Australian Government
Australian Transport Safety Bureau

Man overboard fatality from the container ship *MSC Siena*

off Fremantle, Western Australia | 17 November 2011

Investigation

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Safety summary

What happened

On 17 November 2011, a wave knocked a seaman off *MSC Siena*'s accommodation ladder while he was rigging a combination pilot ladder in preparation to embark a harbour pilot. The ship was near Rottnest Island off the port of Fremantle. An immediate search for the seaman was initiated by Australian search and rescue agencies but the search was unsuccessful.

What the ATSB found

The ATSB's investigation found that a risk assessment for the task of rigging the pilot ladder was not undertaken and a number of precautions, including taking into account the poor weather conditions, were not taken. With regard to this task, the ship's safety management system was not effectively implemented and documented procedures, including issuing a work permit, were not followed.

What's been done as a result

Senior representatives from Allseas Marine, Greece, *MSC Siena*'s manager, attended the ship in Fremantle and conducted an internal company investigation. Since then, Allseas Marine has taken a number of steps to address the safety issues identified by its own and the ATSB's investigation.

The company's shipboard safety management system procedure for its work permit system has undergone major revision with regard to work over the side and a new, improved work permit form has been introduced. Importantly, the revised procedure specifically addresses the task of working on combination pilot ladders and task specific guidance and precautions have been provided.

Crew induction and familiarisation procedures, particularly for ships new to the company fleet, have been enhanced to support implementation of the revised work permit system procedure. On board training has been improved through safety videos and computer based training focusing on permit to work systems. A fleet wide safety campaign was carried out to promote the company's work permit system. A requirement to report all work for which a permit is necessary to the company and submit the permit forms has been introduced.

Allseas Marine also obtained independent advice with regard to rigging pilot ladders. Based on that advice, the company considers that if pilotage services have not been suspended due to the weather conditions, rigging a pilot ladder may be permissible subject to the master's overriding authority and judgment on safety matters.

The ATSB has assessed the action taken by Allseas Marine and is satisfied that it will adequately address the safety issues identified.

Safety message

Rigging a pilot ladder while working over the side of a ship can be a hazardous task and it is imperative that all the precautions necessary to prevent a person falling overboard are taken.

Contents

The occurrence

In the early hours of 17 November 2011, the 4,542 TEU[1] capacity container ship *MSC Siena* (Figure 1) was in the final stages of its passage from Melbourne to Fremantle. The ship was expected to arrive at the Fremantle pilot boarding ground at about midday.

Figure 1: *MSC Siena* in Fremantle harbour

Source: ATSB

At 0600[2] that day, when the boatswain (bosun) came to the navigation bridge, the chief mate told him that the Fremantle harbour pilot was expected at 1230 and assigned some cleaning jobs for the crew that morning. The weather conditions at the time were recorded in the ship's log book as force[3] 8 (34 to 40 knots[4]) winds from the west, rough seas (2.5 to 4 m) and a moderate swell. The sky was overcast but the visibility was clear.

At 0800, the chief mate handed over the watch to the third mate. At about 0845, the master came to the bridge, checked the ship's progress and noted that the estimated time of arrival (ETA) at the pilot boarding ground was 1230. He reminded the third mate to ask for pilot ladder requirements when giving the required 2 hour arrival notice to the Fremantle pilot station. The master then left with the intention of returning to the bridge at 1130.

At 1025, the third mate called the pilot station using the very high frequency (VHF) radio and provided the ship's ETA (1230) and its maximum draught (12.20 m). He was informed that the pilot would board the ship on arrival and a pilot ladder was required on its port side, with its lowest step 2.5 m above the waterline.

At 1031, the third mate advised the bosun using a hand-held radio that the pilot was expected at 1230 and what the pilot ladder requirements were. The bosun passed this information to the crew and indicated that they would start rigging the pilot ladder at about 1100, after completing their cleaning jobs.

At 1100, *MSC Siena* was south-southwest of Rottnest Island and on a course of 016º (T) at a speed of 15 knots (Figure 2). The now force 7 (28 to 33 knots) westerly wind was on the port beam and the ship was rolling easily in the rough seas and swell. The next course alteration to 071º (T), towards the pilot boarding ground, was due at about 1135.

