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Australian Transport Safety Bureau

Man overboard fatality from *Cape Splendor*

Port Hedland, Western Australia | 6 October 2014



Investigation

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Addendum

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Safety summary

What happened

On 6 October 2014, *Cape Splendor's* boatswain (bosun) descended to the lower platform of the ship's accommodation ladder during his lunch break. He intended to fish from this location and asked a seaman to assist. At 1250, the bosun lost his balance and fell into the sea.

The seaman immediately returned to the ship's deck and threw a lifebuoy toward the bosun, before raising the alarm. The ship's crew deployed its rescue boat within 10 minutes, and an extensive air and sea search continued for 3 days. However, the bosun was not found.

What the ATSB found

The ATSB found that the bosun and the seaman were not wearing any flotation devices or fall prevention equipment. The bosun had seen fish below the accommodation ladder that was in the shade, and he probably saw it as a good opportunity to fish without considering the risks involved. The lack of a lifejacket, wet clothing, and possible entanglement with fishing gear, sea conditions, and the current would have adversely affected the bosun's ability to stay afloat and swim.

The ATSB investigation also identified that the ship's safety management system procedures for working over the ship's side were not effectively implemented. Hence, the ship's crew routinely did not take all the required safety precautions when working over the side. It was also found that the crew had differing attitudes to taking safety precautions during work and recreation times as the safety culture on board was not well developed.

What's been done as a result

Cape Splendor's managers conducted a fleet-wide review of procedures and training to ensure ship crews comply with procedures and permits to work, with particular emphasis on working aloft and/or over the side. A number of fleet-wide memoranda describing the accident were issued to promulgate lessons learned, encourage compliance with policies and procedures, and reiterate the importance of taking safety precautions during both work and during leisure periods.

The ship's managers have prohibited fishing from ships' accommodation ladders and warning signs have been posted. Man overboard recovery procedures were reviewed and the accident was highlighted in training programmes.

The ATSB has issued a safety advisory notice (SAN) to shipmasters, owners, and operators to promote the importance of an effective safety culture on board ships. The SAN reinforces the importance of safety awareness at all times, during both work and recreational activities.

Safety message

Any task or activity that involves a person being on a ship's accommodation ladder or other locations over the side of the ship can result in serious or fatal injury. Therefore, precautions to prevent a person from falling overboard, and to improve survivability in case one does fall into the water, are critical. It is important to ensure that these precautions are always taken, regardless of whether the person is engaged in work, recreational or other activities.

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The occurrence

On 27 September 2014, the bulk carrier *Cape Splendor* (Figure 1) anchored about 13 miles¹ off Port Hedland, Western Australia (Figure 2). The ship was awaiting a berth to load iron ore.

While at anchor, the ship's crew went about routine duties - cleaning, painting and minor maintenance tasks. During the morning of 5 October, the master received information that the ship was scheduled to berth in the early hours of 7 October.

Figure 1: *Cape Splendor* at anchor off Port Hedland (the accommodation ladder is rigged)



Source: ATSB

At 0645² on 6 October, at their daily meeting to plan work, the chief mate gave the boatswain (bosun) a number of tasks in preparation for the ship's berthing. The tasks included preparing the mooring lines and accommodation ladder.

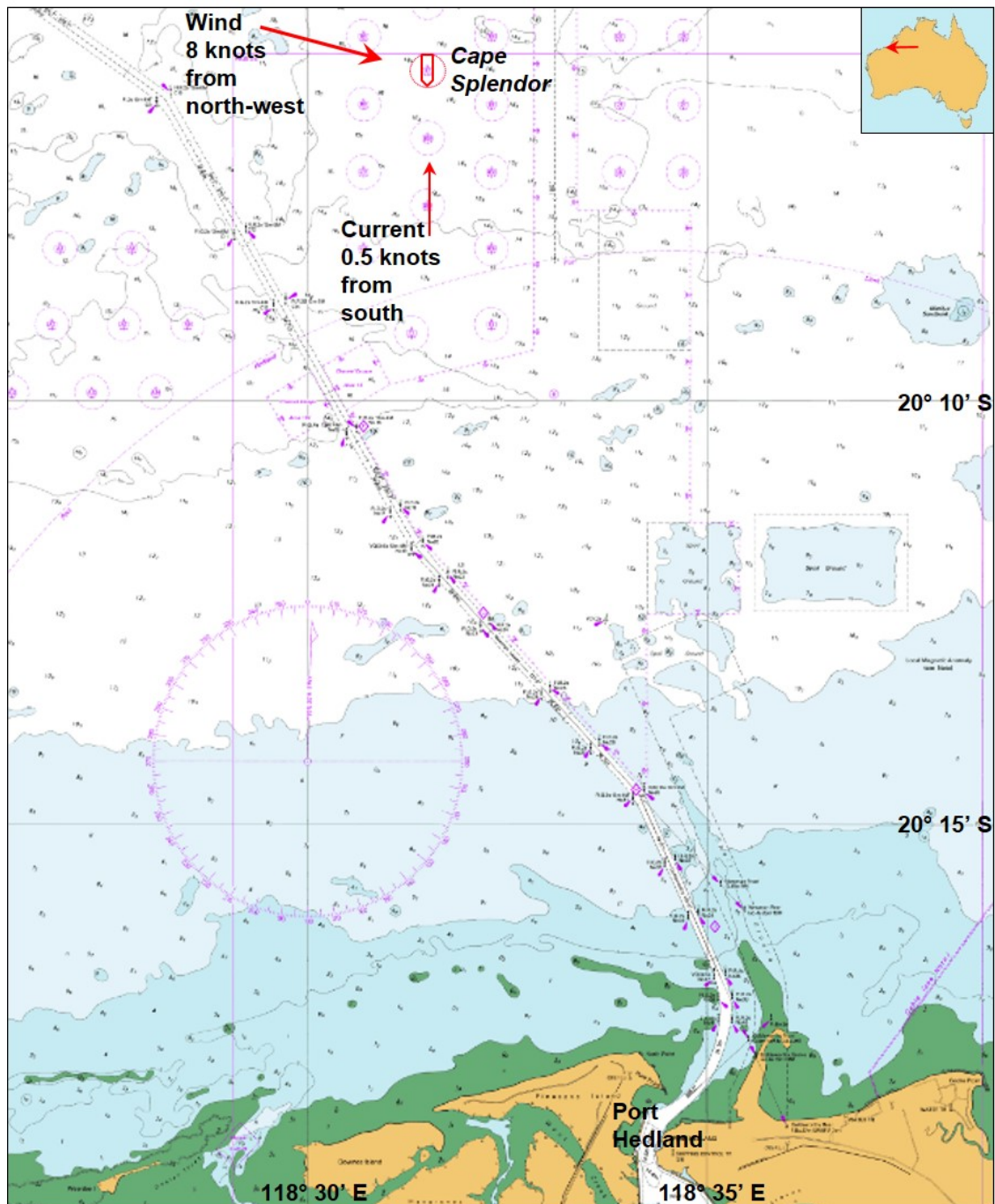
Later that morning, the bosun and two able seamen (AB) donned lifejackets and began preparing to rig the port side accommodation ladder. It was unhoused and swung out from the ship's side. They positioned the handrails and lowered the ladder to about 2 m above the water so that the stanchions and side ropes could be correctly set.

