Final report MO-2015-202: Containership *Madinah*, loss of person overboard, Lyttelton Harbour entrance, 2 July 2015

Final Report

Marine inquiry MO-2015-202
Containership *Madinah*, loss of person overboard,
Lyttelton Harbour entrance
2 July 2015

Approved for publication: September 2016

Transport Accident Investigation Commission

About the Transport Accident Investigation Commission

The Transport Accident Investigation Commission (Commission) is a standing commission of inquiry and an independent Crown entity responsible for inquiring into maritime, aviation and rail accidents and incidents for New Zealand, and co-ordinating and co-operating with other accident investigation organisations overseas. The principal purpose of its inquiries is to determine the circumstances and causes of occurrences with a view to avoiding similar occurrences in the future. Its purpose is not to ascribe blame to any person or agency or to pursue (or to assist an agency to pursue) criminal, civil or regulatory action against a person or agency. The Commission carries out its purpose by informing members of the transport sector and the public, both domestically and internationally, of the lessons that can be learnt from transport accidents and incidents.

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Important notes

Nature of the final report

This final report has not been prepared for the purpose of supporting any criminal, civil or regulatory action against any person or agency. The Transport Accident Investigation Commission Act 1990 makes this final report inadmissible as evidence in any proceedings with the exception of a Coroner's inquest.

Ownership of report

Citations and referencing

Information derived from interviews during the Commission's inquiry into the occurrence is not cited in this final report. Documents that would normally be accessible to industry participants only and not discoverable under the Official Information Act 1982 have been referenced as footnotes only. Other documents referred to during the Commission's inquiry that are publicly available are cited.

Photographs, diagrams, pictures

Unless otherwise specified, photographs, diagrams and pictures included in this final report are provided by, and owned by, the Commission.

Verbal probability expressions

The expressions listed in the following table are used in this report to describe the degree of probability (or likelihood) that an event happened or a condition existed in support of a hypothesis.

Terminology (adopted from the Intergovernmental Panel on Climate Change)	Likelihood of the occurrence/outcome	Equivalent terms
Virtually certain	> 99% probability of occurrence	Almost certain
Very likely	> 90% probability	Highly likely, very probable
Likely	> 66% probability	Probable
About as likely as not	33% to 66% probability	More or less likely
Unlikely	< 33% probability	Improbable
Very unlikely	< 10% probability	Highly unlikely
Exceptionally unlikely	< 1% probability	

The *Madinah* in the port of Napier

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Abbreviations

Commission	Transport Accident Investigation Commission
IMO	International Maritime Organization
SOLAS	International Convention on the Safety of Life at Sea
VHF	very high frequency

Glossary

bosun	a person who works in a ship's deck department as the supervisor of the deck crew. As the deck crew supervisor the bosun plans the day's work and assigns tasks to the deck crew. They check completed work for compliance with approved operating procedures. They should be skilled in all aspects of seamanship
bottle screw	a device for adjusting the tension or length of ropes, cables, tie rods and other tensioning systems. It normally consists of two threaded eye bolts, one screwed into each end of a small metal frame, one with a left-hand thread and the other with a right-hand thread. The tension can be adjusted by rotating the frame, causing both eye bolts to be screwed in or out simultaneously
buoyancy vest	a personal flotation device that can be worn in conjunction with a person's other safety devices and provides a certain amount of buoyancy should the wearer fall into the water. A buoyancy vest does not provide as much buoyancy as a regular lifejacket
combination pilot ladder	normally, pilots board and disembark using a traditional rope ladder. However, if the freeboard of the vessel exceeds nine metres, regulations require that the rope ladder be supplemented by an accommodation ladder, the lower platform of which is at least five metres above sea level, thereby reducing the distance the pilot has to climb
gantline	a rope of approximately 20 millimetres in diameter used for hauling sailors and tools aloft. It has sufficient strength to support someone should they fall
knot	one nautical mile per hour
P&I Club	protection and indemnity insurance, more commonly known as 'P&I' insurance, is a form of mutual maritime insurance provided by a P&I Club. Whereas a marine insurance company provides 'hull and machinery' cover for ship owners, and cargo cover for cargo owners, a P&I Club provides cover for open-ended risks that traditional insurers are reluctant to insure (Anderson, 1999)
rescue boat	one of a vessel's survival craft specially designated, under the International Maritime Organization's International Convention for the Safety of Life at Sea, with certain design features to expedite the launching, recovery and handling of injured persons
tool-box meeting	a way for information to be provided to workers, and for workers to have their say about hazards/controls, incidents/accidents, work processes and company procedures. Tool-box meetings should be run on a regular basis for 10-15 minutes. The frequency of meetings will depend on the size, nature and location of the site. Some hazardous activities could require daily meetings, while often a weekly/fortnightly meeting will suffice. Safety meetings for workers should be short and to the point (sitesafe.org.nz, 2016)
wire grip	a tool that grips two parts of a wire together using a 'U' shaped bolt and a saddle. It is a simple and fast way of making a thimble eye or loop termination in wire rope

Data summary

Vehicle particulars

Name:	*Madinah*
Type:	fully cellular container vessel
Class:	✠ 1A1, container carrier
Limits:	SOLAS
Classification:	Det Norsk Veritas – Germanischer Lloyd
Length:	265.00 metres
Breadth:	32.25 metres
Gross tonnage:	41,225
Built:	Zhejiang Shipbuilding Company Limited, China, 2010
Propulsion:	one direct-reversing, slow-speed MAN B&W 8K90MC-C diesel engine producing 36,350 kilowatts, driving a single fixed-pitch, six-bladed propeller
Service speed:	23.6 knots
Owner:	Hui Merchant Leasing No.1 Limited
Manager:	Seaspan Ship Management Ltd
Operator:	OOCL
Port of registry:	Hong Kong
Minimum crew:	14
Crew on board:	27

Date and time	2 July 2015 at about 1309[1]
Location	approach to Lyttelton Harbour
Persons involved	vessel's crew
Injuries	one person lost overboard and missing

[1] Times in this report are in New Zealand Standard Time (co-ordinated universal time + 12 hours) and are expressed in the 24-hour format.

1. Executive summary

1.1. On 2 July 2015 the container ship *Madinah* was preparing for arrival at the port of Lyttelton. Part of those preparations involved the bosun (deck crew foreman) and a deck trainee rigging the port-side accommodation ladder over the ship's side in readiness for the ship's docking.

1.2. Both the bosun and the deck trainee were wearing safety harnesses. The bosun sent the deck trainee to fetch buoyancy vests, which were required to be worn for any task outside the ship's railing. When the trainee returned the bosun had already swung the accommodation ladder over the side, clipped his safety harness to a plastic-coated wire and walked along the accommodation ladder to try to lift the handrails into place.

1.3. In doing so the bosun lost his balance and fell into the sea. The wire to which he had clipped his safety harness had broken. A crew member on the deck threw a lifebuoy into the water near the bosun. The bosun was last seen swimming towards the lifebuoy.

1.4. The pilot launch that was heading towards the *Madinah* at the time arrived in the area and started the search. Despite an extensive search using several other small craft and a helicopter for the next two hours, the bosun was never found.

1.5. The Transport Accident Investigation Commission (Commission) found that if the bosun had been wearing a buoyancy vest his chances of surviving would have been significantly greater. It also found that the wire rope to which the bosun had connected his safety harness broke because it was severely corroded and also that it had not been constructed and installed in accordance with best industry practice.

1.6. Two safety issues identified were: there was no dedicated formal procedure for rigging the accommodation ladders and gangways on board; and although the procedures on board for responding to a man overboard met industry best practice, the shipboard response to the emergency did not follow those procedures.

1.7. A third safety issue identified was the use of plastic-coated wire for safety-critical applications. If the plastic coating becomes damaged, salt water can enter and become entrapped in the coating, which causes accelerated corrosion. The plastic coating makes it virtually impossible for the wire to be inspected or surveyed properly. The Commission has raised this issue in a previous inquiry and made recommendations to the Director of Maritime New Zealand to address the issue.

1.8. The vessel's manager has taken safety action to address other safety issues discussed later in the report. Therefore, the Commission has not made any new recommendations arising from this inquiry.

1.9. Key lessons arising from this inquiry included:

- where it is necessary for a crew member to work over the side of a ship when at sea, they must wear a safety harness attached to a designated strong point **and** must wear a buoyancy vest
- plastic-coated wires must be treated with caution. Seafarers and surveyors alike must not make assumptions about the condition of any wire that they cannot see, especially when the wire has a safety-critical purpose and is required by rules, regulations or procedures to be examined thoroughly
- a man-overboard situation requires timely and intuitive actions by the crew in order for the rescue to be successful. Crew should follow quick-reference checklists to ensure that: the alarm is raised in the appropriate way; the position of the casualty is recorded and tracked; and the ship is returned to the casualty in the most expeditious way

2. Conduct of the inquiry

2.1. The Transport Accident Investigation Commission (Commission) learned of the accident the following day from media reports; opened an inquiry under section 13(1)b of the Transport Accident Investigation Commission Act 1990; and appointed an investigator in charge.

2.2. On 3 July contact was established with the Hong Kong flag administration and agreement was reached that New Zealand would lead the investigation and conduct the investigation on behalf of Hong Kong.

2.3. On 3 July two investigators travelled to Napier, the *Madinah*'s next port of call. On 4 July the investigators conducted interviews with the crew of the vessel and collected evidence that included a download of the vessel's voyage data recorder.

2.4. On 16 July one investigator travelled to Lyttelton to interview staff from Lyttelton Port of Christchurch and gather further evidence.

2.5. On 20 July contact was established with the missing seaman's next of kin.

2.6. Extra information was sourced from Maritime New Zealand, New Zealand Police, the vessel's manager and the vessel itself.