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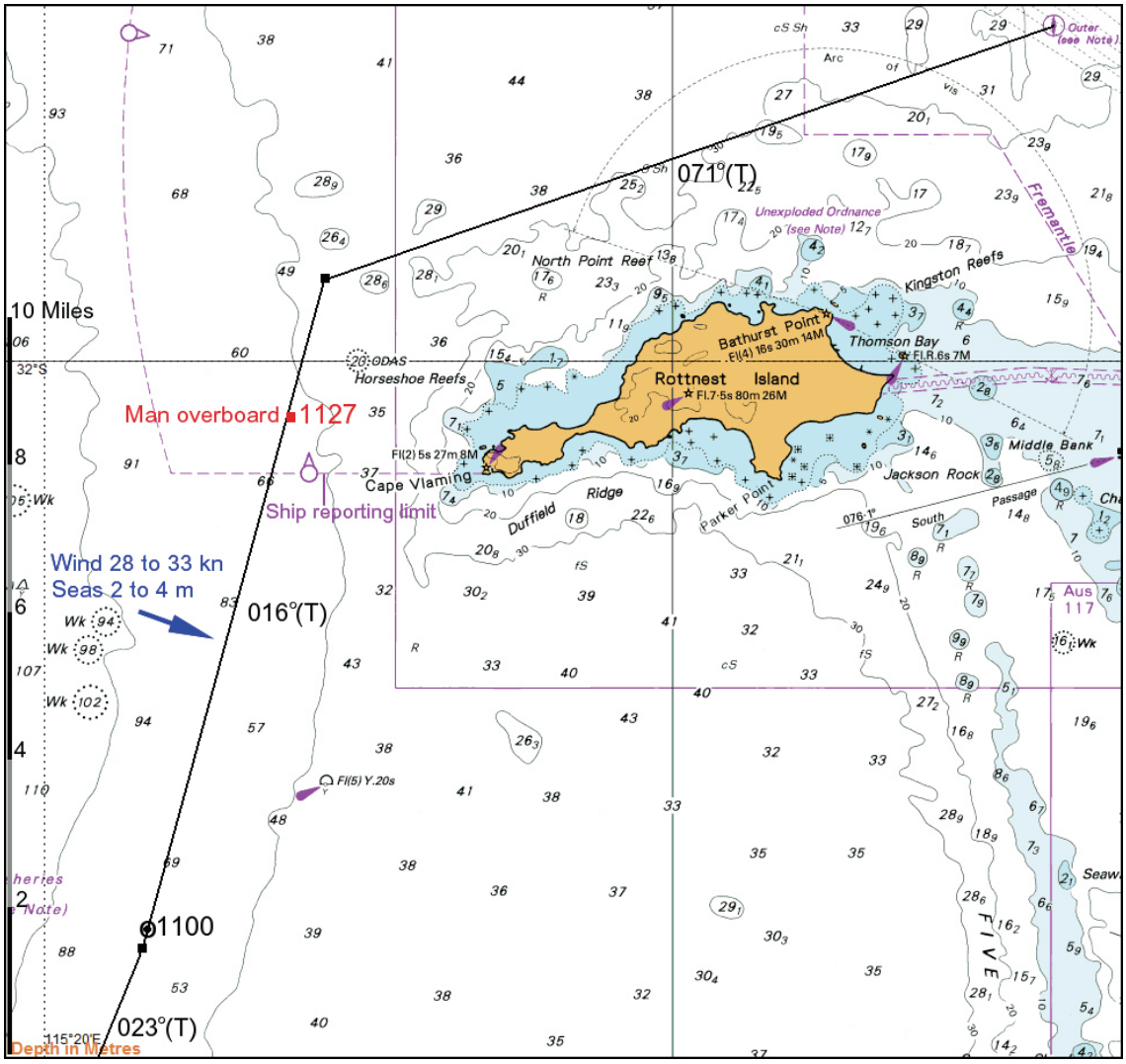
1 Twenty-foot Equivalent Unit, a standard shipping container. The nominal size of a ship in TEU refers to the number of standard containers that it can carry.

2 All times referred to in this report are local time, Coordinated Universal Time (UTC) + 8 hours.

3 The Beaufort scale of wind force, developed in 1805 by Admiral Sir Francis Beaufort, enables sailors to estimate wind speeds through visual observations of sea states.

4 One knot, or one nautical mile per hour, equals 1.852 kilometres per hour.

Figure 2: Section of navigational chart Aus 754 showing the ship's location



Source: Australian Hydrographic Service

Shortly after 1100, the bosun, two ordinary seamen and the deck cadet went to rig the combination pilot ladder[5] (Figure 6) on the ship's port side. After they had swung out the accommodation ladder, one of the ordinary seamen (OS), with some assistance from the other seaman, donned a full body safety harness (Figure 3). He connected the harness lanyard to a rope that was pre-attached to a railing on deck and stepped onto the ladder's top platform. The OS secured the top platform stanchions and handrails and then, with help from the other men, lifted and secured the ladder's side handrails and bottom platform stanchion.

At about 1115, the accommodation ladder was lowered until the bottom platform was about 7 m below the main deck, the usual level for rigging a combination ladder. The OS connected his harness lanyard to a longer rope, also pre-attached to a railing on deck, and descended the accommodation ladder. Using a rope, he lashed the lower part of the accommodation ladder to a set of lugs recessed in the ship's side (Figure 4). Meanwhile, the crew on deck lowered the pilot ladder so that its lowest step would be about 2.5 m above the waterline (in a calm sea).

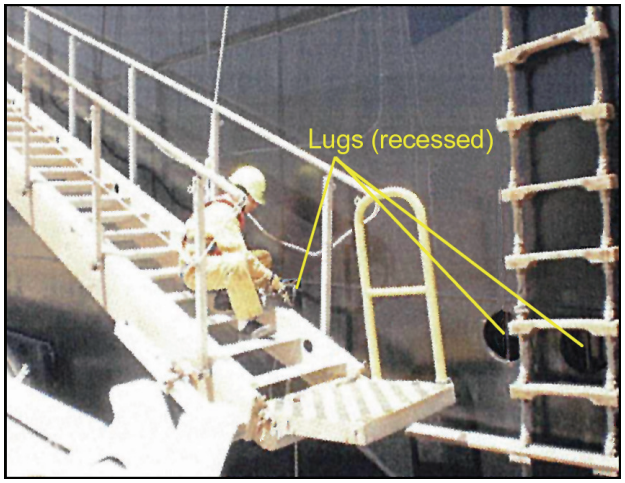
By this time, *MSC Siena* had arrived near the ship reporting limit west of Rottnest Island (Figure 2). At 1122, the third mate reported the ship's position to the 'Port of Fremantle' and was advised that the pilot would board at 1230, as scheduled.