While rigging the port accommodation ladder, the bosun remarked to the others that there were many fish visible around the bottom of the ladder. By about 1130, the work rigging the ladder was completed and the bosun and crew stopped for lunch. They left the ladder in the lowered position.

¹ A nautical mile is 1,852 m.

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

Figure 2: Section of navigational chart Aus 53 showing wind and current at the time of the accident



Source: Australian Hydrographic Service with annotations by ATSB

In the warm conditions of north-west Western Australia, the crew's lunch break was 2 hours. During this time, the bosun further investigated the fishing opportunity he had seen from the accommodation ladder. It was usual for the crew, including the bosun, to spend some of their recreation time at anchor fishing from the ship's after deck. However, fishing during the lunch break was unusual as it was often too hot with the after deck exposed to the sun. In addition, there was no opportunity to fish from the accommodation ladder as it was usually stowed. On this occasion, however, the port accommodation ladder was rigged and in the ship's shadow.

At 1238, the bosun went to an AB's cabin and asked him for assistance at the accommodation ladder. The AB changed into work clothes and at about 1245 went out onto deck. When he reached the accommodation ladder, he saw the bosun on its lower platform (Figure 3). With the

sleeves of his overalls tied around his waist, the bosun was bare chested and wearing slip-on shoes. He was getting fishing gear ready from a bucket that he had placed on a ladder step nearby. The AB descended the ladder and asked the bosun if he was comfortable with the angle of the platform. The bosun replied that he was.

Figure 3: The accommodation ladder as rigged at the time of the accident showing distances and approximate positions of bosun and able seaman



Source: ATSB

Shortly thereafter, the bosun was standing with both hands occupied with fishing gear when the AB felt the accommodation ladder move. The bosun lost his balance and fell, backwards, off the platform into the water.

The AB hurried up the ladder to the deck and threw a nearby lifebuoy towards the bosun. The lifebuoy fell about 20 m short of the bosun, who had been carried aft by the current. He attempted to swim toward the lifebuoy as he was being carried further away from the ship's port quarter.

The AB then went to the ship's office in the accommodation, and, at 1250, telephoned the master's cabin and informed him of the man overboard. The master immediately used the public address system to broadcast an emergency call to all crew. In response, some went to the after deck while others went to the navigation bridge (bridge) to keep a lookout and assist the officer of the watch.

Shortly afterwards, the master and chief mate arrived on the after deck. The bosun was now about 50 m from the ship's stern. He was trying, unsuccessfully, to swim towards the now three lifebuoys and a lifejacket in the water, which the crew had thrown to help him. The chief mate instructed crewmembers to prepare to launch the ship's rescue boat.

At about 1255, the rescue boat was in the water and away, with the chief mate, the first engineer and the ship's carpenter on board. The chief mate carried a UHF radio to communicate with the bridge.

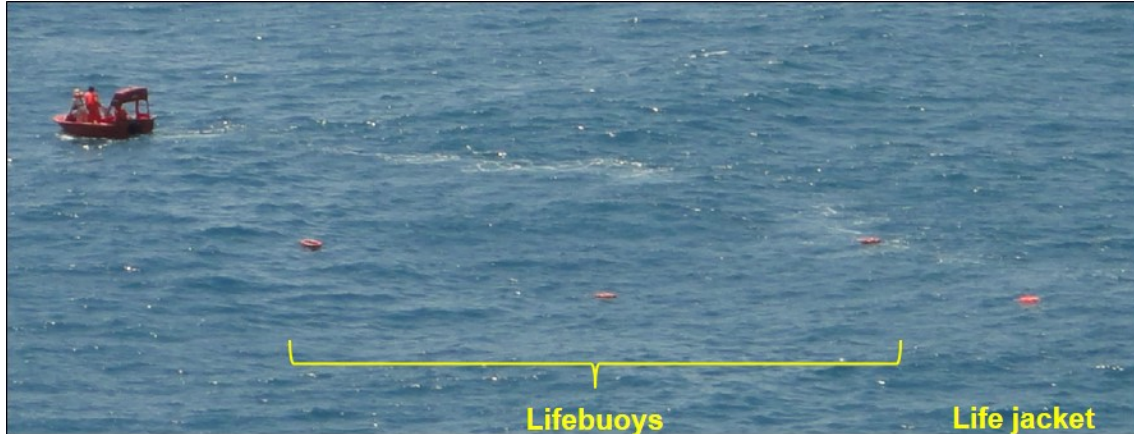
At this stage, the bosun was still visible from the after deck and the bridge. However, as the ship's rescue boat rounded the stern of the vessel, he slipped from sight.