2.7. On 24 June 2016 the Commission approved the draft report to be circulated to interested persons for comment.

2.8. The report was distributed to nine interested persons on 26 July 2016, with the closing date for receiving submissions as 16 August 2016. Three submissions were received that included comments and five submitters declined to comment

2.9. The Commission has considered in detail all submissions made and any changes as a result of those submissions have been included in the final report

2.10. On 28 September the Commission approved the report for publication

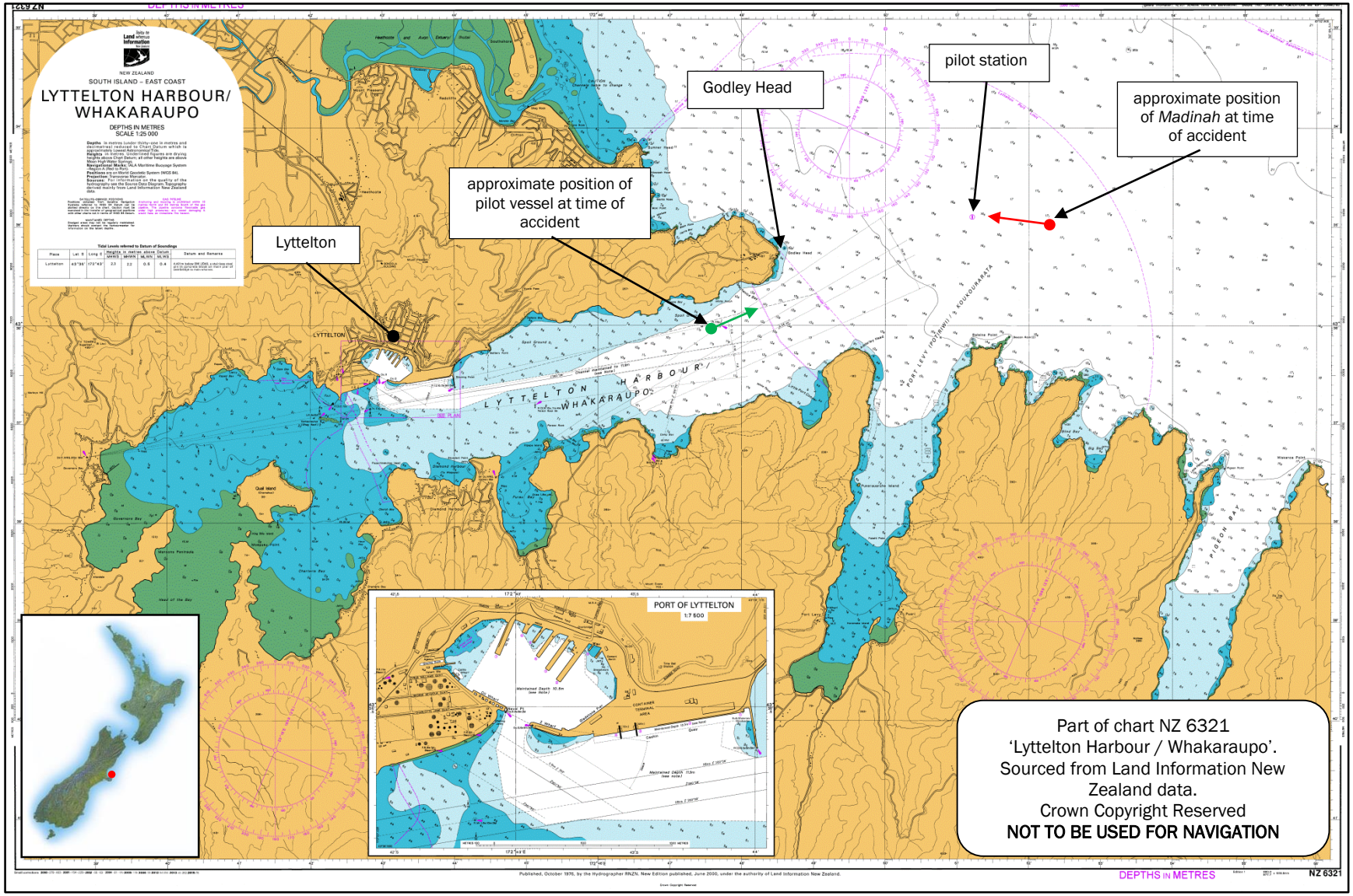

Figure 1
Chart showing the general area of the accident

3. Factual information

3.1. Narrative

3.1.1. On 2 July 2015 at around 0700, the Hong Kong-registered container ship *Madinah* arrived off the port of Lyttelton on the east coast of the South Island of New Zealand after an overnight voyage from Port Chalmers (Dunedin).

3.1.2. The master was informed that the vessel would not be berthing until early afternoon the same day and chose to let the vessel drift off the port of Lyttelton until the pilot boarding time.

3.1.3. The crew were engaged in deck maintenance during the morning. At about 1130 the master asked the bosun to rig the port-side combination pilot ladder[2]. The bosun, accompanied by two able-bodied seamen, rigged the combination pilot ladder and made other preparations for the ship's arrival at Lyttelton. At 1230 the *Madinah* began the journey towards the pilot station (see Figure 1), the position where the pilot would normally board the vessel. The master and the second officer were on the bridge.

3.1.4. At the time of the accident the wind was reported to be north-easterly at approximately 10 knots[3] with a north-easterly swell of about one metre. The visibility was good and the tide was flooding.

Events on the main deck

3.1.5. At about 1300 the master asked for the port accommodation ladder to be rigged before the crew went to their mooring stations. The bosun and the deck trainee proceeded to the port accommodation ladder station. When they arrived the bosun told the deck trainee to get two buoyancy vests[4] from the crew changing room, which was inside the accommodation.

3.1.6. The deck trainee returned from the changing room wearing his own buoyancy vest and carrying one for the bosun. However, the bosun had already removed the lashings and lowered the accommodation ladder to below the main deck level. The deck trainee stood on the top platform of the accommodation ladder, from where he saw that the bosun had walked more than halfway down it and was crouched down trying to lift the outboard handrail from its stowage position (see Figure 2).

3.1.7. As the deck trainee watched, the handrail snapped back into its stowage position, causing the bosun to lose his balance and fall into the sea. The bosun was wearing a safety harness connected to a wire, but as his body weight came on the safety harness line the wire parted and the bosun fell into the sea.

3.1.8. The deck trainee immediately called the bridge on his very-high-frequency (VHF) portable transceiver[5] and reported that the bosun had fallen overboard. He then ran along the main deck towards the stern to locate a lifebuoy. Meanwhile another crew member who was working near the stern of the ship had heard the commotion and a splash. He grabbed a nearby lifebuoy and threw it overboard. The bosun was seen trying to swim an estimated 10-15 metres to the lifebuoy.

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[2] Normally, pilots board and disembark using a traditional rope ladder. However, if the freeboard of the vessel exceeds nine metres, regulations require that the rope ladder be supplemented by an accommodation ladder, the lower platform of which is at least five metres above sea level, thereby reducing the distance the pilot has to climb.

[3] A knot is one nautical mile per hour.

[4] A buoyancy vest is a personal flotation device that can be worn in conjunction with a person's other safety devices and provides a certain amount of buoyancy should the wearer fall into the water. A buoyancy vest does not provide as much buoyancy as a regular lifejacket.

[5] A transceiver is a radio that is capable of both transmitting and receiving calls on certain frequencies.

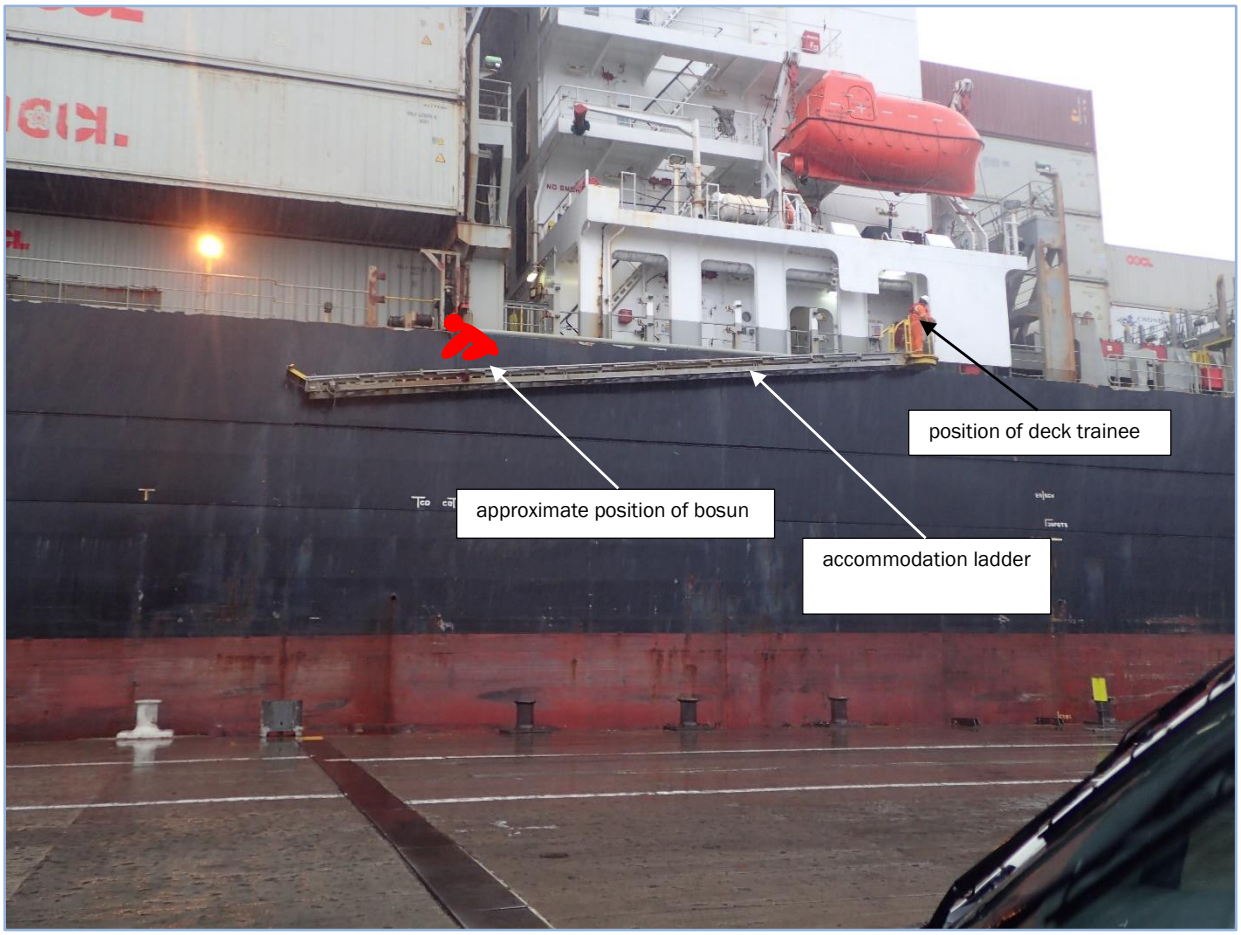

Figure 2
Positions of bosun and deck trainee on accommodation ladder when bosun fell
(starboard accommodation ladder shown)

3.1.9. Those crew members in possession of VHF radios heard the deck trainee's call and made their way to the deck to assist. The chief officer made his way to the stern of the ship, where he saw the bosun some distance away in the water. He called the master for instructions and was told to stand by at the pilot boarding station. Some time later the chief mate heard on his VHF radio that the *Madinah* was proceeding to the man-overboard position to assist in the search. He made his way to the bow and sent one of the crew to get binoculars from the bridge to help look for the bosun.

Events on the navigating bridge

3.1.10. On hearing the VHF radio message from the deck trainee, the master immediately stopped the engine and ordered the helm put hard to port (the side from which the bosun had fallen). Both he and the second officer made their way to the port bridge wing from where they saw the bosun in the water. The master saw that a lifebuoy had been thrown towards the bosun, so he decided not to release the man-overboard lifebuoy[6] from the port bridge wing.

3.1.11. The second officer telephoned the third officer and asked him to commence preparing the vessel's rescue boat[7]. The second officer then contacted the Lyttelton port control on VHF channel 12 and advised them that they had a man overboard. The call was answered by one

[6] A man-overboard lifebuoy is a dedicated man-overboard lifebuoy that rests in a quick-release cradle (one on each navigation bridge wing) and has a smoke signal and a light that both activate when the lifebuoy is released.
[7] one of a vessel's survival craft specially designated, under the International Maritime Organization's International Convention for the Safety of Life at Sea, with certain design features to expedite the launching, recovery and handling of injured persons.

of two pilots who were on board the pilot vessel en-route to meet the ship at the pilot boarding ground. He advised that the pilot vessel would be there as soon as possible to assist.

3.1.12. At about 1316 the master called the pilot and asked whether he should turn the *Madinah* around and return to the man-overboard position or wait for the pilot vessel. A pilot on board the pilot vessel replied that it was probably best to wait for the pilot vessel before turning. At that time the pilot vessel was about seven minutes from the *Madinah*.