[5] Combined use of an accommodation ladder and standard pilot ladder (described in the 'Context' section of the report).

Figure 3: The same type of safety harness as used on 17 November (front and back)

Source: ATSB

Figure 4: *MSC Siena*'s combination pilot ladder



Source: Australian Maritime Safety Authority

At about the same time, the OS stepped onto the accommodation ladder's bottom platform, which was about 3.5 m above the waterline (in a calm sea). He started lashing the pilot ladder to another set of shipside lugs with a rope. The bosun stood at the winch control stand of the accommodation ladder, keeping an eye on the OS, the cadet was near the bosun and the seaman stood by the pilot ladder stowage drum.

At about 1123, as the bosun watched the OS, he saw a 'large wave suddenly rise up' and strike the underside of the bottom platform of the accommodation ladder with force (the rope lashing the ladder to the shipside lugs parted). A loud bang was heard on deck and the bosun then saw the OS hanging from his harness rope, under the accommodation ladder's bottom platform. Seeing that the OS had fallen off the ladder, the bosun began yelling.

On hearing the yells, the seaman and the cadet looked over the side and saw the OS suspended about 1 m below the bottom platform. He was shouting for help while trying to hold on to the lower part of the pilot ladder. His legs were often submerged in the rough seas which were pounding his body against the ship's side, the platform and the pilot ladder, and repeatedly breaking his hold on the ladder.

The bosun, helped by the other two men on deck, tried to pull the OS up by heaving on the harness rope. However, he was caught under the accommodation ladder's bottom platform and they could not pull him up.

Just after 1124, the bosun reported to the bridge on his hand-held radio that the OS had 'fallen' off the ladder. The third mate asked the bosun to repeat the message because he had not understood it. The bosun tried to explain the situation, telling the third mate that the OS was 'hanging'. Still unsure about what had happened, the third mate went out onto the port bridge wing to have a look.

The seaman on deck watched in shock as the OS, who appeared injured, went limp as he hung suspended by the harness rope, swinging fore and aft and side to side. Meanwhile, the cadet had run aft to the ship's accommodation and telephoned the bridge.

From the bridge wing, the third mate saw the OS hanging and ran back inside. He answered the telephone just after 1126, and the cadet told him that the OS had fallen off the ladder and asked him to turn the ship to port. The third mate said that he would call the master.

At 1127, the third mate used the public address (PA) system to announce an 'emergency' and asked for the 'master to come to the bridge immediately'. At the same time, the bosun, whose voice indicated panic and urgency, reported to the bridge that the OS had fallen into the sea. The bosun did not know at the time that the OS had come out of his harness. *MSC Siena* was about 3 miles[6] west of Rottnest Island, in position 32º 00.85'S 115º 23.95'E.

The bosun threw a lifebuoy toward the OS but it landed 5 m from him. The OS was submerged and making no attempt to swim as he drifted aft. To keep him in sight from the moving ship, the bosun and the seaman ran aft. When they were abreast of the accommodation, the cadet came out on deck and saw the submerged OS. He threw another lifebuoy into the water before losing sight of the OS.

Meanwhile, the master had heard the PA announcement and hurried up to the bridge. The third mate informed him that the OS had fallen overboard while rigging the pilot ladder on the port side. The master checked the chart to assess the ship's general location before going onto the port bridge wing. He saw two lifebuoys astern of the ship but no sign of the OS.

By 1128, the master had taken over the conduct of the ship and started a 'Williamson Turn'.[7] On his orders, the third mate released the bridge-wing lifebuoy (fitted with a smoke signal) and then sounded the general alarm to muster the crew. The cadet had come up to the bridge and he was keeping a lookout in place of the duty seaman, who was now steering the ship.

At 1129, the third mate broadcast a Mayday (distress) call on the VHF radio to report a man overboard and provided the ship's position. Perth coast radio acknowledged the distress call, obtained necessary information and then relayed the distress message to stations in the area and to the Rescue Coordination Centre (RCC) in Canberra. Fremantle water police took charge of coordinating the emergency response to search for and recover the OS.

A nearby charter fishing vessel was the first to respond to the emergency call. At 1136, its crew located two lifebuoys and an inflated automatic type lifejacket with its buckle undone (Figure 5). Another small vessel soon joined the search.

By 1152, *MSC Siena* had returned to the area being searched with its lifeboats ready for a man overboard recovery. By then, the OS's boots, with the laces done up, had been located and recovered by the fishing vessel.

At 1222, a water police vessel arrived at the scene and took charge of the surface search. At 1246, a police helicopter located the lifebuoy with the smoke signal a short distance from the other lifebuoys. By this time, a number of other vessels, helicopters and a fixed wing aircraft had joined, or been tasked to join, the search.