Search

At 1300, the master reported the man overboard to the Port Hedland Shipping Control Tower (SCT). The SCT then broadcast an urgency message (Pan-Pan) to all ships in the port and at anchor indicating that there was a man overboard from *Cape Splendor*, including its location.

Soon after, *Cape Splendor's* rescue boat was amongst the flotation aids that the crew had thrown in to help (Figure 4). However, there was no sign of the bosun. The rescue boat crew continued searching amongst the aids and the surrounding area while communicating with the ship.

Figure 4: The rescue boat in the search area about 200 m from the ship at 1302



Source: Master, *Cape Splendor* with annotations by ATSB

The SCT notified responsible authorities, including the Port Hedland harbour master and, at 1308, the Joint Rescue Coordination Centre (JRCC) in Canberra. The JRCC assumed coordination of the incident response and provided the details of a search area for search assets. A number of local organisations were asked to assist, and three harbour boats and a marine pilot transfer helicopter prepared to deploy. The SCT then assumed a communications, information and liaison role in cooperation with the agency coordinating the search.

At 1314, JRCC contacted the Fremantle Water Police³ and requested the Port Hedland Volunteer Marine Rescue Service (VMRS) to respond. Shortly afterwards, VMRS began preparing to deploy its boat.

By 1330, the helicopter was searching the waters surrounding *Cape Splendor*. At 1338, the first boat arrived in the search area, followed shortly thereafter by two others. The JRCC coordinated the search by providing guidance based on its drift analysis for the missing man.

At 1347, *Bsteel Harmony*, a ship anchored near *Cape Splendor*, launched its rescue boat to assist the search. At 1419, the Fremantle Water Police took over coordination for the search,⁴ utilising VMRS as the on-scene coordinator (from its rescue boat).

In all, the helicopter, six boats from Port Hedland, and the rescue boats from *Cape Splendor* and *Bsteel Harmony* searched the waters that afternoon. The Fremantle Water Police search coordinator directed the search based on JRCC's search and rescue advice. The search continued until last light, with no sign of the bosun found.

At first light on 7 October, one helicopter and four boats resumed the search, which continued all day until darkness. Specialist medical advice indicated that there was little or no chance of the bosun surviving beyond that evening. Nevertheless, at first light on 8 October, two boats resumed the search.

At 1400 that day, with no sign of the bosun found, the search was suspended.

³ The Fremantle Water Police, are the search and rescue authority in Western Australia

⁴ In accordance with the National Search and Rescue (SAR) arrangements, the JRCC, after receiving the initial alert, coordinated the search until such time as this role was able to be accepted by the Fremantle Water Police.

Context

Cape Splendor

At the time of the accident, *Cape Splendor* was registered in Singapore, and owned and managed by U-Ming Marine Transport, Singapore (U-Ming Marine). The ship had been delivered from the shipyard in January 2014, after which it completed seven voyages between Port Hedland and China. U-Ming Marine's core business is dry bulk shipping and the fleet comprised 51 ships.

Cape Splendor had a crew of 22 Chinese nationals from mainland China and Taiwan. The master held a Taiwanese master's certificate of competency. He went to sea in 1973 and first sailed as master in 1989. He joined U-Ming Marine in 1995, and began sailing as master since 2000. He had been on board the ship since November 2013, joining before its delivery voyage.

The chief mate held a Taiwanese chief mate's certificate with appropriate endorsements. He first went to sea in 2001, and had been employed with U-Ming Marine since 2006. He had sailed as chief mate for 3 years. He had also joined *Cape Splendor* in November 2013.

The bosun was from mainland China and first went to sea in 1994. In 2001, he joined U-Ming Marine as an able seaman (AB) and first sailed as bosun in 2010. He too joined *Cape Splendor* in November 2013.

The AB who witnessed the accident was from mainland China, and first went to sea in 2006. He joined *Cape Splendor* in May 2014 for his first assignment with U-Ming Marine.

Accommodation ladder

The International Convention for the Safety of Life at Sea (SOLAS) regulations⁵ require that a safe means of embarkation and disembarkation be provided to ships for use in port and during port-related activities. It is the responsibility of the ship's master to ensure that the means of access complies with the regulations, irrespective of whether or not the ship provides those means.⁶

One such means of access is an accommodation ladder, securely attached to the ship to prevent overturning. Access between the ladder and the ship's deck is via a platform guarded by handrails and handholds.

Cape Splendor was equipped with a common type of accommodation ladder (Figure 5). This type of ladder is stowed on the ship's deck by raising it to the horizontal position. The ladder then folds inwards into the vertical position, and is secured in this position. When rigged, the accommodation ladder extends over and clear of the ship's side and down to the wharf or other desired position.

The angle of the accommodation ladder is controlled via a deck-mounted winch and wire rope attached approximately one-quarter of its length from its lower platform. The ladder is hinged at the upper end from a fixed or revolving platform, which is secured to the ship and supported to keep it horizontal when in use. The lower end platform is hinged and can be positioned at various angles and locked in place. Depending on the ship's draught, the lower platform might not be parallel to the water's surface unless it has been adjusted.

The ladder is suspended on the wire rope when deployed and its lower end is free to move to adjust for the ship's movement. This potential for movement makes accommodation ladders an unstable platform, which can easily shift due to the ship's movement or a person moving on the ladder. This instability is greater when the ladder is not firmly resting on a wharf.