3.1.13. At 1336 the pilot vessel requested that the *Madinah* return to the man-overboard position. The master turned the vessel around and returned to the general area of the man-overboard position. At about 1342, as the *Madinah* was returning to the man-overboard position, the third officer reported that both lifeboats were unlashed and ready to be lowered.

3.1.14. At about 1354 the master ordered a crew muster and head count, after which all available crew were distributed around the vessel's decks to assist in searching for the bosun. Once the vessel had returned to the approximate position of the man overboard, the master maintained the vessel in this position while the other smaller vessels that had responded to the call conducted the search.

Events on the pilot vessel

3.1.15. When the pilot vessel received the call from the *Madinah* it was approximately 3.6 nautical miles from the ship. The pilot estimated that it would take them 12 minutes to get to the man-overboard position.

3.1.16. One of the pilots advised port control of the situation and requested that they inform the Coastguard and the 'Westpac rescue' helicopter and ask other vessels to assist. Port control also informed the Police and the harbourmaster of the emergency.

3.1.17. On the way to the accident site the crew of the pilot vessel were unable to locate the lifebuoy or the bosun, so they asked the *Madinah* to direct them. The *Madinah*'s crew had kept the lifebuoy and bosun in sight for as long as possible, but by the time they were asked by the crew of the pilot vessel for guidance they had lost sight of the bosun and the lifebuoy and were only able to direct the pilot vessel to an approximate area. At about 1333, about 20 minutes after the bosun had been lost overboard, they found a hard hat and a pair of working gloves belonging to him.

3.1.18. A pilot requested Lyttelton Harbour Radio to provide more assistance. A fishing vessel, two port tugs, two coastguard vessels, several workboats from Lyttelton and a fast rescue boat from an anchored tanker responded and a grid search was initiated. The rescue helicopter arrived at the scene and started to conduct an expanding circle search. The outbound container vessel stopped to the north of the search area and provided a static search platform using its increased height of eye.

3.1.19. At about 1449 the control of the search was handed to the New Zealand Police search and rescue co-ordinator.

3.1.20. At about 1523 the outbound container ship was stood down from the search. At about 1540 the helicopter was stood down, and the search was suspended at 1618 due to failing light and weather conditions. The pilots then boarded the *Madinah* and brought the vessel into Lyttelton port.

3.1.21. The bosun has not been found.

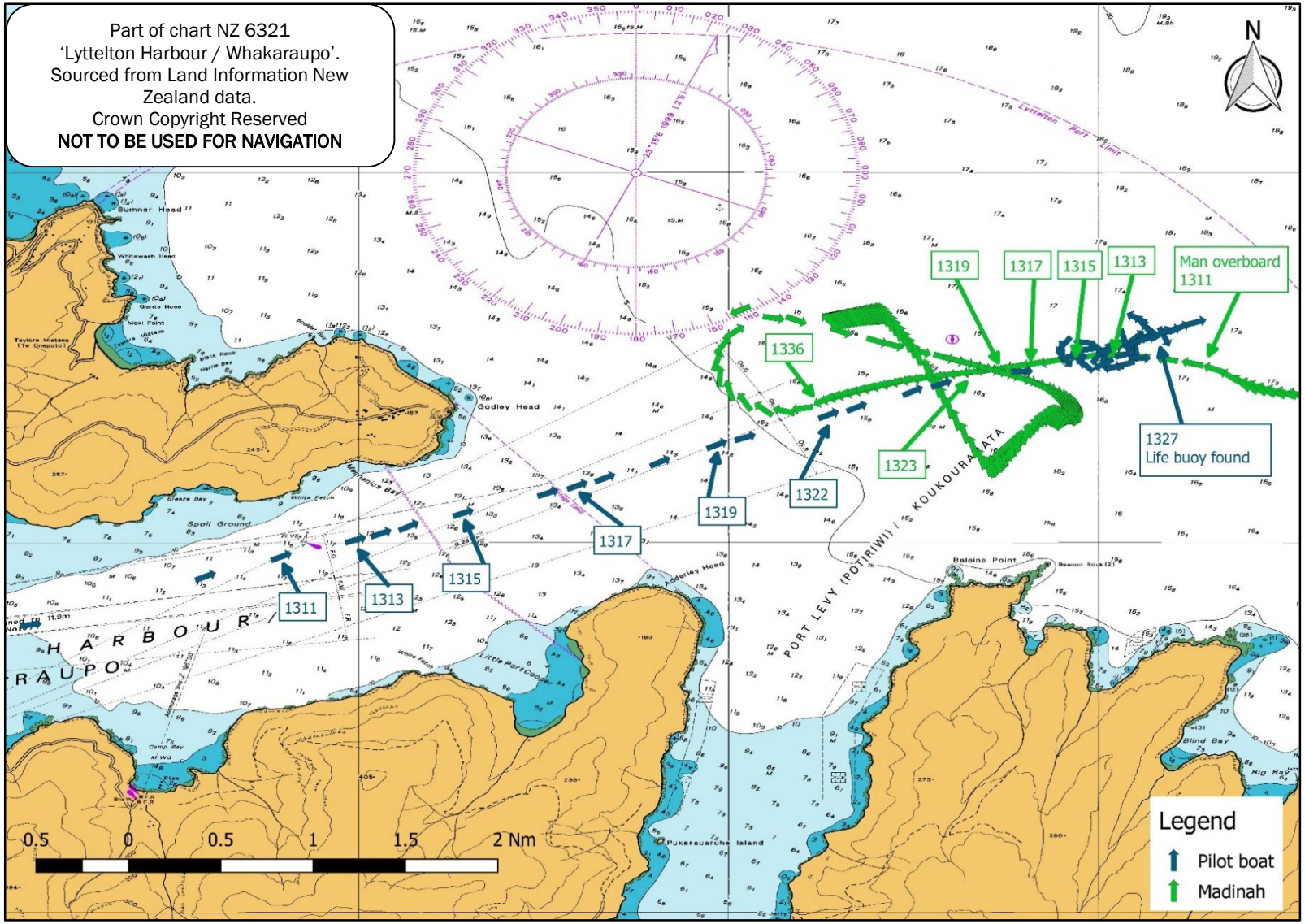

Figure 3
Tracks of the *Madinah* and the pilot boat during the accident

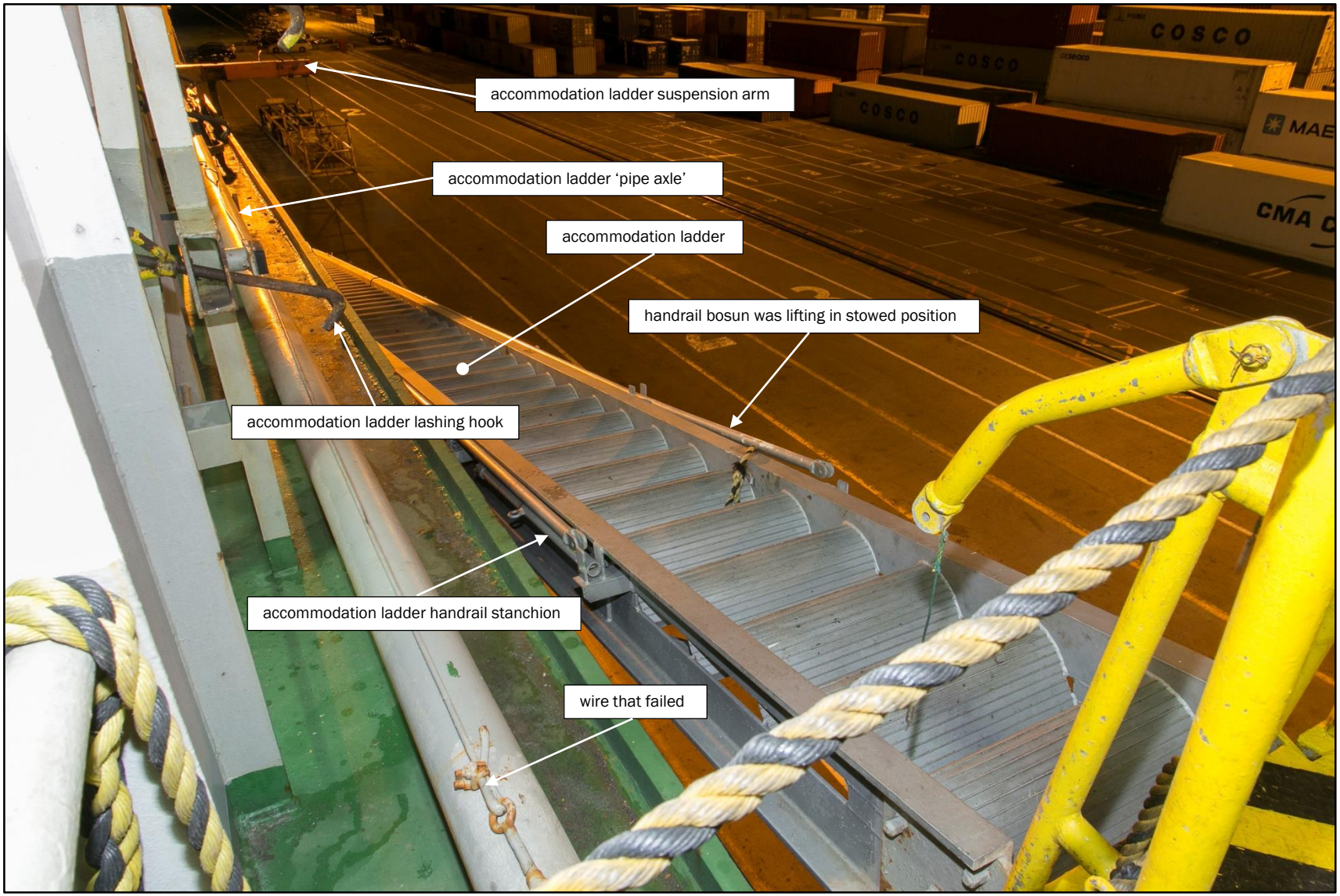

Figure 4
Parts of the port-side accommodation ladder

4. Analysis

4.1. Introduction to the issues

4.1.1. Preparing an accommodation ladder for use is a routine task carried out many times a day across the world on vessels of all sizes. It is not unusual for a crew to prepare the accommodation ladder before a ship arrives at the dock. This requires them to work outside the rail (often referred to as 'over the side'). Having crew members work over the side is a risk that has been widely recognised by the industry for many decades.

4.1.2. In 2014 the United Kingdom P&I Club[8] issued Technical Bulletin Number 42/2014, which stated:

> The UK Club's claims statistics show that many serious injuries (or deaths) are caused by falls from gangways or embarkation ladders. The Club's risk assessors frequently visit ships where these are badly rigged, in a poor condition or witness dangerous working practices. Many accidents occur during the rigging of the gangway. The process of rigging the stanchions and the side ropes is inherently dangerous as there can be little for crew members to hold on to until this is completed. Crew should always wear a safety harness and lifejacket during this operation. Securing of the safety harness line can sometimes be difficult as there can be little to clip on to and movement can be restricted by the length of the harness line.