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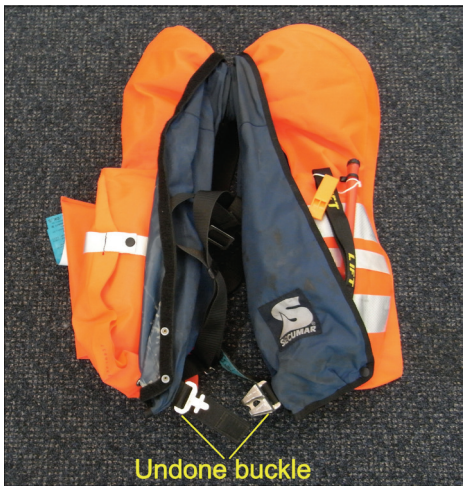
6 A nautical mile of 1852 m.

7 A recognised manoeuvre to quickly return the ship to a person overboard position and attempt recovery.

Figure 5: Inflated lifejacket



Source: ATSB

By 1300, search coordinators had decided that *MSC Siena* should be berthed in the port because it was not required for the search. Fremantle Port advised the master to proceed to the pilot boarding ground and at 1330, a pilot boarded the ship for its entry into Fremantle harbour.

The search continued and included the western end of Rottnest Island, in case the missing OS had swum ashore.

By 1624, *MSC Siena* had been secured alongside its berth in the port of Fremantle. Police officers boarded the ship and retained the harness that the OS had been wearing. The harness had been found with the right leg and chest buckles (that is, two of its four buckles) undone.

Meanwhile, up to 20 air and surface craft continued searching for the OS until 1950, when the search was suspended for the night.

At 0600 on 18 November, the search for the OS was resumed with the deployment of up to 17 air and surface craft. At 1045, specialist advice obtained from a doctor indicated that the best case scenario for the OS's survival in the conditions prevailing in the area was 24 hours.

At 1230, about 25 hours after the accident, the search for the missing OS was called off and all deployed resources were stood down. The body of the OS was never found.

Context

MSC Siena's management and crew

MSC Siena had been managed by Allseas Marine, Greece, since May 2011 (6 months before the accident). Its crew of 24 comprised 20 Filipinos, three Ukrainians and one Russian, all of whom were appropriately qualified for their positions.

The master began his 6 year maritime training in 1990 in Ukraine before sailing as a deck officer. In 2007, he obtained his Ukrainian master's certificate of competency and he began sailing as a master in 2009. *MSC Siena* was his fourth assignment as master and his first ship with Allseas Marine. He had joined the ship 2 months before the accident.

The chief mate started his seagoing career in 1987 in Russia. In 1998, he obtained a Russian chief mate's certificate of competency and began sailing at that rank. He had joined *MSC Siena*, his first ship with Allseas Marine, 3 weeks before the accident.

The boatswain (bosun) started his seagoing career in 1998 after training in the Philippines. He had been bosun since 2008. He joined *MSC Siena*, his first ship with Allseas Marine, 6 months before the accident.

The ordinary seaman (OS) who was lost overboard first went to sea in 2005 as a deck cadet after completing his training in the Philippines. *MSC Siena* was his fourth assignment as an OS, and the first with Allseas Marine. He had joined the ship 6 months before the accident.

Pilot ladders

Pilots embarking or disembarking a ship using a pilot boat do so by means of a pilot ladder because it is safer and easier to transfer between the boat and a relatively light and flexible pilot ladder than directly to/from a rigid and heavy accommodation ladder.

If a ship's freeboard[8] is more than 9 m, a combination pilot ladder (Figure 6) is required. Even with freeboards less than 9 m, combination ladders are often used because they are considered safer.[9] However, since rigging a combination ladder involves working over the side, there is a higher risk of a crew member falling overboard while rigging it.

Previous occurrences

Occurrences where a person has fallen overboard are not unusual and, in many cases, the person is either not found or recovered alive. In 2010, a report published by the United Kingdom's Marine Accident Investigation Branch documented a number of such occurrences. Inadequate risk assessments and/or deficiencies with ladders and associated equipment, generally, were found to have contributed to those occurrences.[10]

Lifejacket and safety harness use on 17 November

An inflated lifejacket, with its buckle undone, was found during the search for the missing OS. However, the evidence suggests that he may not have been wearing the lifejacket when he was knocked off the accommodation ladder.

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8 The vertical distance between the waterline and the ship's main deck.

9 In addition to reducing the vertical climb up the pilot ladder, the slope of the accommodation ladder offers an easier climb and its handrails provide added security.

10 Marine Accident Investigation Branch, *Ever Elite*, Fatality on 10 Sep 2009, Report No 8/2010, Sec 1.17, pp. 33-35. <www.maib.gov.uk/cms_resources.cfm?file=/Ever_Elite_Report.pdf>

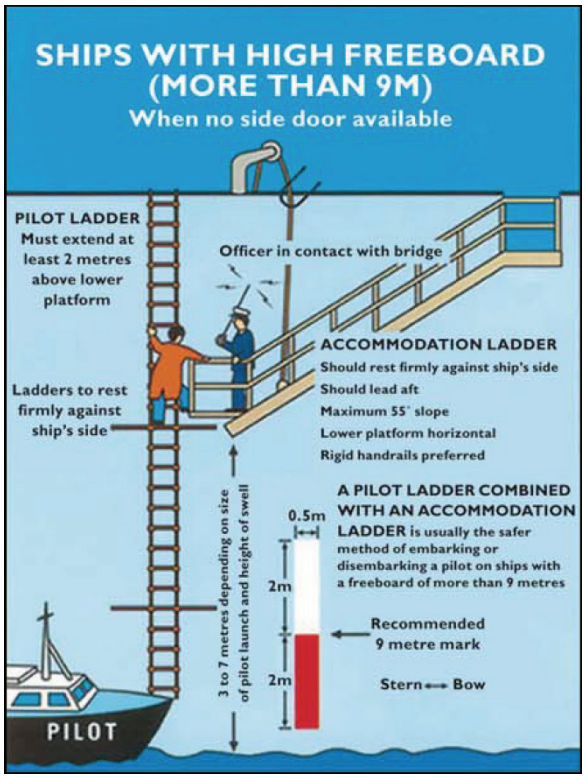
After the OS fell, he was only ever seen underwater (that is, not floating). Shortly after the search for him began, the crew reported to search coordinators ashore that the OS had not been wearing a lifejacket, just a safety harness.