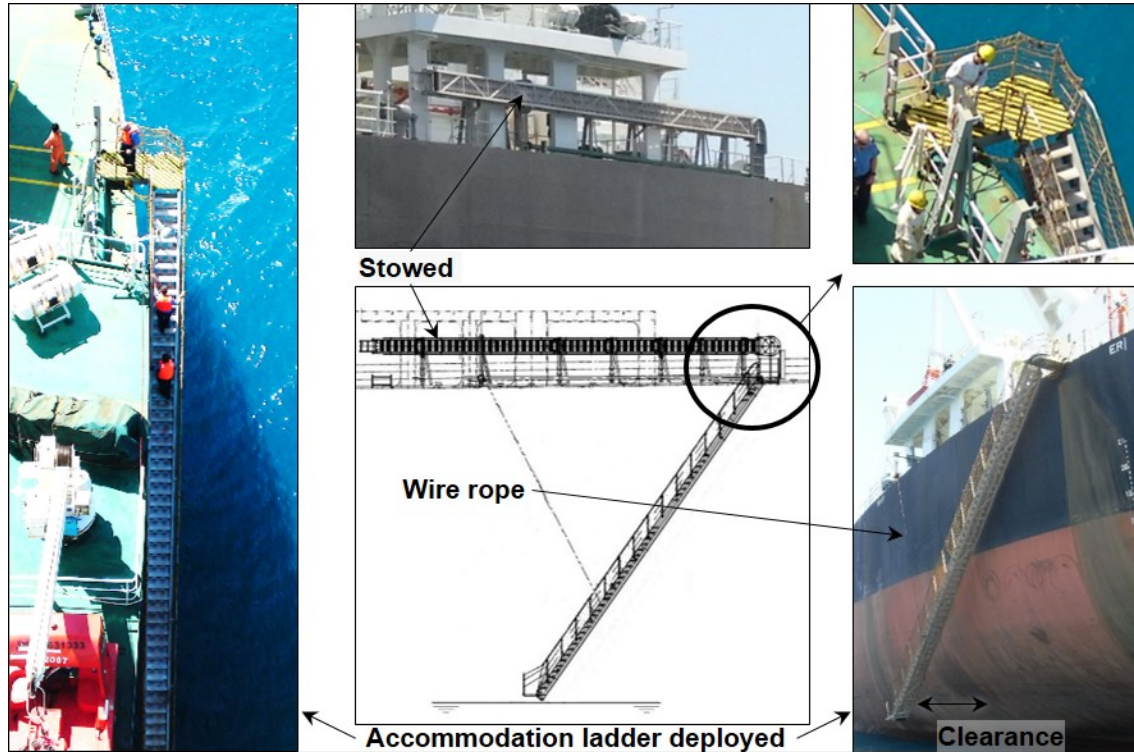
⁵ SOLAS, Chapter II-1, Regulation 3-9, *Means of embarkation on and disembarkation from ships*, IMO, London.

⁶ AMSA 2014, *Marine Notice 13/2014 Means of embarkation and disembarkation from ships in port*, AMSA, Canberra.

When stowed, the accommodation ladder side rails lay flat along the ladder. During deployment one or more crew walk out onto the upper platform and along the ladder to manually raise, adjust and secure the side rails, ropes and safety nets (if rigged).

When a ship is alongside a wharf, the accommodation ladder is rigged and the lower end is securely landed on the wharf. It is then a safe means of access to and from the ship.

Figure 5: Example of a typical accommodation ladder arrangement



Source: *Cape Splendor's* master and ATSB

Safety management system

Cape Splendor's safety management system (SMS) included procedures, permits to work, and risk assessments applicable to shipboard operations, including some recreational activities. These documents referenced the United Kingdom Maritime and Coastguard Agency's 'Code of Safe Working Practices for Merchant Seamen, 2009' and closely followed the templates provided therein. The SMS contained procedures for tasks, including:

- working at heights
- working over the side of the ship
- rigging the gangway or pilot ladder
- using the accommodation ladder.

Procedures

The ship's procedures were written in both English and Chinese and included general sections on preparation and precautions, and sections cross-referencing other documents, procedures, forms or checklists.

Not all procedures included specific details on the operation or use of the subject item of the procedure. For example, the procedure for the 'Operation of pilot ladder/gangways whilst underway or at anchor' included the aforementioned sections but contained no specific details as to how the equipment actually operated, or the safety equipment to be used. Nor did this procedure cross-reference other documents (such as risk analyses) for the operation of the

accommodation ladder, working aloft or working over the side. There was no requirement for a permit to work for tasks involving accommodation ladders.

Permit to work

The SMS included standard permit to work forms for working aloft/overside, hot work and entering confined spaces.

The form for the permit to work aloft/overside included generic sections requesting details of the work to be conducted, isolations required, and personnel involved. This permit directly asked if a risk assessment for the work had been carried out.

It also included subsection checklists depending on whether the work was on the ship's engine room funnel, near radar scanners and aerials, or over the side. The work over the side checklist required the duty officer or engineer to be notified, and a lifebuoy with line readied.

In addition to these subsections for specific areas of work, there was a separate subsection listing options for personal protective equipment (PPE). This section applied to all work aloft/overside. It listed a safety helmet, a safety harness tethered to a strong point and a lifejacket as options.

Risk assessment

Many SMS procedures, such as confined space entry, referred to 'assessing the risk' and directed users to the relevant permit to work, which included the check - 'Has a risk assessment of the proposed work been carried out?' Amongst other tasks, there were risk assessments for:

- working aloft (all referring to work on the ship's main mast)
- accommodation ladder operation
- working over the side (painting).

The risk assessments associated with 'Accommodation ladder operation' identified hazards including the possibility of 'man overboard during rigging aloft'. The associated hazard control measures included using PPE and having ready a lifebuoy with line. No details of working aloft PPE, such as fall prevention equipment (safety harness and line) were included. The stated residual risk for this hazard was 'medium', which triggered additional controls. In this case, the additional control was a pre-work meeting and briefing to cover the necessary safety precautions.

Working aloft was identified as a risk during work over the side in risk assessments for painting the ship's side. Risk mitigations included the use of a secure and appropriate safety harness.