4.1.3. The following analysis discusses the circumstances of what happened in this case. It also discusses the following issues:

- The lack of a consistent procedure for rigging an accommodation ladder while still at sea
- The design and failure of the wire that the bosun had connected his safety harness to
- The shipboard emergency response to the bosun falling into the sea

4.2. What happened

4.2.1. When the bosun and the deck trainee went to prepare the accommodation ladder the bosun was aware of the need for the correct personal protective equipment. Both he and the deck trainee were wearing their safety harnesses, and he had sent the deck trainee to retrieve their buoyancy vests from the crew changing room.

4.2.2. While the deck trainee went to collect the buoyancy vests, the bosun started unlashing the accommodation ladder, swinging it out and lowering it to a level where the handrails could be rigged. This part of the operation could be accomplished safely from the vessel's deck because it did not require him to go over the side.

4.2.3. However, he then walked out onto the accommodation ladder, connected his safety harness onto the plastic-coated wire rope and attempted to rig the handrails without waiting for the deck trainee to return with the buoyancy vests.

4.2.4. Rigging the handrails was usually a two-man operation. The handrails comprise a long aluminium pipe supported by pivoting stanchions along its length. The geometry of the handrail is such that when one end is lifted it tends to cause the other end to "dig in". Normal practice on board was to use two crew members to raise both ends simultaneously. Lifting the hand rail from the middle causes both ends to "dig in" and results in the handrail snapping back down, in this case with sufficient force to cause the bosun to lose his balance and fall off the accommodation ladder.

4.2.5. It is unclear why the bosun walked out onto the accommodation ladder without waiting for the deck trainee to return with his buoyancy vest. He possibly felt secure in the fact that he was

[8] Protection and indemnity insurance, more commonly known as 'P&I' insurance, is a form of mutual maritime insurance provided by a P&I Club. Whereas a marine insurance company provides 'hull and machinery' cover for ship owners, and cargo cover for cargo owners, a P&I Club provides cover for open-ended risks that traditional insurers are reluctant to insure (Anderson, 1999).

wearing a safety harness and would not therefore fall into the sea. However, the wire he clipped on to was not of sufficient strength to arrest his fall.

4.2.6. According to studies of 'human factors', individual actions can be classified in several ways; in 1990 James Reason proposed some distinctions that have become widely accepted. Firstly, he made an important distinction between two broad groups of individual actions that increase risk (Walker, 2004).

- **Errors**: those occasions in which an individual's planned sequence of mental or physical activities fails to achieve their intended outcomes, and when these failures cannot be attributed to the intervention of some chance agency (Reason, 1990).
- **Violations**: deliberate deviations from an organisation's safety procedures drawn up for the safe or efficient operation and maintenance of plant or equipment (Health and Safety Executive, 1995).

4.2.7. In this case the non-wearing of a personal flotation device appeared to be an exceptional violation. Exceptional violations appear as isolated departures from authority, not necessarily indicative of individuals' typical behaviour patterns or condoned by management (Reason, 1990). They are not considered exceptional because of their extreme nature; rather they are considered exceptional because they are neither typical of the individuals nor condoned by authority. What makes exceptional violations particularly difficult for an organisation to deal with is that they are not indicative of individuals' behavioural repertoire and, as such, are particularly difficult to predict. Usually when individuals are confronted with evidence of their behaviour and asked to explain it, they are left with little explanation (Shappell & Wiegmann, 2000).

4.3. Failure of the wire to arrest the bosun's fall

4.3.1. The wire to which the bosun attached his safety harness was plastic coated. It was rigged between two eye bolts that had been fitted to the accommodation ladder suspension arrangement (see Figures 4 and 5).

4.3.2. There was no record on board the *Madinah* of when and who had fitted the eye bolts. Each of the four accommodation ladders (one either side of the accommodation and one either side at the pilot boarding station on the main deck) fitted on the *Madinah* had been similarly modified. However, only the port-side accommodation ladder had a wire strung between the eye bolts.

4.3.3. This wire was removed from the vessel after the accident and sent for examination and testing by an independent contractor engaged by the Commission. The independent contractor reported that the "wire rope was a 6 x 19 right hand regular lay galvanised steel wire rope with fibre core of approximately 8 mm diameter. The rope was sheathed with a plastic coating which had been painted. The original minimum breaking strength of the rope is estimated to have been in the order of 3,500 kg" (see Appendix 1).

4.3.4. A soft eye[9] had been formed at each end of the wire rope using a single wire grip[10]. At the forward end of the wire rope the soft eye had been formed through the eye of a bottle-screw or turnbuckle, which was in turn hooked over the eye bolt (see Figure 5).

4.3.5. There was no record on board the *Madinah* to show when the wire had been fitted. The wire was not entered into the planned maintenance system or wire rope register. Therefore there was no record of it ever having been examined, maintained or tested.

[9] A soft eye is a loop of rope formed in the end of a wire or rope usually by splicing or mechanical crimp. A soft eye does not have a thimble or other insert to keep the eye open.
[10] A wire grip is a tool that grips two parts of a wire together using a 'U' shaped bolt and a saddle. It is a simple and fast way of making a thimble eye or loop termination in wire rope.

4.3.6. The point where the wire failed was severely corroded. There were holes in the plastic sheathing in the area of the failure (see Appendix 1). This had allowed water to penetrate through the sheathing and corrosion to form.

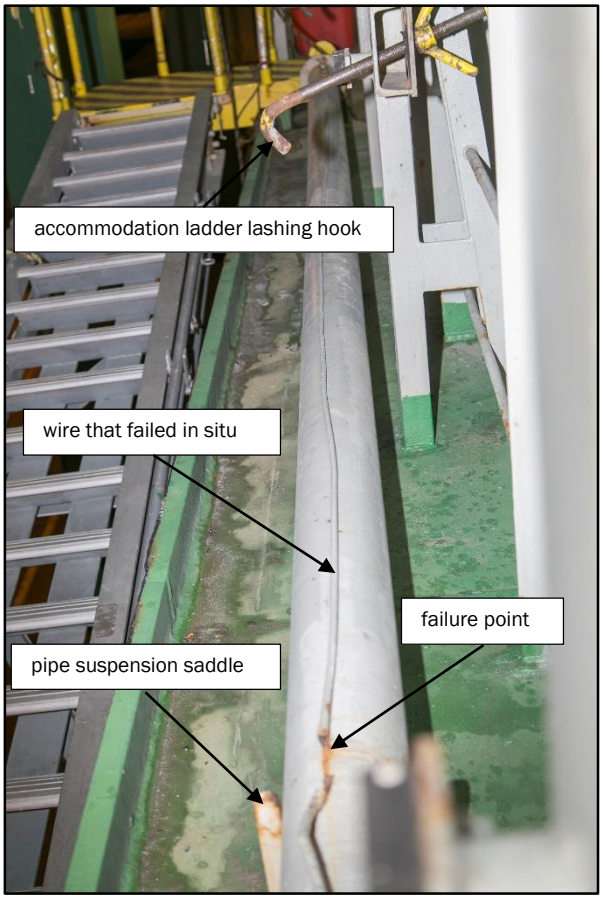

Figure 5
Port accommodation ladder and pipe showing the wire that failed
(a pipe suspension saddle is a support for a pipe)

4.3.7. An expert on ropes, chains and fittings[11] stated that best practice was not to use plastic-covered wire rope when wire grips were to be used. It further stated that to attain an 80% of rope minimum breaking load for an eight-millimetre-diameter wire rope, a minimum of three wire grips should be used. The method used for forming the eyes at each end of the wire rope did not therefore comply with industry best practice. Even though the eyes were not the part of the wire that failed, this lack of best practice was of concern.

4.3.8. It is about as likely as not that the wire rope was originally intended to be used as a safety lifeline. There was no other logical reason for it being fitted. If this was the case a safety lifeline, which is critical equipment, should have been constructed to industry best practice and regularly maintained. The complete assembly, including the attachment points, should have been assessed for adequate strength and made up of permanent components. The use of an open hook on the bottle screw[12] was another potential point of failure.

4.3.9. The use of plastic-coated wire for any rigging that is required to be inspected frequently is unsafe. The Commission has raised this issue in another report involving the failure of a plastic-coated wire sling used for launching and retrieving a lifeboat (MO-2014-202 Lifting sling failure on freefall lifeboat, general cargo ship *Da Dan Xia*, Wellington, 14 April 2014).

[11] Bridon International Limited.
[12] A bottle screw is a device for adjusting the tension or length of ropes, cables, tie rods and other tensioning systems. It normally consists of two threaded eye bolts, one screwed into each end of a small metal frame, one with a left-hand thread and the other with a right-hand thread. The tension can be adjusted by rotating the frame, causing both eye bolts to be screwed in or out simultaneously.

4.3.10. Encasing steel wire in plastic sheathing when it is to be used in the marine environment has significant implications for maritime safety, especially when the wire must be regularly inspected and maintained in order to remain fit for purpose.

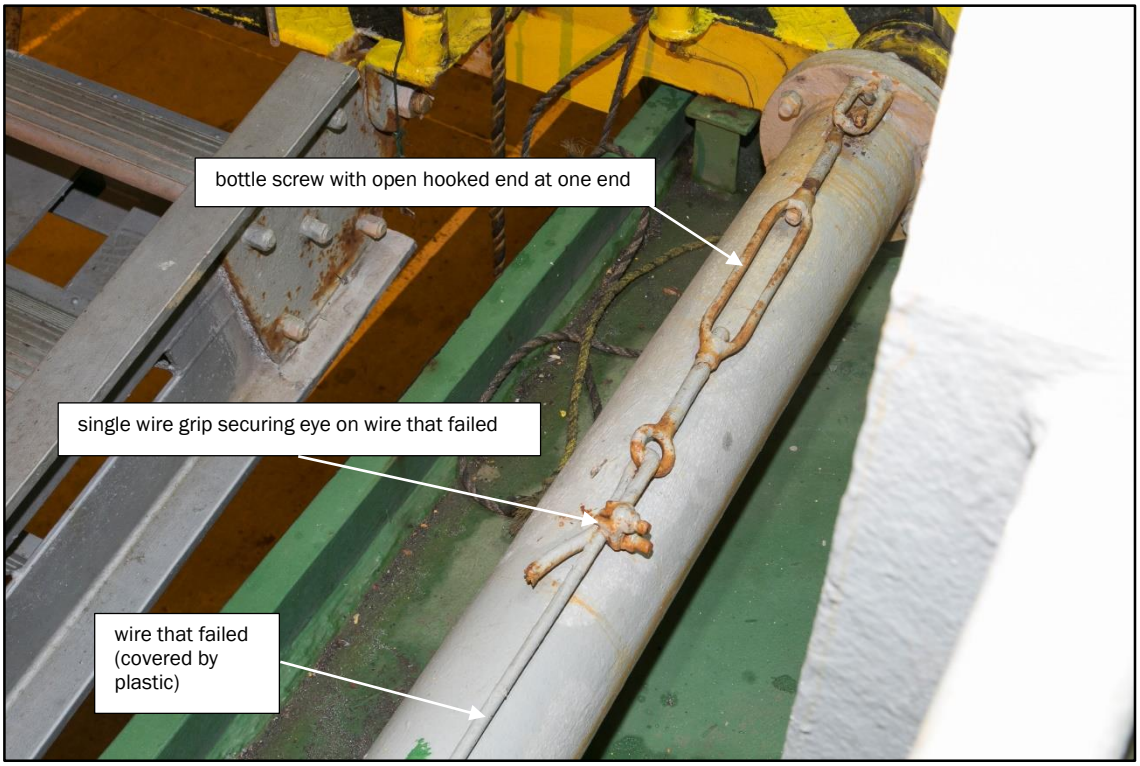

Figure 6
Port accommodation ladder showing wire formation and hooked bottle screw

Figure 7
End of failed wire showing corrosion and sheath degradation

4.3.11. Arising from that report the Commission recommended that the Director of Maritime New Zealand submit the report to the International Maritime Organization (IMO) and raise the implications that plastic-sheathed wire ropes have for maritime safety through the appropriate IMO safety committee for its consideration (recommendation 002/15). Maritime New Zealand accepted the recommendation and submitted the report to the Ship Systems and Equipment subcommittee of the IMO on 16 March 2016 as document SSE.3/INF.4. This document was considered and noted by the subcommittee and the information will be available for future reference.

