines. The bosun was thus occupied with the handling of the forward spring and windlass controls.

The VDR data also shows that at 1251, Mitrope reached the designated berth but she was about 10 to 15 m off the quay. At that time, the second mate was instructed to let go the towline to allow tug Hermes to re- position on the ships side. Hermes eased on the towline and the second mate had no difficulty pulling up the towline.

The AB lifted the towline eye clear off the bollard and placed it next to the bitts. He belayed the messenger line on the aft bitt and stepped back. The free end of the messenger line lay between the AB and OS who was ready to pay off.

The VDR data revealed that the second mate had not yet signalled that the towline was cast off. Moreover, and neither the pilot nor the master had instructed Hermes to heave the towline. However, at 1252 tug Hermes reported to the pilot, “Hermes let out and approaching [the] ship’s side.” This seemed to have been done without any accord with the master or the second mate and started to move and heave in the towline.

As the towline on Mitrope came under load, the second mate rushed over the bulwark, calling the tug to stop. The towline eye started to run out and the messenger line came under sudden load and ran out of the OS’ hands. The second mate called the bridge and looking back found the AB’s leg entangled in the messenger line.
Table 1: Extracts from the VDR data
(translated to English from Polish)

<table>
<thead>
<tr>
<th>Time (UTC)</th>
<th>From</th>
<th>To</th>
<th>Voice Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.44.20</td>
<td>Pilot</td>
<td>-</td>
<td>Af? is 7 m from the quay.</td>
</tr>
<tr>
<td>10.45.34</td>
<td>Boatmen</td>
<td>Pilot</td>
<td>30 m ahead more please?</td>
</tr>
<tr>
<td>10.46.18</td>
<td>Boatmen</td>
<td>Pilot</td>
<td>Ship is 1.5 m from fenders now.</td>
</tr>
<tr>
<td>10.46.30</td>
<td>Pilot</td>
<td>Euros</td>
<td>Euros hold tightly.</td>
</tr>
<tr>
<td>10.46.56</td>
<td>Hermes</td>
<td>Pilot</td>
<td>May I proceed to the quay &amp; pull the bow?</td>
</tr>
<tr>
<td>10.47.00</td>
<td>Pilot</td>
<td>Hermes</td>
<td>Please.</td>
</tr>
<tr>
<td>10.47.21</td>
<td>Master</td>
<td>-</td>
<td>Dead slow ahead.</td>
</tr>
<tr>
<td>10.47.25</td>
<td>Pilot</td>
<td>Boatmen</td>
<td>How may metres ahead – 10 metres?</td>
</tr>
<tr>
<td>10.47.30</td>
<td>Boatmen</td>
<td>Pilot</td>
<td>20 metres.</td>
</tr>
<tr>
<td>10.47.58</td>
<td>Master</td>
<td>-</td>
<td>Easy on spring. Don’t hold</td>
</tr>
<tr>
<td>10.48.54</td>
<td>Boatmen</td>
<td>Pilot</td>
<td>No more ahead please. Vessel on position.</td>
</tr>
<tr>
<td>10.48.56</td>
<td>Master</td>
<td>-</td>
<td>Dead slow astern. Midship.</td>
</tr>
<tr>
<td>10.49.13</td>
<td>Master</td>
<td>-</td>
<td>Slow Astern.</td>
</tr>
<tr>
<td>10.49.21</td>
<td>Pilot</td>
<td>Hermes</td>
<td>Hermes on the water please.</td>
</tr>
<tr>
<td>10.49.40</td>
<td>Euros</td>
<td>Pilot</td>
<td>May I take her to the quay?</td>
</tr>
<tr>
<td>10.49.42</td>
<td>Pilot</td>
<td>Euros</td>
<td>OK but easy please. Not too strong. Vessel already stopped. Spring wires are ashore already.</td>
</tr>
<tr>
<td>10.49.46</td>
<td>Master</td>
<td>-</td>
<td>Stop Engine.</td>
</tr>
<tr>
<td>10.49.55</td>
<td>Master</td>
<td>-</td>
<td>Forward spring tensioned.</td>
</tr>
<tr>
<td>10.50.09</td>
<td>Master</td>
<td>-</td>
<td>Dead slow astern.</td>
</tr>
<tr>
<td>10.50.16</td>
<td>Pilot</td>
<td>Euros</td>
<td>Easy please, otherwise bow will move out of berth. They slacken forward spring.</td>
</tr>
<tr>
<td>10.50.32</td>
<td>Master</td>
<td>-</td>
<td>Stop engine.</td>
</tr>
<tr>
<td>10.50.32</td>
<td>Euros</td>
<td>Pilot</td>
<td>Towl ine slack, proceeding on the water.</td>
</tr>
<tr>
<td>10.50.57</td>
<td>Pilot</td>
<td>Hermes</td>
<td>Hermes may you drop &amp; proceed for pushing.</td>
</tr>
<tr>
<td>10.51.02</td>
<td>Hermes</td>
<td>Pilot</td>
<td>When they drop towline certainly.</td>
</tr>
<tr>
<td>10.51.05</td>
<td>Pilot</td>
<td>Hermes</td>
<td>OK Hermes let go towline.</td>
</tr>
<tr>
<td>10.51.05</td>
<td>Master</td>
<td>-</td>
<td>OK let go towline.</td>
</tr>
<tr>
<td>10.51.33</td>
<td>Hermes</td>
<td>Pilot</td>
<td>They may let go towline.</td>
</tr>
<tr>
<td>10.51.35</td>
<td>Pilot</td>
<td>-</td>
<td>OK.</td>
</tr>
<tr>
<td>10.52.29</td>
<td>Hermes</td>
<td>Pilot</td>
<td>Hermes let out. Approaching ship side.</td>
</tr>
<tr>
<td>10.52.34</td>
<td>Pilot</td>
<td>Hermes</td>
<td>In vicinity of midship. Closer to the bow.</td>
</tr>
<tr>
<td>10.52.45</td>
<td>Hermes</td>
<td>-</td>
<td>Clear.</td>
</tr>
<tr>
<td>10.53.25</td>
<td>Master or</td>
<td>-</td>
<td>Something hooked up on forecastle deck.</td>
</tr>
<tr>
<td>10.53.36</td>
<td>Second</td>
<td>-</td>
<td>(on VHF radio) Tug boat, tug boat...</td>
</tr>
<tr>
<td>10.53.37</td>
<td>Pilot</td>
<td>Hermes</td>
<td>Hermes. Towline hooked up. Stop moving please.</td>
</tr>
<tr>
<td>10.53.45</td>
<td>Master or</td>
<td>-</td>
<td>What happened there?</td>
</tr>
<tr>
<td>10.54.07</td>
<td>Pilot</td>
<td>Traffic</td>
<td>Call Ambulance please. Accident on ship, on the bow</td>
</tr>
<tr>
<td>10.54.30</td>
<td>Chief</td>
<td>Mate</td>
<td>Ambulance on the way already</td>
</tr>
</tbody>
</table>