The use of gymnasium (gym) equipment was the only recreational activity captured in the SMS. Risks associated with physical activity, the use of gym machines and the handling of weights were assessed and controls identified.

Fleet safety circulars

U-Ming Marine supported fleet safety endeavours with a fleet-wide training record form. This included crew training to cover incidents within the fleet. Amongst other incidents reported, in September 2014 there had been a failure to wear a lifejacket when rigging the pilot ladder. The report identified this as a 'clear evidence of lack of safety awareness and poor safety culture and deviation of ISM procedures.' All of *Cape Splendor's* crew, including the bosun, had signed the attendance record for the training session covering the September 2014 incident.

Another company safety initiative was a deficiency and correction reporting system. Incident and near miss reports from U-Ming Marine ships were circulated across the fleet. The circulars included an analysis of the incident and information on safety action taken.

One such circular dealt with a January 2014 incident on board *Cape Splendor*, where crew had not worn lifejackets while preparing the pilot ladder. Corrective actions to be taken included reiterating the use of appropriate PPE for pilot ladder operations and the initiating meetings to identify, assess and address the risks before undertaking the task.

Working over the side as working at height

In the maritime industry, working over the side is defined as any work in a location from which there is a risk of falling into the sea. Working at height (or aloft) is 'all work carried out where a person can fall a distance liable to result in an injury',⁷ irrespective of the height at which the work is being carried out.

Work over the side, such as rigging of the accommodation ladder, is also work at height. This connection is reinforced in numerous marine publications and guidelines, including codes of safe working practice.⁸

Working aloft (falling from heights) was identified in *Cape Splendor's* SMS as a risk during work over the side (associated with painting the ship's side) and with accommodation ladder operation. In practice, however, crewmembers had not made the connection between this risk, and using the permit to work system to mitigate the risk.

Port Hedland

Port Hedland is Australia's largest bulk cargo port. It is located on the north-west coast of Western Australia and services the mineral rich Pilbara region. The port's major export commodity is iron ore. In the financial year ending 30 June 2014, more than 372 million tonnes of iron ore was exported in over 2,500 ships.

Pilbara Ports Authority (PPA) is responsible for the safety and efficiency of shipping in the port and waters, for which it has overall responsibility for planning and development. The Shipping Control Tower (SCT) operated by PPA is the port's communication centre and operates 24 hours a day.

The SCT maintains a continuous listening watch on 14 VHF radio channels and records all communications. Arriving ships are designated a berth in one of 40 anchorage berths located to the western and eastern sides of the single shipping channel. The SCT also communicates with ships to monitor their movements to and from the 16 berths at the port's wharves.

Search and rescue

Search and Rescue (SAR) is the search for, and provision of lifesaving assistance to people in distress and imminent danger of loss of life. Australia's SAR response arrangements are under the direction, coordination and control of the Australian Maritime Safety Authority's (AMSA) Joint Rescue Coordination Centre (JRCC).

The JRCC operates 24 hours a day from Canberra, as a part of AMSA's Emergency Response Centre. It is responsible for the national coordination of both maritime and aviation SAR. As part of its role, JRCC coordinates medical evacuations, broadcasts maritime safety information, and operates the Australian ship reporting scheme and the national SAR training school.

Australian SAR arrangements are intended to complement other emergency services (police, fire, ambulance) in circumstances where those services are unable to operate effectively. These include remote area operations, rescues at sea, and when there is a need for specialist SAR facilities not normally available to emergency services. State-based police organisations are the nominated SAR authority in each State. Australia's SAR zone extends beyond the land borders to encompass 52.8 million square km of the Indian, Pacific and Southern Oceans.

Upon receiving a distress signal or being notified of a missing civil aircraft or seagoing ship, JRCC takes action to establish the safety of the aircraft, ship or source of the signal. Action may include passing coordination of the SAR operations to the appropriate regional police organisation.

⁷ UK Maritime and Coastguard Agency (UKMCA) Marine Guidance Note MGN 410, *The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Work at Height) Regulations 2010*, <www.mcga.gov.uk>

⁸ UKMCA 2010, *Code of Safe Working Practices for Merchant Seamen*, The Stationery Office (TSO), Norwich, UK. <www.tsoshop.co.uk>

The National Search and Rescue Plan and a standard reference,⁹ which provides comprehensive information on SAR techniques and operations, guide SAR activities. Western Australia has a State emergency management plan for marine SAR (WESTPLAN-MARSAR)¹⁰ which details the arrangements in place for marine SAR incidents, including liaison with federal, state and local organisations.

⁹ Australian Maritime Safety Authority, 2014, *National Search & Rescue Manual*, viewed February 2015.
<www.amsa.gov.au/search-and-rescue/>

¹⁰ WESTPLAN-MARSAR is available at <www.semc.wa.gov.au>

Safety analysis

Man overboard

On 6 October 2014, during the lunch break, *Cape Splendor's* bosun descended to the lower platform of the ship's portside accommodation ladder. He intended to fish from this location and, at his request, an able seaman (AB) joined him to assist. Neither man was using flotation aids or fall prevention equipment.

At about 1250, the bosun lost his balance and fell into the sea. The AB ascended to the ship's deck and threw a lifebuoy toward the bosun before raising the alarm. Within 10 minutes, the ship's crew had deployed its rescue boat. An extensive, 3-day air and sea search followed but the bosun was not found.

Opportunity

The combination of a number of coincidental factors presented what seemed a good opportunity to catch fish quickly and easily. While rigging the accommodation ladder that morning, the bosun had seen many fish in the water under the ladder. In addition, the ladder's lower platform was a couple of metres from the water and in the shade. Further, the crew completed rigging the ladder just before their 2-hour lunch break.