4.3.12. This report will also be submitted to the IMO Casualty and Statistics working group as further evidence of the need for action to address the safety issue of plastic-coated wires in the maritime environment.

4.4. Procedures

4.4.1. At the time of the accident there was no dedicated procedure for rigging an accommodation ladder on board the ship. As part of its international safety management system the company had procedures in place for personnel working aloft and over the side of the vessel. The procedure required a risk assessment to be made before a permit to work could be issued and the work be undertaken (see Appendix 3).

4.4.2. However, this procedure would normally have been used for special or one-off tasks. It would have been highly unusual for a safety management system to require a permit for a routine task of rigging an accommodation ladder, particularly when a permanent procedure could easily be introduced.

4.4.3. When the crew were interviewed it was apparent that there was a normally followed practice of using safety harnesses and buoyancy vests while rigging the accommodation ladder. However, there were some variances in the methods used that created some risk as described in the following paragraphs.

4.4.4. At each end of the accommodation ladder a gantline[13] had been attached to a dedicated strong point, which allowed the crew rigging the accommodation ladder a certain amount of free movement along the length of the ladder when their safety harnesses were attached to it. The vessel had also been supplied with two fall-arrester devices, which could be attached to dedicated strong points on the vessel to further assist the crew when rigging the accommodation ladder. For the most part the crew used this satisfactory arrangement but occasionally they connected their safety harnesses directly to the ship's handrails instead.

4.4.5. It is an unsafe practice to use a vessel's handrails as an anchor point for safety harnesses, because the material condition and strength of the rails are unknown. They are often only lightly welded and would not provide sufficient guaranteed strength to withstand the load of a falling person.

4.4.6. The bosun did not use either of these arrangements when he went over the side onto the accommodation ladder. Instead he clipped his safety harness onto the wire that had been strung between two eyebolts fitted to the pipe-axle[14].

4.4.7. Crew members who usually rigged the accommodation ladder were aware of the wire rope between the eye bolts, but did not use it as they considered it unsafe due to its appearance.

4.4.8. A proper risk assessment for rigging an accommodation ladder would have identified the necessary strong points to which to attach the fall arresters. Once these strong points had been included in a procedure any other practice, including clipping on to the handrails and any use of the wire that failed would have been a departure from the standard procedure.

---

[13] A gantline is a rope of approximately 20 millimetres in diameter that used to be used for hauling sailors and tools aloft. It has sufficient strength to support someone should they fall.
[14] A pipe-axle is an axle that is constructed of a certain-diameter hollow pipe that in this case joins the lowering arm and upper platform together so that they rotate in unison.

4.4.9. Having rules, regulations and guidelines does not in itself ensure compliance, nor does simply repeating the rules and regulations in on-board documentation. The responsibility for ensuring compliance with legislation and company operating procedures rests firstly with the ship owner or operating company, then with senior staff on board who have the responsibility for ensuring crew compliance. It is this chain of responsibility that is espoused in the International Safety Management Code, and if the chain is broken in some way the crew who are most likely to encounter a local hazard or threat are at higher risk of having an accident.

4.4.10. In this case the vessel's managing company had not conducted a risk assessment and had not developed a formal procedure for rigging any of the four accommodation ladders on board the *Madinah*, and neither had the senior on-board management or the crew who were performing the task. Having a standard procedure for rigging an accommodation ladder while the ship was at sea might not have necessarily prevented this accident, for the reason given above. However, by not having one there was a heightened risk of such an accident occurring.

4.5. Search and rescue

4.5.1. Losing someone overboard from a ship is a long-recognised and well documented risk associated with any maritime activity. IMO and the International Chamber of Shipping provided standard procedures to ensure the best and consistent method of responding to a person lost overboard. These procedures were incorporated in the *Madinah*'s safety management system, but the crew did not follow all of them. It is difficult to say whether the bosun could have been saved if the correct procedures had been followed. Regardless of that question, it is a key lesson for mariners that man-overboard procedures ought to be well practised and followed because in other circumstances they could make the difference between life and death.

4.5.2. The IMO International Convention on Standards for Training, Certification and Watchkeeping, 1995 revision, required that seafarers be provided with "familiarization training" and "basic safety training" as shown below

> Section A-VI/1
>
> *Mandatory minimum requirements for safety familiarization, basic training and instruction for all seafarers.*
>
> Safety familiarization training:
>
> 1 Before being assigned to shipboard duties, all persons employed or engaged on a seagoing ship, other than passengers, shall receive approved familiarization training in personal survival techniques or receive sufficient information and instruction, taking account of the guidance given in part B, to be able to:
>
> 1 communicate with other persons on board on elementary safety matters and understand safety information symbols, signs and alarm signals;
>
> 2 know what to do if:
>
> a person falls overboard, ...

4.5.3. The vessel's manager had a man-overboard procedure as part of its safety management system (see Appendix 2), which gave clear instructions on the procedure to be followed in the event of a man overboard. The procedure paraphrased the details outlined in the International Chamber of Shipping's Bridge Procedures Guide, Part C Emergency Checklists, C4 man overboard (see Appendix 5).

4.5.4. The International Convention for the Safety of Life at Sea requires crews of vessels to conduct Fire, Abandon Ship and other emergency drills at regular intervals. The most recent man-overboard drill on board the *Madinah* had been held on 20 May 2015 (about six weeks before this accident) and prior to that on 17 February 2015.

4.5.5. The proper man-overboard procedures outlined in the appendices to this report are based on the premise of immediate, intuitive actions to: raise the alarm; record the position of the event; return the ship to the scene as soon as possible; and render assistance.

4.5.6. The immediate and intuitive actions for a man-overboard scenario (see Appendix 5) would be to: commence a recovery manoeuvre (see Figure 8); note the ship's position; release a lifebuoy with a light and smoke signal; sound the appropriate sound signal on the vessel's whistle; sound the general alarm; and post lookouts with binoculars to maintain a continuous watch on the man overboard.

4.5.7. The actions of the *Madinah*'s bridge team were not intuitive. They did not: note the ship's position; release a lifebuoy with a light and smoke signal; sound the appropriate signal on the ship's whistle; or sound the general alarm. Instead of immediately manoeuvring the vessel to return to the man-overboard position the master asked the pilot on the pilot boat whether he should start a Williamson turn. At this point the *Madinah* was still close to the man-overboard position and had sufficient room and depth of water to return to the man-overboard position relatively quickly.

4.5.8. Acknowledging that the *Madinah* was at that moment proceeding to the pilot station and co-ordinating with the pilot for boarding, once the man overboard occurred this should have taken precedence and the focus of the master and crew should have turned to responding immediately to the emergency.

4.5.9. Had the *Madinah* transmitted a distress call on the international distress and calling VHF frequency, channel 16, it would have alerted all the vessels and radio stations in the vicinity, including the pilot vessel, of the need for assistance and provided the necessary positional information.

4.5.10. In this case the most effective means of raising the alarm on board the ship, sounding the general alarm, was not used. Consequently, not all of the crew were available to help manage the recovery. Instead of broadcasting the alarm externally over the dedicated emergency distress radio channel, the master was engaging directly with the pilot vessel. Eventually the situation was escalated to involve all of the available external resources. However, time was lost.

4.5.11. The position where the bosun went overboard was not well marked or recorded. Consequently, the searching vessels had difficulty locating the correct search area. Again, potentially valuable time was lost.

4.5.12. In such cases it is good seafaring practice for the ship to return immediately to the position of the man overboard. The ship has the means to do so, has the best information, and has the high search platform better suited to searching for small people in the water.

4.5.13. This accident highlights the importance of having an effective emergency response checklist to prompt the correct procedures to follow in a high-workload situation, and the efficacy of using the checklist.

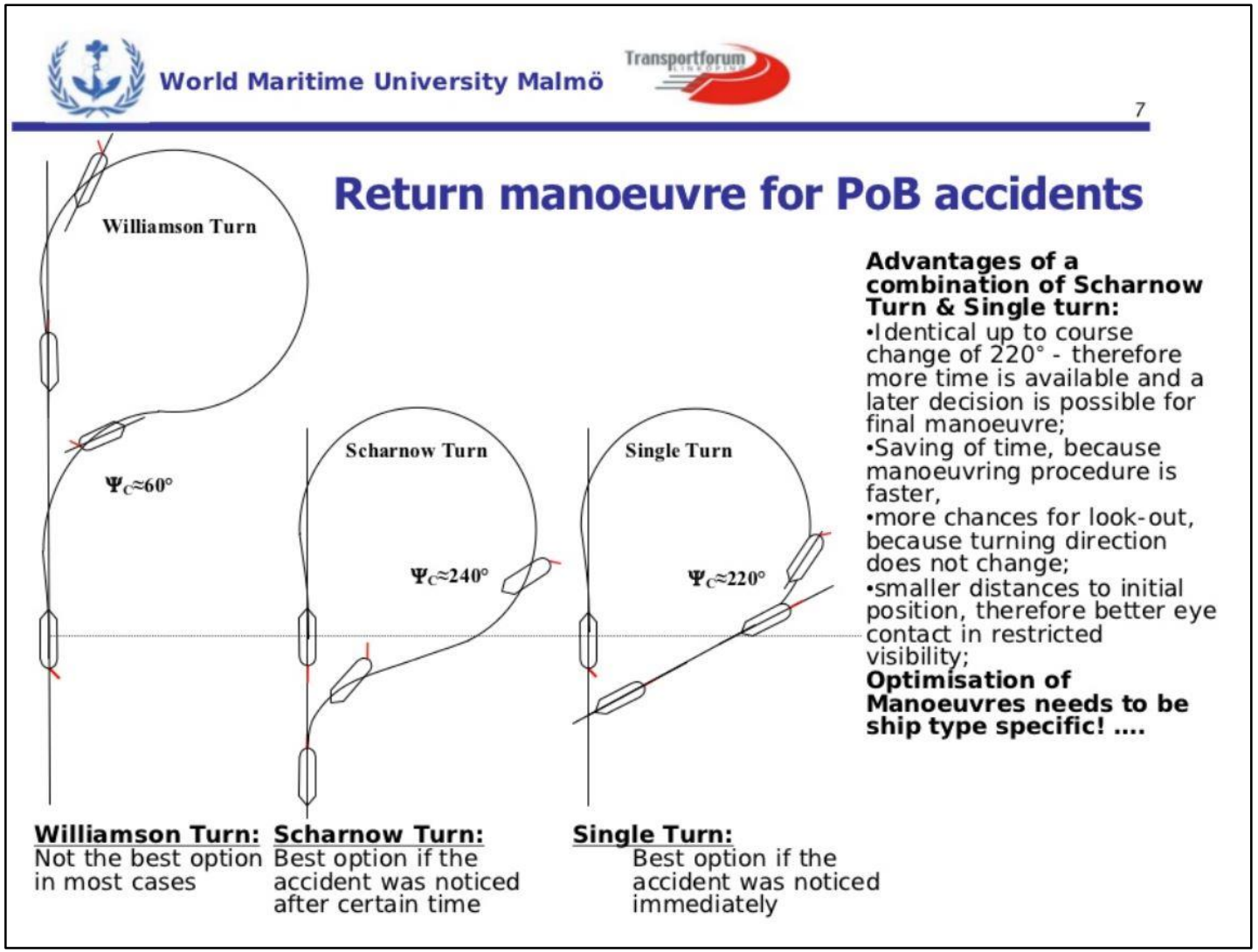

Figure 8
Examples of turns to be used in man-overboard situations

5. Findings

5.1. The bosun was not wearing a buoyancy vest when he fell into the water. A buoyancy vest would have significantly enhanced his chances of surviving after falling overboard.