At interview, one crew member claimed that the OS was wearing a lifejacket under his harness, another could not remember if one was worn and the third thought that, if worn, it should have been over the harness.

It is possible but unlikely that the OS was wearing the lifejacket with its buckle undone, or that he managed to undo it while he was being pounded against the ship's side. It is more likely that he was not wearing a lifejacket and that it was thrown overboard at the same time as the lifebuoys.

Given that the search resulted in finding all the various floating items, it is likely that the OS would also have been found if he had been floating, either with or without a lifejacket.

Figure 6: Combination pilot ladder poster



Source: International Maritime Pilot's Association

It is not known exactly how the OS came out of the harness. None of its buckles or straps failed nor did the lanyard. However, the two buckles found undone would have made it easier to come out of the harness.

The only explanation for the undone buckles is that either they had not been done up or the OS undid them to avoid being pounded against the ship's side (the latter is unlikely because it is difficult to undo a buckle with weight on it). The OS was seen hanging limp and his upper back, shoulder and one arm appeared deformed, indicating that he was injured and probably unconscious. In such a condition, loss of muscle tone would have made slipping out of the harness more likely, particularly as the OS's body was lifted and tossed about by the waves.

In any case, it is improbable that the OS could have survived the injuries he would have suffered as his body was pounded against the ship's side while hanging in the harness for about 4 minutes.

It is worth noting here that wearing a lifejacket with a full body harness presents some practical problems. The lifejacket can properly inflate only when it is worn over the harness. However, depending on the design of each, they could interfere with each other (for example, the lifejacket covering the harness lanyard or its dorsal D-ring or hook). To overcome such problems, lifejackets which incorporate a full body harness are available for shipboard use. However, such lifejackets were not available on board *MSC Siena* and their use on board ships was not mandatory.

Safety analysis

Pilot ladder rigging on 17 November

MSC Siena's usual freeboard meant that the crew always rigged a combination pilot ladder. The task was a normal part of port calls and the crew had carried out the task more than 30 times in the 2 months before the accident.

Rigging the combination pilot ladder involved the risk of working over the side on the accommodation ladder. Exposure to rough weather when rigging the combination ladder increased the risk and the difficulty of the task. The accommodation ladder's bottom platform was normally about 3.5 m above the waterline (in calm seas) and the pilot ladder's lower steps closer to the water. Therefore, the sea, swell and wind were important considerations when undertaking this work over the side.

From the early hours of 17 November, *MSC Siena*'s port side was fully exposed to gale force winds and 2 to 4 m waves. However, with regard to rigging the pilot ladder, no one on board the ship properly considered these weather conditions before the rigging task was started.

The chief mate felt that it was sufficient to advise the bosun of the expected pilot boarding time but not to discuss the actual rigging of the pilot ladder. Neither was the subject discussed at the change of watch between the chief and third mates. It was not until the master reminded the third mate to check the pilot ladder requirements that the side on which the ladder was required was given any thought.

However, once the pilot ladder requirements were obtained, the precautions to safely rig the ladder by taking into account the weather and other risks were not considered. Other than passing on the ladder requirements, no communication took place between the crew on deck and the bridge. The bosun was not instructed when he should rig the ladder nor did he ask when it should be rigged. Neither was there any communication when the task was started.

The crew's usual lunch time of 1200 may have been a factor in deciding when to rig the pilot ladder. Starting the task at 1100 meant that the ladder would be ready by about 1130, allowing the crew sufficient time to clean up, have lunch and then standby to receive the pilot at 1230.

The 016º (T) to 071º (T) course alteration, expected at 1135, would have reduced exposure to weather on the ship's port side. However, no one considered the ship's course, weather or an appropriate time/opportunity to rig the pilot ladder. Consequently, while various crew members knew the pilot ladder was required at 1230, there was little planning and preparation to ensure it was rigged at the safest possible time.

Risk assessment

An effective risk assessment for the task of rigging a combination pilot ladder should be centred about preventing a person working over the side falling overboard. On 17 November, had a risk assessment been carried out on board *MSC Siena*, the weather, along with other relevant risk factors, would probably have been considered and the accident may have been prevented.

Any person working over the side must be appropriately tethered to a strong point on the ship. This must ensure that in case of a fall, a person does not fall overboard, is not seriously injured and can be safely recovered. Tethering equipment generally includes a full body safety harness connected to a fall arrestor secured to a strong point, as nearly as possible vertically above the work site.