The bosun probably decided to descend the ladder to fish without properly considering the risk of falling overboard. While he did ask the AB to help, it was more likely that it was to help him with the catch, rather than to watch out for him. Consequently, both seamen did not take even basic precautions such as wearing a lifejacket, and initial emergency assistance was limited to the AB's immediate but unprepared response.

Survivability

According to a number of the crew, the bosun was fit and healthy. He could swim and the crew saw him trying to swim towards the lifebuoy. However, the bosun disappeared from view after about 10 minutes. Factors that may have affected his ability to keep afloat that day include the:

- shock of falling into the sea
- weight of his sodden overalls
- possible entanglement with his fishing gear
- ingestion of sea water when trying to swim to the lifebuoy
- effort to swim against the current in the prevailing sea and swell conditions.¹¹

Implementation of SMS procedures

When ATSB investigators attended *Cape Splendor* after the accident, they observed the crew rigging the ship's port side, midships accommodation ladder (Figure 6). Some of the significant observations included the:

- absence of standard working at height precautions, such as fall prevention equipment
- unraised handrails on ladder section 13 m above water with two crew members on it
- crew member standing outside ship's handrails with no fall protection or lifejacket.

The ship's safety management system (SMS) documented in a risk assessment, the risks and risk controls to prevent falls from height when working over the side of the ship. The assessment was consistent with recognised industry publications and practices that deal with work over the side,

¹¹ At 1200, the weather conditions, recorded in *Cape Splendor's* bridge logbook, were – north-northwest wind at 7-10 knots, 3 m seas on a 1 m swell, cloudy and air temperature 31°C.

which is also acknowledged as work at height. Further, the SMS included procedures and permits to work that were relevant to safely undertaking work over the side, including rigging accommodation ladders.

Figure 6: Crew rigging the accommodation ladder without fall protection and/or lifejacket



Source: ATSB

However, following the accident, ATSB investigators witnessed the ship's crew rigging the ladder in a manner that was contrary to its SMS procedures and relevant risk assessments. Accordingly, it appeared that company safety circulars and training to support those SMS procedures had not resulted in the crew learning lessons for safe work over the side – nor had such lessons been learned from the accident on 6 October.

Other evidence, including interviews with crew and permit to work records, indicated that the ladder was routinely rigged in a similar way. The crew's usual practices show that they did not appreciate the importance of fall prevention when working over the side. It appears that they associated fall prevention only with working at heights on board the ship (for example, a mast). Therefore, the critical importance of fall prevention when working over the side, rather than relying completely on safe recovery after a fall into the water, was not recognised. Further, and notably, they did not generally consider that safe work precautions applied during recreational activities.

In summary, *Cape Splendor's* safety management system (SMS) procedures for working over the side of the ship were not effectively implemented. As a result, the ship's crew routinely did not take all required safety precautions when working over the side. Further, they did not consider such precautions were necessary if going over the side for recreation or purposes other than work.

Safety during recreational activities

On board ship, seafarers live and relax in the same place in which they work. There are often no clear boundaries between the workspace and the areas for recreation. Guidance and legislation¹² for the safety of seafarers focuses on the working aspect of the seafarer's life. These publications make little reference to recreational activities involving work areas of the ship, or recreational activities that overlap with similar work activities.

When the bosun went down the accommodation ladder to fish during a period of rest, the dangers involved were not adequately considered. The bosun and other crew had just completed rigging

¹² Such as the Maritime Labour Convention 2006, the International Labour Organization code of practice: *Accident prevention on board ship at sea and in port* and the Maritime and Coastguard Agency Code of Safe Working Practices for Merchant Seamen.

the accommodation ladder and had reportedly followed safety precautions such as wearing a lifejacket and PPE. However, when fishing, the same risks and mitigating them were ignored.

At interview, crewmembers indicated their belief that completion of safety procedures (usually undertaken during work activities) did not extend to recreational activities, even if the risks were the same. The evidence showed that neither the conduct of a risk assessment nor the use of PPE was considered necessary when the activity was a leisure activity, conducted in off-duty time.

Accordingly, it was evident that a separation existed between attitudes to safety during work and safety during recreation time. Crewmembers' attitude to tasks involving the same or similar levels of risk varied depending on whether the task was undertaken during work time or as recreation. Therefore, commitment to following established procedures and using available safety equipment when undertaking recreational activities was compromised by a belief that the procedures and equipment were only applicable to work activities.

Safety culture

A shipping company's safety culture is dependent upon shared beliefs, values and attitudes to safety by personnel from all levels of the company. Where an effective safety culture exists, all personnel agree and understand that the goals of the company will be achieved through accepted safety procedures, practices and behaviours.

A safety culture achieves effectiveness by commitment to the reduction of violations of good practice through individual choice (self-regulation), rather than relying solely on dictated compliance with rules and regulations. Thus, the aim is to achieve complete acceptance of this safety commitment in all areas of work and recreation, during work hours or off duty, on board ship or ashore, and when on shore leave. That is, all individuals, at all times, feel responsible for actions and behaviours taken to improve safety and performance.

When ATSB investigators attended *Cape Splendor*, they observed an accommodation ladder being rigged without appropriate working at height precautions. Interviews with crewmembers of *Cape Splendor*, however, indicated that it was usual to comply with safety procedures during work activities. Similar behaviours within the fleet had been previously identified by U-Ming Marine as evidence of poor safety culture on board ships.

Additionally, awareness of risk and safety procedures did not appear to extend to recreational activities, even when the risks were the same. At interview, a number of crewmembers indicated that they did not consider safety precautions as necessary when they were off-duty.

These attitudes showed an inconsistency between the company's safety policy and values,¹³ and how these values were understood on board. Crewmembers did not always consider all possible risks when following safety procedures for work tasks, and they did not see that similar safety precautions were necessary for recreational tasks. This suggests they had not accepted the goal of each person self-regulating personal and group safety at all times, even when not on duty.