5.2. The bosun fell into the sea because the wire rope to which he had connected his safety harness broke when he lost his balance and fell. The design of the wire rope and its method of attachment to the ship were not fit for the purpose of attaching a safety harness.

5.3. The wire rope parted because it was significantly weakened by corrosion. The corrosion had gone undetected because the wire was coated in plastic, a significant safety issue that prevented the wire rope being properly inspected and maintained.

5.4. There was sufficient personal safety equipment provided on board the *Madinah* for safely rigging the accommodation ladder while at sea in good weather conditions. However, there was no formal procedure on board to guide the crew in the proper safety precautions to take.

5.5. The shipboard emergency response to the bosun falling overboard did not follow best industry practice, which would have been unlikely to alter the outcome in this case. However, in different circumstances, such as if the bosun had been wearing a buoyancy vest, any delay in retrieving someone from the water can prove fatal.

6. Safety actions

General

6.1. The Commission classifies safety actions by two types:

(a) safety actions taken by the regulator or an operator to address safety issues identified by the Commission during an inquiry that would otherwise result in the Commission issuing a recommendation

(b) safety actions taken by the regulator or an operator to address other safety issues that would not normally result in the Commission issuing a recommendation.

Safety actions addressing safety issues identified during an inquiry

6.2. Since the accident the vessel's manager, Seaspan Ship Management Ltd., has:

- compiled a document on the procedure for safe rigging of gangways/accommodation ladders, which has been distributed fleet-wide (see Appendix 4)
- carried out a close inspection of all wires associated with gangways and accommodation ladder wires, fleet-wide
- retrofitted gangways and accommodation ladders with new wires and ancillary equipment where deemed necessary, fleet-wide
- compiled and instituted detailed inspection routines for gangways and accommodation ladders, which have been included in the planned maintenance system fleet-wide
- compiled internal audit checklists for superintendents and the Health, Safety, Environment and Quality team for standing wires and associated equipment, for use throughout the fleet.

7. Recommendations

General

7.1. The Commission may issue, or give notice of, recommendations to any person or organisation that it considers the most appropriate to address the identified safety issues, depending on whether these safety issues are applicable to a single operator only or to the wider transport sector

7.2. The safety actions taken by Seaspan Ship Management Ltd have negated the need for recommendations to be made.

8. Key lessons

8.1. Where it is necessary for a crew member to work over the side of a ship when at sea, they must wear a safety harness attached to a designated strong point and must wear a buoyancy vest.

8.2. Plastic-coated wires must be treated with caution. Seafarers and surveyors alike must not make assumptions about the condition of any wire that they cannot see, especially when the wire has a safety-critical purpose and is required by rules, regulations or procedures to be examined thoroughly.

8.3. A man-overboard situation requires a high number of actions by a number of crew over a short period of time in order to be successful. Crew should follow quick-reference checklists to ensure that: the alarm is raised in the appropriate way; the position of the casualty is recorded and tracked; and the ship is returned to the casualty in the most expeditious way

9. Citations

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Walker, M. (2004). Topic 3, Individual actions. In A. T. Bureau, *ATSB Human Factors Course* (pp. 3-1 to 3-6). Canberra: Australian Transport Safety Bureau.

Appendix 1: Report on status of failed wire

Defence Technology Agency NZ Defence Force, Private Bag 32901, Auckland Naval Base, AUCKLAND
Ph (09) 445-5902 Fax (09) 445-5890

File Ref:	3739/5	Contact Ph No:	(09) 445 - 5823
Project No:	141		
Work Requested:	To identify the cause of failure		
Task Reference:	TAIC Order Number 6126		
Report to:	TAIC		

Introduction

1 Following an accident that occurred on board M.V. *Madinah* on 2nd July 2015, DTA was requested to investigate the cause of failure of a safety wire which had failed during the incident when a crew member fell overboard.

2 The failed wire was received on 23rd July 2015.

Examination

3 The wire received consisted of a 6 x 19 right hand regular lay galvanised steel wire rope with fibre core. The rope was sheathed with a plastic coating which had been painted. Eye ends for attachment had been formed by loops fastened with clips/clamps. Wire rope diameter was measured to be approximately 8 mm. Failure had occurred approximately mid span. Figure 1 shows the failed ends of the rope upon receipt.

4 The failed zone was clearly severely corroded. The outer plastic sheathing appeared to be relatively degraded, possibly with crimping or abrasion damage. An area of fresh abrasions was also present and it has been assumed that this fresh damage had occurred during the accident (figure 2). At approximately 60 - 70 mm from one side of the failure, surface penetrations were present (figure 3).

5 On the other half of the rope multiple cracks of the sheathing were present from the failure extending to approximately 300 mm from the failure (figure 4.) Beneath these sheathing cracks the wire rope was superficially bright and shiny, but with evidence of corrosion emanating from the core.

6 In order to assess the general condition of the wire rope, an area was randomly selected approximately 900 mm from the failure. The outer sheathing was removed and the strands and wires separated for examination. As can be seen in figure 5, no corrosion had occurred, and the sheathing was intact and pliable.

Figure 1. Failed ends of the rope upon receipt

Figure 2. Local degradation of outer sheathing and fresh abrasions (circled).

Investigator:	Signed: [original signed]	Released:	Signed: [original signed]

Security Classification: Unclassified

Figure 3. Penetrations of the outer sheathing 60 – 70 mm from failure

Figure 4. Relatively uncorroded wires present close to the failure (indicated by arrow)

Investigator:	Signed: [original signed]	Released:	Signed: [original signed]

Figure 5. Uncorroded condition approximately 900 mm from the point of failure

7 All of the wires at the point of failure were corroded to the extent that none of the zinc coating remained. A great number of the wires were severely corroded to the point that individual wire strength would have been negligible. This was evidenced by extreme thinning of the wires as shown in figures 6 and 7.

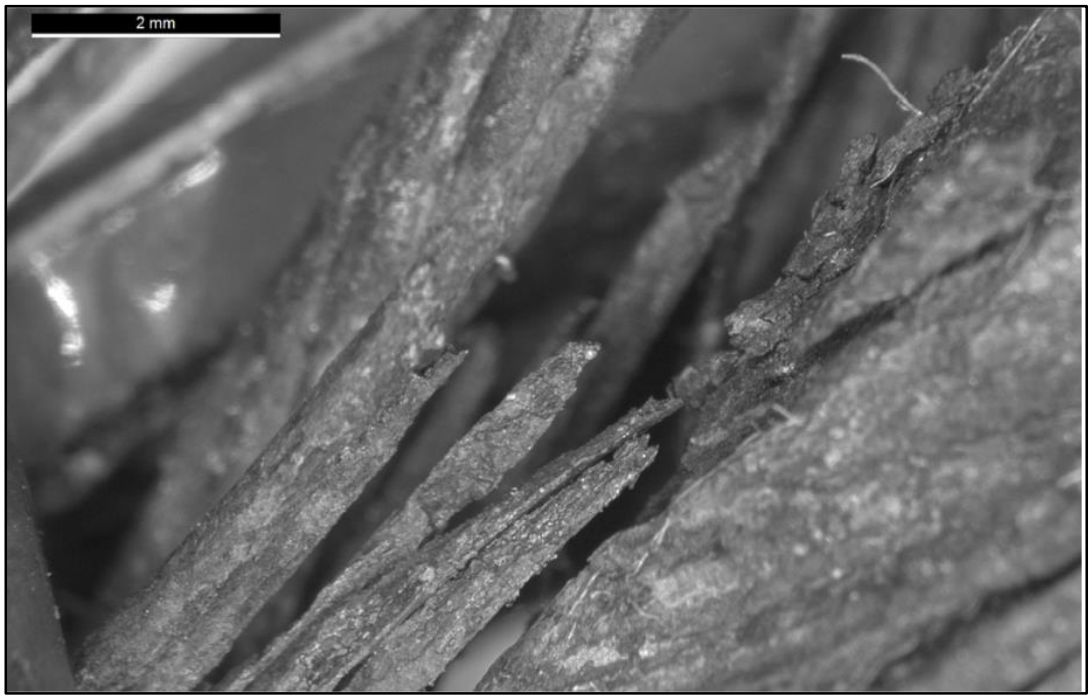

Figure 6. Severely corroded wires at the point of failure

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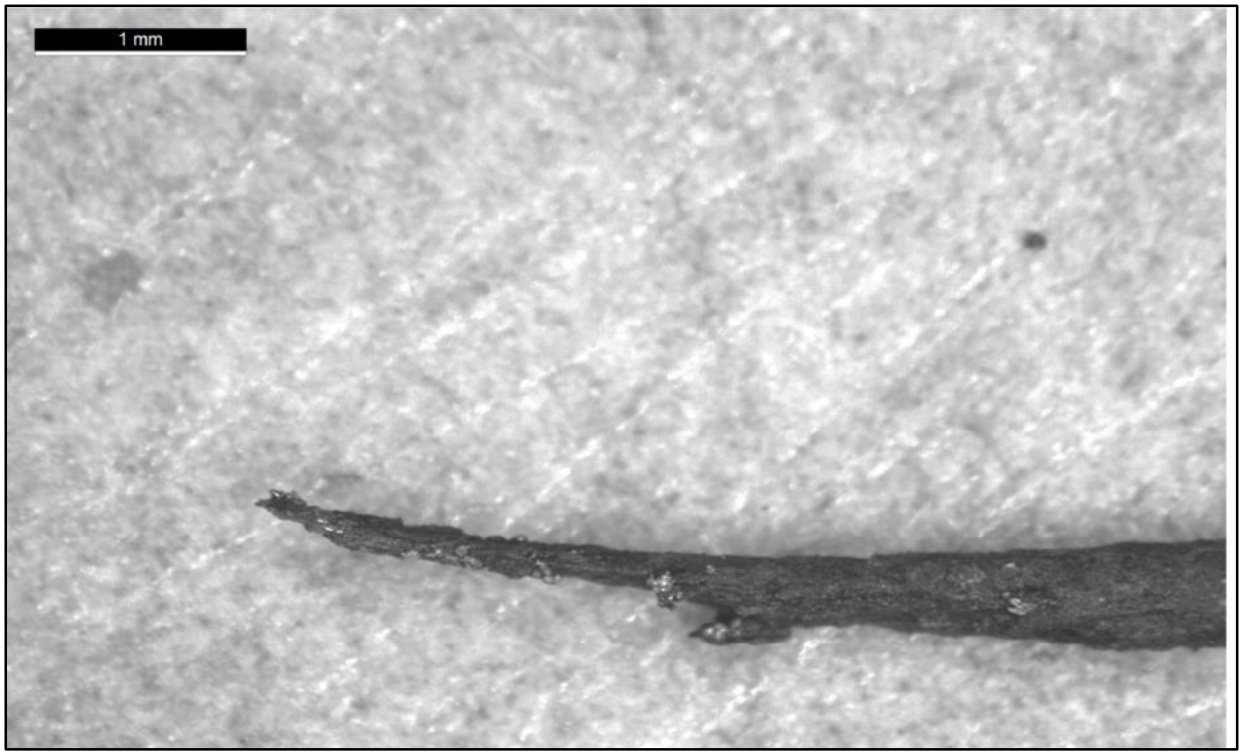


Figure 7. A single severely corroded wire extracted from the failure zone

Discussion

8 In very general terms, the condition of the wire rope beneath the plastic sheathing was found to be very good. The sheathing was also in good condition with good ductility remaining. At a few points, however, the sheathing had been compromised and corrosion had occurred. In addition to the zone of failure, at each end of the rope the sheathing had been cut (necessarily so) and where the eye ends had been attached to end fittings and clamps, the sheathing had been penetrated, allowing corrosion to occur.