The skipper of Hermes stated that the ship’s crew had let the towline eye fall into the water and that the messenger line was hanging loosely down the Panama chock. He further stated that he had heaved in until about only 10 m of the towline was left when the messenger line started to strain. On the other hand, the second mate and the AB stated that the towline eye had not yet cleared the Panama chock.¹

The bosun, with his back to the forecastle deck, did witness the accident. However, he claimed to have felt a sudden sharp pull on the vessel. Looking back, he saw the towline eye rapidly approaching the Panama chock. He also recalled hearing the second mate yelling on the VHF radio to stop pulling the towline.

The AB said that as soon as he set the towline eye on deck, he stood back clear of the messenger line and the towline eye hove towards the Panama chock at great speed. The attached messenger, pulled by the towline line, caught his left leg and tightened violently.

After a thorough and careful analysis of the available evidence, the MSIU considered it unlikely that the weight of the towline alone, hanging freely down the Panama chock, would have contained sufficient potential energy in the messenger line to cause a whiplash action. It is likely, however, that the release of the messenger line under sudden load would rapidly uncoil in a whiplash action, if an insufficient number of turns are taken around the bollard.

It looks very likely that the lifting of the towline eye from the aft bitt may have disturbed the carefully laid out messenger line on deck. The fact that as the towline suddenly tensioned, the second mate rushed over the bulwark to warn the tug to stop,

¹ The distance between the Panama chock and the starboard aft bitt was 3.34 m.
² The freeboard measured 9.89 m.
indicated that the second mate may have noticed that the AB had inadvertently stepped in the loop of the messenger line. Getting no response from the tug, the second mate called the bridge. It was at this crucial moment that the accident occurred.

Although, there was no evidence to suggest that this was the case, such possibility cannot be excluded given that the AB had suffered no injuries other than the epidermis abrasion near the left knee and traumatic amputation of the lower left leg, just above the ankle joint. The serious nature of the injuries further suggested that the loop was much more likely to be a bight in the messenger line.