On board *Cape Splendor*, a culture of safety compliance prevailed, wherein people behaved in a safe manner not because they perceived safety as an important organisational goal, but because there was a rule that they felt obliged to obey.^{14,15} Further, this was limited to work tasks, with no evident regard to safety during recreational activity outside of work hours. A genuine commitment to a safety culture had not yet been fully developed.

¹³ U-Ming Marine's stated safety policies and values included the desire to establish a safety culture that encourages continuous improvement and to motivate crew to achieving this through committing to and following procedure, policy and guidelines.

¹⁴ Luria, G. & Rafaeli, A. (2008). Testing safety commitment in organizations through interpretations of safety artefacts. *Journal of Safety Research*, 39, 519-528.

¹⁵ Griffin, M.A. & Neal, A. (2000). *Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge and motivation*. *Journal of Occupational Health Psychology*, 5 (3), 347-358.

The above demonstrates the challenges faced in striving to ensure that safety values and attitudes are considered across all shipboard activities, including both work and recreation. Research has shown that employees will take their cues about the importance of safety behaviours from what they observe is rewarded by their supervisors and close superiors, rather than from the company's policies.^{16,17} It is therefore critically important that masters, officers and supervisors take every opportunity to encourage and reinforce the primary importance of safety at all times, and across all activities.

The safety culture on board *Cape Splendor* was not well developed and the ship's managers had earlier identified it as such. A consequence of this inadequacy was the ineffective implementation of working over the side procedures, including the general belief by its crew that safe work practices applied only when working, and not during recreational activities.

Search

Cape Splendor's bosun fell into the sea from the accommodation ladder at about 1250. The accounts of crewmembers confirmed that he was near the buoyancy aids for at least 10 minutes while he continued to drift away from the ship. He remained in sight as the ship's rescue boat was launched and approached the scene, but was lost from view soon after.

At 1300, the master contacted the Port Hedland SCT and reported the emergency. In response, a helicopter was above the ship by 1330 and the first of several boats arrived at 1338. The search effort continued to last light on 6 October and continued during daylight until 1400 on 8 October.

In all, six boats from Port Hedland, two ships' rescue boats and a helicopter were involved in the search. Drift modelling was done to assist search patterns and expert survivability advice was obtained. The search continued into the third day – beyond the assessed maximum survival time.

When the master notified authorities of the emergency 10 minutes after the bosun had fallen into the water, the bosun had just been lost from view. The immediate search using the ship's rescue boat was unable to find any sign of him. When the first shore-based search craft reached the area about 30 minutes later, the likelihood of a rescue had significantly diminished.

The man overboard emergency response by *Cape Splendor's* crew, port authorities and others was rapid and appropriate. Australian search and rescue authorities coordinated a search for the missing man that was extensive, thorough and exhausted all opportunities for finding him.

¹⁶ Luria, G. & Rafaeli, A. (2008).

¹⁷ Zohar, D. (2010). Thirty years of safety climate research: Reflections and future directions. *Accident Analysis and Prevention*, 42, 1517-1522. (p1518)

Findings

From the evidence available, the following findings are made with respect to the loss overboard of *Cape Splendor's* bosun on 6 October 2014 at Port Hedland anchorage. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Safety issues, or system problems, are highlighted in bold to emphasise their importance.

A safety issue is an event or condition that increases safety risk and (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 operating environment at a specific point in time.

Contributing factors

- At about 1250 on 6 October 2014, *Cape Splendor's* bosun fell into the sea from the lower platform of the ship's accommodation ladder. He had gone down the ladder to fish during his lunch break without telling anyone except the able seaman on the ladder with him.
- Neither the bosun nor the able seaman was wearing a lifejacket or fall prevention equipment when they were over the ship's side on the accommodation ladder.
- While rigging the accommodation ladder before his lunch break, the bosun saw many fish in the water below the ladder, which was also in the shade. He probably thought that the ladder provided a good opportunity to catch fish, and it is unlikely that he properly considered the risk of falling from it.
- The bosun's ability to stay afloat and swim was adversely impacted by, amongst other factors, the lack of a lifejacket, wet clothing, possible entanglement with fishing gear, a strong current and moderate sea and swell conditions.
- ***Cape Splendor's* safety management system (SMS) procedures for working over the side of the ship were not effectively implemented. As a result, the ship's crew routinely did not take all the required safety precautions when working over the side. Further, they did not consider that any such precautions were necessary if going over the side when not working. [Safety issue]**
- **The safety culture on board *Cape Splendor* was not well developed and the ship's managers had identified it as such. A consequence of this inadequacy was the ineffective implementation of working over the side procedures, including the general belief by its crew that safe work practices applied only when working, and not during recreational activities. [Safety issue]**

Other findings

- The man overboard emergency response by *Cape Splendor's* crew, port authorities and others was rapid and appropriate. Australian search and rescue authorities coordinated a search for the missing man that was extensive, thorough and exhausted all opportunities for finding him.

Safety issues and actions

The safety issues identified during this investigation are listed in the Findings and Safety issues and actions sections of this report. 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 directly involved parties were provided with 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.

The initial public version of these safety issues and actions are repeated separately on the ATSB website to facilitate monitoring by interested parties. Where relevant the safety issues and actions will be updated on the ATSB website as information comes to hand.

Implementation of SMS procedures

Number:	MO-2014-011-SI-01
Issue owner:	U-Ming Marine Transport, Singapore
Operation affected:	Shipboard operations
Who it affects:	All persons responsible for shipboard operations

Safety issue description:

Cape Splendor's safety management system (SMS) procedures for working over the side of the ship were not effectively implemented. As a result, the ship's crew routinely did not take all the required safety precautions when working over the side. Further, they did not consider that any such precautions were necessary if going over the side when not working.