9 In order to partially assess the corrosion implications, the number of wires that had corroded to negligible strength at the failure was counted. Note that in order to preserve the general condition of the rope at this location for future reference, this was not done rigorously. The results, therefore, should be considered to provide a conservative estimate of the residual strength prior to failure. Of the 114 individual wires, at least 77 were counted as being severely corroded. The original minimum breaking strength of the rope is estimated to have been in the order of 3,500 kg [A, B]. Based on the wire count, the residual strength, therefore, would have been approximately 32% of original, or 1,120 kg. It is important to note that the residual strength would have been less than this, because ALL wires had been corroded to some degree.

10 The reason for severe corrosion at the particular point of failure is not clear. There is some evidence of long term sheathing degradation at this location, but the cause of it is not obvious. It is possible that the rope passed through a retention eye or stanchion at this point, or that it had been damaged at some time previously by crushing, crimping or cutting. The source of this damage should be investigated.

Investigator:	Signed: [original signed]	Released:	Signed: [original signed]

Conclusions

11 Failure of the safety wire occurred when a crew member harnessed to the wire fell overboard. The wire is likely to have been severely corroded to the extent that it was unable to withstand the force of the falling crew member.

12 There is evidence to suggest that the sheathing at the point of failure had been penetrated allowing corrosion to occur prior to the accident.

Recommendations

13 It is recommended that the cause of sheathing failure at the location of the rope failure be determined.

References

A. www.lifting.com/literature/kiswire/steel-wire-rope-catalog-low.pdf
B. Machinery's Handbook, 22nd Edition.

Appendix 2: *Madinah*, man-overboard procedure

Issue :1	MADINAH
Amendment :1	Jan 2013

MAN OVERBOARD

Refer: Emergency Preparedness SP4.W1.4.9

General and Back Ground Notes:

This contingency plan is prepared on the basis that there are two different approaches to the following scenarios:

1. If person has been seen falling overboard, immediate action is required by the Officer on Watch.
2. If person has been reported missing/suspected of having fallen overboard after it has been ascertained that he is not on board, action required as follows.

Only the initial action from the Bridge / OOW differs, the actions by other teams would remain similar in both the cases.

Initial Actions:

Bridge

If person has been seen falling overboard, immediate action is required by the Officer on Watch.

1. Release Man Overboard lifebuoy on the side that the person has fallen.
2. Engage hand steering and put wheel hard over to the side of the casualty, using the Williamson Turn or Single Turn / Anderson Turn, as the situation demands.
3. Inform Master and activate MOB on GPS.
4. Sound General Emergency Alarm Signal. Sound the Man Overboard signal, if there are vessels in the vicinity.
5. Inform engine-room and reduce speed.
6. Complete the turn to bring vessels head towards the casualty (Refer to "IAMSAR" manual and Maneuvering Diagram).
7. Stop engines in close vicinity of the MOB, taking into account set and drift and make a good lee for launching the rescue boat.
8. Hoist "**O**" flag if ships are in the vicinity.

If person has been reported missing/suspected of having fallen overboard after it has been ascertained that he is not on board, action required as follows.

1. Inform Master about missing person.
2. Ascertain time when the missing person was last sighted.
3. Check vessels position at the time of last sighting.
4. Raise General Emergency Alarm signal.
5. Turn vessel around (using Scharnov Turn) back on reciprocal course (Refer to "IAMSAR" manual).
6. Initiate distress / urgency alert on MF and VHF with all relevant details.
7. Determine set / drift rate and plot 'Most Probable Position" on chart.
8. Refer to IAMSAR manual to initiate type of search pattern if assistance is obtained from other ships or aircraft, etc.

- 1 -

MAN OVERBOARD

Command Team

1. Announce "Man Overboard "on PA system.
2. Direct Emergency team to prepare Rescue boat.
3. Direct Back Up team to get Rescue boat personnel ready in immersion suits for boarding rescue boat.
4. Initiate distress alert on VHF and inform all ships in the vicinity.
5. Maintain log of events.

Emergency Team

1. Muster outside EHQ.
2. Prepare Rescue boat (starboard lifeboat) for immediate use.
3. Post additional lookout on bridge, one on forecastle with radio and binoculars and one on the poop deck.
4. Rig gangway net on the shipside with part of the net trailing in the water.
5. Lower the rescue boat with full rescue boat complement on board.
6. Have stretcher, first aid kit, O2 resuscitator, towels and blankets standing by.
7. Have hot water bottles ready.

Back Up Team

1. Muster outside EHQ.
2. Prepare rescue boat personnel in immersion suits in the starboard lifeboat.
3. Assist Emergency team as necessary.

Rescue Boat Team

1. In cold weather all rescue boat crew to wear immersion suits.
2. Carry blankets, additional lifejacket and O2 resuscitator.
3. Maintain communications on normal working radios and once inside rescue boat on Emergency Walkie-Talkies.

Engine-room Team

1. Muster in ECR.
2. Follow instructions from bridge and assist as required.

Appendix 3: *Madinah*, working aloft – overside permit

seaspan SHIP MANAGEMENT	Approver:	
	Revision:	1
	Valid from:	01/05/2014
	Doc No.:	SP-102
WORKING ALOFT-OVERSIDE PERMIT		

Purpose

- To provide guidance in preparing for and carrying out Risk Assessment and obtaining permits to work Working Aloft/Overside.
- This applies to all vessels.

Definition

'Working aloft' involves performing activities at heights 2 m and above in areas that are considered unsafe. Unsafe means any area or platform that is not surrounded by rails on three sides, where the rails are:

- Minimum 1.2 m in height
- Divided vertically by a bar and small rails approximately 60 cm high in between

'Overside' means outside the ship's rails.

Responsibility

Master

- Ensure that all requirements for working aloft operations are strictly followed.
- Ensure that work overside is avoided while the vessel is underway.

Personnel involved in working aloft or overside have the following responsibilities

Personnel Not to Perform Work

Personnel who have a fear of heights should not perform this work. Personnel under 18 years of age, or with less than 12 months of experience at sea, should not work aloft or overside unless accompanied by an experienced seafarer or otherwise adequately supervised.

Permit to Work and Risk Assessment

Before any work aloft or overside starts, the following must be done:

- A **Working Aloft / Overside Work Permit** must be completed and approved along with **a Risk Assessment**
- All personnel involved in the task must participate in an on-site review of the **Working Aloft / Overside Work Permit**

Safety Equipment

When working aloft or overside, use a harness, fall arrestor and lifeline, and adjust the line length to avoid unnecessary slack. Safety belts are not approved equipment.

When using staging at the hull side, make sure that the two gantlines used in its rigging are long enough to at least trail into the water to provide additional lifelines in case a crew member falls in.

When working overside, always use a personal flotation device such as a working vest or lifejacket.

When there is a risk of a person falling into the water, a ladder should be lowered to the water to aid in recovery, and a lifebuoy with a line should be standing by for rapid deployment at the work site.

Preparing the Work Site and Equipment

Prepare the site and equipment as follows:

- Store equipment for working aloft away from heat and sunlight, separated from containers of chemicals, detergents, rust removers, paint strippers or other substances capable of damaging them. Clearly mark staging equipment to prevent their use for purposes other than working aloft.
- Use polypropylene ropes with ultraviolet protection for gantlines, safety lines and the rope in the bosun chair. Make sure that splices have at least three full tucks.
- When using a bosun chair for riding topping lifts or stays, make sure that the bow of the shackle, not the pin, rides on the wire. The pin should be moused.
- Check that the securing points for lines and blocks are of adequate strength and, where practicable, are permanent fixtures to the ship's structure.
- Do not place tools where they may be accidentally knocked down and fall on someone below. Do not carry tools in pockets from which they may easily fall.
- Switch off radar and transmission devices if working near a relevant mast.
- Rope off with warning signs the area directly below the work site. Secure doors leading into roped-off areas.
- Do not use Jacob's ladders to read drafts. If required for a critical transit or operation and no other options are available, they may only be used after a thorough **Risk Assessment**, including completion of a **Working Aloft / Overside Work Permit**
- Get approval from the duty deck officer:
    - Before starting the operation
    - When it is dark and adequate lighting needs to be coordinated

Accommodation Ladder

Only rig the accommodation ladder after considering all of the following basic safety measures:

- Determine if the task can be performed without going overboard—for example, the rigging of handrail lines so that handrails can be raised or lowered from the safety of the main deck if possible.
- Attach a safety line to a strong point on deck and safety harness on the individual.
- Position a lifebuoy with line for immediate use.
- Have a crew member on constant standby on deck, in touch with the bridge via walkie-talkie and available to throw the lifebuoy if required.
- The Officer of the Watch is familiar with the correct response when a person falls overboard

m.v.

Date: **Work Location** **Job**

To be completed by the Chief Officer and/or Chief / Second Engineer and verified by the Master.
DO NOT ISSUE THE PERMIT IF REQUIRED RISK ASSESSMENTS HAVE NOT BEEN DONE OR, IF OF UNACCEPTABLE RESULTS.