A fall arrestor has an inertia reel mechanism (like a car's seatbelt) to allow some freedom of movement while keeping a constant tension on the safety line. In case of a fall, the jerking motion on the inertia reel causes it to stop paying out. As a result, the fall is arrested and the person is left

suspended in the harness which is designed to evenly distribute weight and avoid injury. To be effective, the equipment must be free from defects and correctly worn/used.

The bosun indicated that the fall arrestor stored in the crew's change room (Figure 7) was used when working at heights (for example, on a mast) but not when rigging a combination pilot ladder. This suggests that *MSC Siena*'s crew did not consider rigging a combination ladder as working at a height. For rigging a ladder, they hooked the harness lanyard to the eye of a tethering rope, the other eye of which was secured to a handrail adjacent to the accommodation ladder (Figure 8).

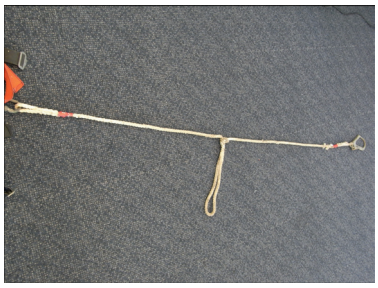
Figure 7: Fall arrestor

Source: ATSB

Figure 8: Tethering rope used

Source: Australian Maritime Safety Authority

Figure 9: Knotted lanyard



Source: ATSB

The tethering rope was secured to the middle handrail, 6.9 m above the shipside lugs (the level of the accommodation ladder's bottom platform when lowered). To be a useful tether while allowing sufficient freedom of movement while on the platform, the effective length of the rope should have been no more than 6.5 m.

However, the effective length of the rope was 8.05 m, about 1.5 m longer than required. This was because the 5.9 m long tethering rope led directly from the middle handrail to the harness lanyard, which had been knotted and shortened to 2.15 m (Figure 9). Consequently, when the OS fell off the ladder, he was left hanging more than 1 m below the ladder's platform, and 2.5 m above the waterline (in a calm sea). With his head about 1 m under the platform, his body would have been continually struck by the 2 to 4 m waves and pounded against the ship's side and/or the platform.

Furthermore, the effective length of the rope could be varied (for example, leading it over the top handrail would make it 0.7 m shorter), which introduced unnecessary variability and a greater likelihood of error.

The 32 mm diameter, polypropylene tethering ropes were already in place when the crew joined the ship 6 months before the accident. The crew did not consider whether or not they were suitable, they simply used them because they were there. A proper risk assessment might have established an appropriate rope length and method of use, and possibly considered the use of a fall arrestor. The suitability of using handrails as a strong point should also have been assessed.

After the accident, many of the risk factors became evident to the crew involved. All of them felt that the weather conditions should have been considered before rigging the pilot ladder. The third mate and the chief mate noted that a safer opportunity for the task would have presented itself after 1135, when the course alteration was due. Both mates and the bosun acknowledged that either the bridge should have instructed the crew when to start the task or been informed before it was started. The master expressed similar thoughts, recalling occasions in the past when he had altered a ship's course to allow the crew to safely rig a pilot ladder.

However, the manner in which the pilot ladder was being rigged on 17 November was routine for the crew. A general or specific risk assessment for the task was never carried out and a number of bad habits had developed. As a result, some of the precautions being taken were ineffective while others were not taken. Importantly, relevant safety management system (SMS) procedures were not followed.

MSC Siena's procedure for work over the side

MSC Siena's SMS included a 'permit to work system'[11] for controlling hazardous tasks. The SMS described the permit to work system, including when and how it was to be used. The system included a number of work permit forms for the various types of hazardous tasks, including an 'aloft/outboard work permit'[12] form.

As rigging a combination pilot ladder involves work over the side (that is, outboard), it follows that a permit was required when carrying out this task on board *MSC Siena*.

In addition, the permit to work system procedure described general instructions for working aloft or over the side, including evaluating the work beforehand (that is, a risk assessment). The instructions stated that the 'work aloft/outboard should only be carried out by experienced personnel and job safety analysis form[13] as well [as] aloft/outboard work permit form has been issued'. The permit form consolidated the general instructions for work aloft or over the side and together these documents covered all the risks that should be considered for such tasks.

Safety harnesses, lifelines, lifejackets and the weather were amongst the items listed on the work permit. The general instructions also covered these items and reiterated weather considerations and the use of 'fall arrest gear'. The master or a responsible officer had to sign the permit and the person carrying out or in charge of the task had to countersign it. Therefore, issuing a permit was intended to ensure that the ship's management and those carrying out the task considered the risks and took the necessary precautions.

On 17 November, a work permit to rig the pilot ladder was not issued. In fact, the last and only time that a permit for this task had been issued was on 13 June 2011, about 5 months before the accident. This shows that the procedural requirements for working over the side were routinely not followed and formal safety oversight by the responsible officer issuing the permit was missing. Consequently, the risks that should have been considered on every occasion were routinely ignored.

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11 Allseas Marine, *Shipboard Operations Manual*, SOMC 7.7, Permit to Work System, SOMC/7.7, Rev 1, 15/01/2011.

12 Working aloft was defined as involving a risk of falling more than 4 feet (1.2 m) and instructions were provided to cover the general precautions when working aloft or over the side.

13 At the time of the accident, only the work permit form applied because the job safety analysis form had been removed from the SMS but the general instructions had not been amended to reflect its removal.