Close examination of voice communication in the voyage data recorder (VDR) showed that the accident took place within a minute of the skipper’s reporting to the pilot that the towline was cast off. The events had unfolded so quickly thereafter that the MSIU considered it unlikely for the tug to have heaved up close to 55 m of towline in such a short time, given that the tug had no towing winch aft. Thus, it appeared very likely that the tug movement whilst underway had caused the sudden and unexpected severe load on the messenger and towline.

Communication
Good communication between the tug and the vessel are important to ensure safety of crew and the status of tow lines. This is particularly true to be prepared for unexpected loads on the towline and accidents.

The voice communication in the VDR did not suggest that the second mate had communicated either to the master or signalled to the tug that the towline was cast off or clear. Moreover, there was no record of the master telling the pilot (or the pilot querying Hermes) when at 12.52.29 it reported that it had let out the towline and approaching the ship’s side. Instead, the pilot responded by indicating the location from where to push the vessel.

Although there are provisions on the forecastle deck to use the intercom system, communication between the bridge and the second mate were only carried out over the portable VHF radios. However, the safety investigation did not have evidence to show that the failure to switch on or use the intercom had contributed to this accident.

Safety Management System
Mitrope’s safety management system (SMS) documentation on mooring and unmooring was provided on board in both English and Polish languages. It covered operational requirements of mooring and unmooring operations. The documentation, however, did not contain any reference to towing operations or risks to mooring crew associated with towing lines under tension, loops and bights of ropes, snap-back and danger zones.

Mooring station
The visit on the forecastle during the course of the safety investigation revealed that no snap-back zones were marked as recommended in the industry (Figure 7).

---

3 This is the secondary means of communication on Mitrope.
Although no snap-back zones had been incorrectly marked, the safety investigation determined that these did not contribute directly to the accident. However, should the crew members rely on these marked zones, they might be lulled into a false sense of security and may find themselves exposed to hazards by the very same things that is intended to warn them against.

**CONCLUSIONS**

1. A section of the tensioned messenger line struck and entangled around the AB’s left leg in the loop or the bight of the messenger line.
2. The bosun was occupied with the spring line and was not available to assist in casting off the towline.
3. The second mate got directly involved in lifting the towline that momentarily deviated his attention from overseeing the mooring and towing operation, and movement of the tug.
4. The towline floating in the water gave the impression that it was cast off from the ship.
5. Tug *Hermes* started to haul in the towline without instructions from the bridge or a signal from the second mate.
6. The SMS documentation on mooring and unmooring operations did not address procedures on towing operations or risks associated with it to guide the mooring crew.
RECOMMENDATIONS

Polish Steamship Company is recommended to:

21/2014_R1 amend its SMS Manuals to include a section on towing operations;

21/2014_R2 develop an operational risk assessment check list which identifies appropriate measures to mitigate the risks of towing operations;

21/2014_R3 provide refresher and practical instruction training on board for all crew on safe mooring and towing operations, including communication between parties involved in mooring and towing operations;

Tug operator Zakład Usług Zeglugowych Sp. z o.o. is recommended to:

21/2014_R4 provide training on communication procedures during harbour towing operations to crew members serving on its tugs.

4 Recommendations should not create a presumption of blame and / or liability.
SHIP PARTICULARS
Vessel Name: Mitrope
Flag: Malta
Classification Society: Polish Register of Shipping
IMO Number: 9154294
Type: Chemical tanker
Registered Owner: Mitrope Navigation Limited
Managers: Polish Steamship Company, Poland
Construction: Steel
Length Overall: 149.40 m
Registered Length: 139.35 m
Gross Tonnage: 11530
Minimum Safe Manning: 13
Authorised Cargo: Liquid cargo in bulk

VOYAGE PARTICULARS
Port of Departure: Helsingborg, Sweden
Port of Arrival: Szczecin, Poland
Type of Voyage: Short international
Cargo Information: In ballast
Manning: 18

MARINE OCCURRENCE INFORMATION
Date and Time: 18 September 2013 at 1250 (UTC +2)
Classification of Occurrence: Serious Marine Casualty
Location of Occurrence: Szczecin, Poland
Place on Board: Forecastle deck
Injuries / Fatalities: One serious injury to a crew member
Damage / Environmental Impact: None
Ship Operation: Normal service – Under pilotage
Voyage Segment: Arrival
External & Internal Environment: Cloudy weather with light to moderate rain. The wind Beaufort force 4 was from the Southeast and the air temperature was 13°C. The visibility was good and the sea conditions were calm.
Persons on board: 18