General	Yes	No	Remarks
Has a Safety & Environment Risk Assessment been completed			
Master (or Chief Engineer) has determined that the procedure is safe			
Work plan has been agreed by all parties (including port authority , if applicable).			
Precautions have been explained to all personnel involved			
Bridge /Deck / Engine-room watch-keepers have been notified when work is to begin (funnel, mast, over-side….)			
Other vessels, barges, non-essential craft have been moved from the ship's side during diving operations			
Only experienced / rested crew to be sent aloft			
Radio / communication equipment in operation considered NOT a hazard / risk to working personnel			
IMDG / Hazardous materials NOT being handled and/or NOT likely to cause risk to personnel/ operation			
Sea /wind condition checked and found acceptable (especially for overside work)			
Weather forecast obtained (Overside work)			
No overside work to be undertaken when vessel is underway			
When working aloft, it is best to wear a belt designed to hold essential tools securely in loops.			
Send tools up in suitable containers and use them to stow tools not being used. Never leave tools unsecured on such areas as mast tables.			
Do not raise personnel in a bosun-chair.If necessary,only do so by hand. Never use a power winch. When a bosun-chair is used for rigging or maintaining topping lifts, crnae wires etc. it is essential that the bow of the shackle, not the pin, rides on the wire.The pin must be locked with seizing wire.			
When using a bosun-chair, if personnel prefer to self-lower, they must first frap (bind together) both parts of the gantline together with a suitable piece of line to secure the bosun-chair before making the lowering hitch. The practise of holding on with one hand and making the lowering hitch with the other is dangerous.			
Following to be confirmed by Chief Officer/ Chief Engineer prior to commencement of operations			
Safety harness with lifeline worn?			
Respective equipment shut off and "DO NOT OPERATE" warning signs placed near to controls (to avoid accidental use of radar, radio equipment, whistles, safety valves, emission of steam, harmful gases and fumes) when personnel working on funnel or masts.			
Both officers of watch(Bridge and Engine Room) informed of personnel working aloft(funnel/masts) or overside.			
Where necessary and appropriate, safety nets rigged			
Appropriate clothing, shoes and hard hat worn?			
Safety harness with lifeline and lifejacket worn for overside work?			
Lifebuoy with sufficient line available on deck for immediate use (Overside work)			
A responsible person on deck is designated to watch work aloft / overside and able to quickly summon help if required?			
Lifeboat / rescue boat : ready for immediate use in an emergency			

THE MASTER MUST BE INFORMED IMMEDIATELY IF ANY OF THE ABOVE ARE ANSWERED "NO"!

enter date/time **PERMIT ISSUED** **VALID UPTO**

Master Ch. Engineer Ch. Officer

The current version of this document can be found in the Company's electronic Management System. Whenever this document is revised, it is the responsibility of the user to ensure that the edition being used is valid.

Record distribution: Original (Ship) / Copy (display at work site and explain to work team) Record retention: 1 Year

Appendix 4: *Madinah*, procedure for safe rigging of accommodation ladders/accommodation ladders

Procedure For Safe Rigging of Gangways/Accommodation Ladders

The following procedure for safe rigging of gangways/accommodation ladders is to be followed on all Company ships.

Step-1:

Risk Assessment – A detailed risk assessment shall be carried out and discussed by the Chief Officer with relevant crew and officers, at least once prior commencement of coastal voyages between ports and more frequently if necessary. The risk analysis shall be reviewed each time for any changes to physical conditions of work, equipment or personnel. See attached example of such a risk assessment.

Risk assessment discussed by Chief Officer with the crew.

Step-2:

Preparation for work overside – Crew members involved in working overside shall prepare themselves with the correct safety gear. This shall include boiler suits, safety shoes, safety helmets, leather gloves, flotation device and safety harness. A lifebuoy with a buoyant line must be kept standing by. The Chief Officer shall issue a Working Aloft-Overside Work Permit FM-112 when he is satisfied that all requirements are met.

Wear the flotation device and pull each of the straps until they are fully tight. Tuck in loose ends.

Wear the safety harness and ensure that the thigh straps are properly tightened.

Tighten the chest straps and check that the safety harness lanyard & hook are free.

Step-3:

Tool-Box Meeting – A tool-box meeting shall be held prior to commencement of the job. This is to be a brief meeting in which the person in charge (normally the Chief Officer or the Bosun), will explain who will be responsible for what job and how it is to be done. Any doubts or queries must be clarified before the job is commenced.

Team leader directs each crew member to perform particular tasks.

Step-4:

Cross-Check Equipment – A cross-check of the safety equipment worn is to be carried out so as to ensure that each person has worn the safety harness and the flotation device correctly and that there are no visible defects.

Check the straps at the back and the front. The safety harness should be comfortably tight.


Make adjustments to the flotation device straps. Check that the lanyard & hook are in good condition.

Step-5:

Unlashing The Accommodation ladder – All the lashings of the accommodation ladder are to be removed systematically and cleared.



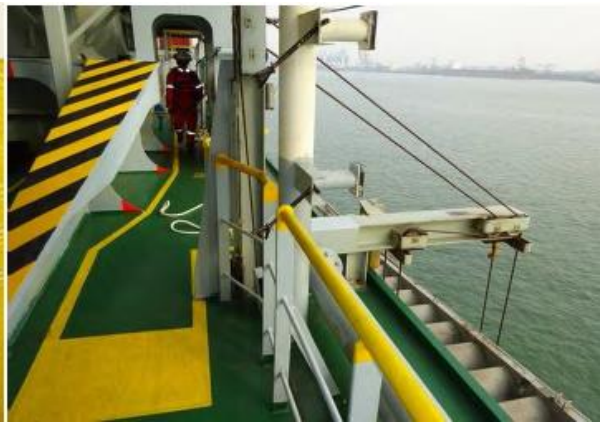
Step-6:

Once all the lashings are off and securing bolts clear of the accommodation ladder, positive reporting to the accommodation ladder operator is to be carried out. This can be a simple hand signal.

Crew report back positively that all lashings are clear. Team Leader acknowledges the report.

Step-7:

Swinging out the accommodation ladder – Check that there are no obstructions overside. The team leader will swing out the accommodation ladder in a controlled manner until it is parallel to the main deck.

Step-8:

Securing the Fall Arrestor – Two crew members will secure the fall arrestor to the standing wire, one near the top of the accommodation ladder and one between the bottom platform and swinging arm. Before stepping overside on the accommodation ladder, they shall secure their safety harness lanyard hook to the fall arrestors.


Step-9:

Rigging the top platform stanchions – The crew member working near the top platform of the accommodation ladder will insert all stanchions in place.

Step-10:

Rigging the collapsible railings – The operator shall lower the accommodation ladder by about 2 meters. Both crew members working overside shall rig the accommodation ladder railings, first inboard side and then the outboard side.


Step-11:

Securing the railings & rope work – One of the overside crew must connect the upper part of the collapsible railings to the top stanchions and lash the safety ropes tightly while the other overside crew member shall connect the bottom end stanchions to the other end of the collapsible railings.


Step-12:

Completion of rigging accommodation ladder - After completion of rigging the accommodation ladder, the two overside crew will return on board for mooring stations. Bosun shall confirm to bridge on a walkie-talkie that the accommodation ladder has been rigged and all personnel are safely back on board.

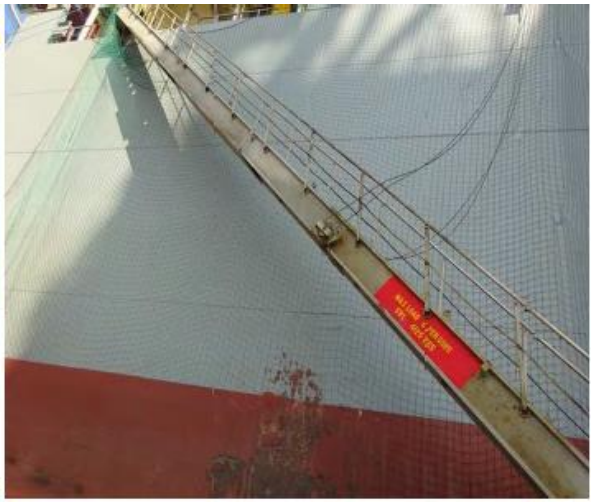
Step-13:

Lowering the accommodation ladder to quay level – After the vessel is safely moored alongside the berth, one of the crew wearing a flotation device and safety harness shall proceed to the bottom of the accommodation ladder to direct the accommodation ladder operator while he is lowering the accommodation ladder. Using hand signals, he will guide the operator until the base of the accommodation ladder is close to the quay level and then signal him to stop lowering.

Crew member directs operator to lower accommodation ladder. Once close to the quay level he signals him to stop.

Step-14:

Rigging the inboard side of the accommodation ladder net – Other crew on deck shall tie the inboard side of the accommodation ladder net to the ship's railings.



Step-15:

Placing the accommodation ladder base on the quay – Two crew members shall assist the man at the bottom of the accommodation ladder to push the accommodation ladder away from ship's side so that he may step safely on the quay. Once he is on the quay, he shall pull the manrope secured at the bottom of the accommodation ladder so that two more crew can step ashore to assist him to pull the accommodation ladder onto the quay. The accommodation ladder operator must pay close attention to them while lowering the accommodation ladder, waiting for it to clear the edge as the crew pull out the accommodation ladder and then lowering it on to the quay.

Step-16:

Rigging the outboard side of the accommodation ladder net – One of the crew will pull the accommodation ladder net from the shipside towards the quay using a long-handled hook. He will make sure to stay clear of the edge of the quay. Another crew member shall hold on to his safety harness line as an additional precaution. Other crew will make fast the outboard side of the net to the outboard side of the accommodation ladder railings such that, should anyone fall between the accommodation ladder and the shipside, that person will be caught in the net.


Step-17:

Completing the job – Ensure that the accommodation ladder net extends at least four meters past the bottom of the accommodation ladder platform so that no person falls in the water in case he trips at the base of the accommodation ladder. After completing this job, the Bosun shall inform the duty officer that the accommodation ladder is ready. Duty Officer shall check that the accommodation ladder, accommodation ladder net, safety notices and sufficient illumination are correctly in place using the checklist CL-003 – Access-Accommodation Ladder-Gangway Checklist. Once he has confirmed that everything on this checklist has been completed, he will sign it and then present it to the Master for his signature. Master will visually confirm that the means of access to the vessel is safe for use before signing the checklist.


Refer to the following documentation in the DocMap system SMS which provides additional guidance;
SP-105: Safe access to and from vessel
SP-102: Working aloft-overside permit

Some ports in the world (eg. USA/Canada/Australia) may require the net to be rigged differently. You must comply with port regulations but follow the safe working practices shown above.

Appendix 5: International Chamber of Shipping's Bridge Procedures Guide (Third edition), Part C Emergency Checklists, C4 man overboard

C4 Man overboard

Actions to be carried out:

- ☐ Release lifebuoy with light and smoke signal on the side the crew member has fallen overboard
- ☐ Take immediate avoiding action so as not to run over the man overboard
- ☐ Sound three prolonged blasts of the ship's whistle and repeat as necessary
- ☐ Post a lookout with binoculars and instructions to maintain a continuous watch on the man overboard
- ☐ Hoist signal flag 'O'
- ☐ Commence a recovery manoeuvre, such as a Williamson turn
- ☐ Engage hand steering, if helmsman available
- ☐ Note ship's position, wind speed and direction and time
- ☐ Inform master, if not already on the bridge
- ☐ Inform engine room
- ☐ Place engines on stand-by
- ☐ Muster rescue boat's crew
- ☐ Prepare rescue boat for possible launching
- ☐ Distribute portable VHF radios for communication
- ☐ Rig pilot ladder/nets to assist in the recovery
- ☐ Make ship's position available to radio room/GMDSS station
- ☐ Broadcast URGENCY message to ships in the vicinity

Other actions:

- ☐
- ☐
- ☐

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09-204 and 09-207	Coastguard rescue vessel *Dive! Tutukaka Rescue* collision with rocks, Taiharuru River entrance Northland, 4 March 2009; Coastguard rescue vessel Trusts Rescue, heavy weather encounter,Manukau Bar, 31 May 2009
10-201	Bulk carrier *TPC Wellington*, double fatality resulting from enclosed space entry, Port Marsden, Northland, 3 May 2010

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