One of *MSC Siena*'s work permit requirements stated that the ship 'should not be underway when working over side'. The term underway was probably intended to generally describe a ship moving through the water. However, as a matter of course and of necessity, a pilot ladder on any ship is often rigged when the ship is moving in harbour waters or their approaches. Therefore, it was not possible to comply with all the requirements of the permit when rigging a pilot ladder. It is possible that the inability to comply with the permit requirements was one of the motivators in the crew's decision not to issue permits for the task of rigging a pilot ladder.

While a specific reference to pilot ladders in the permit form or a job safety analysis for the task may have been helpful to *MSC Siena*'s crew in following the SMS procedure, shipboard management could also have sought clarification with regard to the procedure and permit form from Allseas Marine. However, this was not done. In any case, recognised precautions for the task based on the ordinary practice of seamen, reiterated by the general instructions described in the procedure, could have routinely been taken without being totally reliant on the issue of a permit.

On 17 November, the work permit requirements for rigging the combination pilot ladder were not complied with and a permit was not issued. Furthermore, the procedure and general instructions for working over the side, which the permit consolidated, were routinely ignored when rigging a pilot ladder.

Findings

On 17 November 2011, a wave knocked a seaman off *MSC Siena*'s accommodation ladder while he was rigging a combination pilot ladder in preparation to embark a harbour pilot. The ship was near Rottnest Island off the port of Fremantle. An immediate search for the seaman was initiated by Australian search and rescue agencies but the search was unsuccessful.

From the evidence available, the following findings are made with respect to the incident and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- On 17 November 2011, a risk assessment for the task of rigging *MSC Siena*'s combination pilot ladder was not carried out. Consequently, the weather conditions, safety harness tethering, wearing of a lifejacket and communication were amongst the factors that were not properly considered before the crew started rigging the ladder.
- *MSC Siena*'s safety management system procedure for working over the side required that a risk assessment be carried out, and necessary checks and precautions documented in a work permit. However, the procedure had not been effectively implemented on board the ship. *[Significant safety issue]*
- *MSC Siena*'s permit to work over the side and the associated procedure required that the ship not be underway when working over the side. However, this requirement could not be complied with when working over the side to rig a combination pilot ladder. *[Minor safety issue]*

Safety issues and actions

The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the responsible organisations for the safety issues identified during this investigation were given a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

Procedure for work over the side

Number:	MO-2011-010-SI-01
Issue owner:	Allseas Marine, Greece
Operation type:	Shipmanager
Who it affects:	All ship owners, operators, masters and crew
Risk:	Significant

Safety issue description:

MSC Siena's safety management system procedure for working over the side required that a risk assessment be carried out, and necessary checks and precautions documented in a work permit. However, the procedure had not been effectively implemented on board the ship.

Current status:

Residual risk: Minor
Issue status: Adequately addressed
Justification: Proactive safety action has been taken by Allseas Marine, Greece.

Proactive safety action taken by: Allseas Marine, Greece

Allseas Marine advised the ATSB of a number of measures that it has taken to address the safety issue. In summary, these corrective measures are:

- Major revision of the shipboard safety management system procedure for working over the side. The revised work permit system procedure specifically identifies the task of working on combination pilot ladders, including the applicable work permit form and risk assessment. The procedure describes task specific precautions associated with the weather conditions, safety harnesses, fall arrest devices, inflatable buoyancy aids, communication and other factors.
- Company procedures with regard to the induction and familiarisation of the crew of ships entering the fleet have been revised to enhance the implementation of procedures.
- A pre-assignment crew induction program has been launched at company and manning agent offices. The program introduced the issue of personal pocket safety booklets, enhanced safe work practice presentations and safety equipment demonstrations related to work permits.
- Safety videos and computer based training programs with a focus on work permit systems and other safety matters have been provided to enhance training on board company ships.
- A safety campaign promoting the principles of the work permit system has been carried out on board all ships in the fleet and the company's office.
- A requirement to report all work for which a permit is necessary and to submit the permit forms to the company has been introduced to improve the implementation of the work permit system.

Action number: MO-2011-010-NSA-010

Action status: Closed

ATSB response: The ATSB is satisfied that the action taken by Allseas Marine, Greece will adequately address the safety issue.

Permit to work

Number:	MO-2011-010-SI-02
Issue owner:	Allseas Marine, Greece
Operation type:	Shipmanager
Who it affects:	All ship owners, operators, masters and crew
Risk:	Minor

Safety issue description:

MSC Siena's permit to work over the side and the associated procedure required that the ship not be underway when working over the side. However, this requirement could not be complied with when working over the side to rig a combination pilot ladder.

Proactive safety action taken by: Allseas Marine, Greece

Allseas Marine advised the ATSB that the work permit system procedure was revised to better address work over the side and provided details as described with respect to safety issue number MO-2011-010-SI-01. An improved 'permit to work overside' form supports the revised procedure, which includes the following guidance that is relevant to working on combination pilot ladders:

> Work must not be carried out over-side when the ship is underway unless proper risk assessment has taken place and all precautions have been taken and always subject to master's discretion. … Any such work should be closely monitored / watched by a responsible officer.

Allseas Marine also advised that it had obtained independent advice with regard to rigging pilot ladders. Based on that advice, the company considers that when pilotage services have not been suspended due to weather conditions, rigging a pilot ladder may be permissible subject to the master's overriding authority and judgment on safety matters.