Proactive safety action taken by U-Ming Marine Transport, Singapore

Action number: MO-2014-011-NSA-025

Action status: Closed

U-Ming Marine Transport has advised the ATSB that it has taken the following safety action to address this safety issue:

- Prohibited fishing from accommodation ladders and posted warning signs adjacent to ladders.
- Issued a fleet-wide training record form that includes safety precautions for working on the accommodation ladder, and establishing and enhancing shipboard safety culture.
- Updated man overboard search and rescue procedures across the fleet.
- Improved the curriculum for shore-based training courses to learn from this accident and enhance safety culture across the fleet.
- Upgraded fleet-wide risk assessments and procedures for working aloft/over the side to emphasise the importance of permits to work, use of personal protective equipment and ensuring suitable supervision.
- Documented compliance with procedures and safety precautions for tasks completed out of work hours across a range of documents.
- Directed company auditors to pay particular attention to the use of procedures and permits to work, and assessing crewmember attitudes to safety at work and during leisure.

Current status of the safety issue

Issue status: Adequately addressed

Justification: The safety action taken should reduce the risk of a similar accident and assist in improving the safety culture on U-Ming Marine Transport ships. The action should better assist the effective implementation of the SMS procedures for working over the side and/or at heights, including safe practices during recreational activities.

Safety culture

Number:	MO-2014-011-SI-02
Issue owner:	U-Ming Marine Transport, Singapore
Operation affected:	Shipboard operations
Who it affects:	All persons responsible for shipboard operations

Safety issue description:

The safety culture on board *Cape Splendor* was not well developed and the ship's managers had identified it as such. A consequence of this inadequacy was the ineffective implementation of working over the side procedures, including the general belief by its crew that safe work practices applied only when working, and not during recreational activities.

Proactive safety action taken by U-Ming Marine Transport, Singapore

Action number: MO-2014-011-NSA-026

Action status: Closed

U-Ming Marine Transport has advised the ATSB that it has taken the following safety action to address this safety issue:

- Prohibited fishing from accommodation ladders and posted warning signs adjacent to ladders.
- Issued a fleet-wide training record form that includes safety precautions for working on the accommodation ladder, and establishing and enhancing shipboard safety culture.
- Updated man overboard search and rescue procedures across the fleet.
- Improved the curriculum for shore-based training courses to learn from this accident and enhance safety culture across the fleet.
- Upgraded fleet-wide risk assessments and procedures for working aloft/over the side to emphasise the importance of permits to work, use of personal protective equipment and ensuring suitable supervision.
- Documented compliance with procedures and safety precautions for tasks completed out of work hours across a range of documents.
- Directed company auditors to pay particular attention to the use of procedures and permits to work, and assessing crewmember attitudes to safety at work and during leisure.

ATSB safety advisory notice to the masters, owners and operators of all ships

Action number: MO-2014-011-SAN-024

Action status: Closed

The Australian Transport Safety Bureau advises the masters, owners and operators of ships that an adequately developed safety culture underpins an effective shipboard safety management system. Such a culture can better ensure that seafarers apply safe practices at all times, both during and recreational activities on board.

Current status of the safety issue

Issue status: Adequately addressed

Justification: U-Ming Marine Transport has identified the importance of continuing to develop the safety culture on board its ships and across the organisation. This has been promulgated across its fleet through safety circulars and the internal auditing system, which will support a positive safety culture to develop over time. The ATSB has issued the safety advisory notice, MO-2014-011-SAN-024, to promulgate this safety issue more broadly across industry.

General details

Occurrence details

Date and time:	6 October 2014 – 1250 hours (UTC +8 hours)		
Occurrence category:	Accident		
Primary occurrence type:	Man overboard fatality		
Injuries:	Fatal: 1	Serious: Nil	Minor: Nil
Damage:	Nil		
Location:	Anchorage B-7, Port Hedland		
	Latitude: 20° 06.142' S	Longitude: 118° 31.611' E	

Ship details

Name:	<i>Cape Splendor</i>
IMO number:	9631333
Call sign:	9V2007
Flag:	Singapore
Classification society:	DNV-GL
Ship type:	Dry bulk carrier
Builder:	Shanghai Waigaoqiao Shipbuilding, China
Year built:	2014
Owner(s):	U-Ming Marine Transport, Singapore
Operator and Manager:	U-Ming Marine Transport, Singapore
Gross tonnage:	106,816
Deadweight (summer):	206,070 t
Summer draught:	18.490 m
Length overall:	299.92 m
Moulded breadth:	50.0 m
Moulded depth:	24.9 m
Main engine(s):	MAN-B&W 6S70ME (Mk 8.2)
Total power:	18,660 kW (91 rpm)
Speed:	15.0 knots

Sources and submissions

Sources of information

On 8 October 2014, investigators from the Australian Transport Safety Bureau (ATSB) attended *Cape Splendor* while the ship was at anchor off Port Hedland, Western Australia. The master and directly involved crewmembers provided their accounts of the accident. Photographs of the ship and copies of available, relevant documents were obtained.

Further evidence was obtained from the ship's managers, U-Ming Marine Transport, the Pilbara Ports Authority, Fremantle Water Police and the Australian Maritime Safety Authority.

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Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003* (the Act), the Australian Transport Safety Bureau (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 the master, chief mate and able seaman of *Cape Splendor*, U-Ming Marine Transport (Singapore), Maritime and Port Authority (MPA) of Singapore, the Australian Maritime Safety Authority (AMSA), Fremantle Water Police, Pilbara Ports Authority and the Maritime Safety Administration of the People's Republic of China (China MSA).

Submissions were received from U-Ming Marine Transport, AMSA, Fremantle Water Police, Singapore MPA and China MSA. 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 ATSB 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 operations involving the travelling public.

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 factors related to the transport safety matter being investigated.

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.

Australian Transport Safety Bureau

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Investigation

ATSB Transport Safety Report

Man overboard fatality from Cape Splendor
Port Hedland, Western Australia, 6 October 2014

314-MO-2014-011

Final – 9 February 2016