Action number: MO-2011-010-NSA-011

Action status: Closed

General details

Occurrence details

Date and time:	17 November 2011 - 1127 (UTC + 8 hours)	
Occurrence category:	Accident	
Primary occurrence type:	Fatality (man overboard)	
Type of operation:	Deck operation (rigging pilot ladder)	
Location:	Off Fremantle, Western Australia	
	Latitude: 32° 00.85’ South	Longitude: 115° 23.95’ East

Ship details

Name	*MSC Siena*
IMO number	9252096
Call sign	A8ZK6
Flag	Liberia
Classification society	Germanischer Lloyd
Ship type	Container ship (fully cellular)
Builder	Stocznia Gdynia, Poland
Year built	2006
Owner(s)	Aral Sea Shipping, Liberia
Operator	Mediterranean Shipping Company, Switzerland
Manager	Allseas Marine, Greece
Gross tonnage	52,701
Deadweight (summer)	58,261 tonnes
Summer draught	13.20 m
Length overall	291.68 m
Moulded breadth	32.24 m
Moulded depth	21.80 m
Main engine(s)	MAN B&W 7K98MC, two stroke single acting diesel engine
Total power	45,660 kW
Speed	24.0 knots

Sources and submissions

Sources of information

On 19 November 2011, two investigators from the Australian Transport Safety Bureau (ATSB) attended *MSC Siena* while the ship was berthed in Fremantle. The master and directly involved crew members were interviewed. Photographs of the ship and copies of relevant documents and records, including data from the ship's voyage data recorder, were obtained.

On 20 November, the investigators sighted evidence retained by the Fremantle water police. The police also provided additional information subsequently.

Through the course of the investigation, further information was provided by *MSC Siena*'s master, Germanischer Lloyd and the Australian Maritime Safety Authority (AMSA).

References

Allseas Marine, Greece, *Shipboard Operations Manual*, Rev 1, 15 January 2011.

Australian Maritime Safety Authority, *Code of Safe Working Practice for Australian Seafarers*, Australia, 1999.

Australian Transport Safety Bureau, *Marine Pilot Transfers*, Research and Analysis Report, Australia, 2006. <http://www.atsb.gov.au/media/32718/grant_200667474.pdf>

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International Chamber of Shipping, *Bridge Procedures Guide*, Fourth Edition, UK, 2007.

International Maritime Organization, *International Convention for the Safety of Life at Sea (SOLAS)*, 1974, as amended, UK.

International Maritime Pilot's Association, *Safety Campaign 2007*, UK.

International Maritime Pilot's Association, International Chamber of Shipping and International Shipping Federation, *Shipping industry guidance on the rigging of ladders for pilot transfer (Ensuring compliance with SOLAS)*, First edition 2008, UK.

Marine Accident Investigation Branch, *Ever Elite*, Fatality on 10 Sep 2009, Report No 8/2010, Sec 1.17, pp. 33-35, MAIB, UK. <www.maib.gov.uk/cms_resources.cfm?file=/Ever_Elite_Report.pdf>

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to *MSC Siena*'s master, chief mate, third mate, boatswain, ordinary seaman (witness) and deck cadet, Allseas Marine, the Liberian International Ship & Corporate Registry, the Australian Maritime Safety Authority (AMSA), Germanischer Lloyd (GL) and the Fremantle Water Police.

Submissions were received from *MSC Siena*'s master, third mate and boatswain, Allseas Marine, the Liberian International Ship & Corporate Registry, the Australian Maritime Safety Authority (AMSA) and the Fremantle Water Police. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

Terminology used in this report

***Occurrence*:** accident or incident.

***Safety factor*:** an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (for example, engine failure, signal passed at danger, grounding), individual actions (for example, errors and violations), local conditions, current risk controls and organisational influences.

***Contributing safety factor*:** a safety factor that, had it not occurred or existed at the time of an occurrence, then either: (a) the occurrence would probably not have occurred; or (b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or (c) another contributing safety factor would probably not have occurred or existed.

***Other safety factor*:** a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

***Other key finding*:** any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which 'saved the day' or played an important role in reducing the risk associated with an occurrence.

***Safety issue*:** a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

***Risk level*:** The ATSB's assessment of the risk level associated with a safety issue is noted in the Findings section of the investigation report. It reflects the risk level as it existed at the time of the occurrence. That risk level may subsequently have been reduced as a result of z taken by individuals or organisations during the course of an investigation.

Safety issues are broadly classified in terms of their level of risk as follows:

- **Critical safety issue:** associated with an intolerable level of risk and generally leading to the immediate issue of a safety recommendation unless corrective safety action has already been taken.
- **Significant safety issue:** associated with a risk level regarded as acceptable only if it is kept as low as reasonably practicable. The ATSB may issue a safety recommendation or a safety advisory notice if it assesses that further safety action may be practicable.
- **Minor safety issue:** associated with a broadly acceptable level of risk, although the ATSB may sometimes issue a safety advisory notice.

***Safety action*:** the steps taken or proposed to be taken by a person, organisation or agency in response to a safety issue.

Australian Transport Safety Bureau

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Investigation

ATSB Transport Safety Report
Marine Occurrence Investigation

Man overboard fatality from the container ship *MSC Siena* off Fremantle, Western Australia, 17 November 2011

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Final