Australian Government
Australian Transport Safety Bureau

Contact with wharf by *Madang Coast*

Port of Townsville, Queensland, on 16 November 2015

Investigation

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Addendum

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Safety summary

What happened

At about 2106 Eastern Standard Time, on 16 November 2015, a pilot boarded *Madang Coast* for its transit into Townsville, Queensland. The master and pilot completed the master-pilot information exchange, which included the berthing plan at Berth 10. As the ship approached the berth, the first line ashore, the forward spring, was looped over a bollard on Berth 10. The forward mooring party made two turns around the first post of the bitts and held onto the spring line. However, shortly after, as weight came onto the line, the line slipped on the post and fell slack.

Madang Coast started moving off the berth towards a ship on the opposite berth. Despite repeated efforts to hold on to the line, it continued to fall slack. Subsequently, *Madang Coast*'s bow made contact with the shore end of Berth 10 and its port quarter with the ship on the opposite berth. Both ships sustained minor damage and there were no injuries.

What the ATSB has found

As *Madang Coast* came alongside the wharf, the forward spring line slipped and could not be used to manoeuvre against. After the spring line slipped, the distance from the stern to the wharf was too far for the aft mooring party to throw any heaving lines ashore. Hence, the stern's movement away from the wharf continued.

The shipping agent requested a tug reduction for the ship's berthing. The acting regional harbour master, pilot manager and the ship's master were all unaware that the agent's application was made without the master's knowledge.

The pilotage service did not have documented guidance procedures for berthing or any associated contingencies. The risk management processes were not sufficiently mature nor resilient enough to effectively identify and mitigate risks in pilotage services.

What's been done as a result

The Port of Townsville Limited (POTL) Pilotage Services has completed a review of, and subsequently updated and fully implemented a safety management system (SMS). The SMS included detailed berthing, operations and emergency procedures amongst others. The qualifications and training requirements for licensing pilots for the number of observation, supervised and check trips have significantly increased.

The tug reduction requesting procedure has been updated and now requires a declaration by the ship's master that an assessment of the intended manoeuvre(s) to and/or from berths have been undertaken.

Safety message

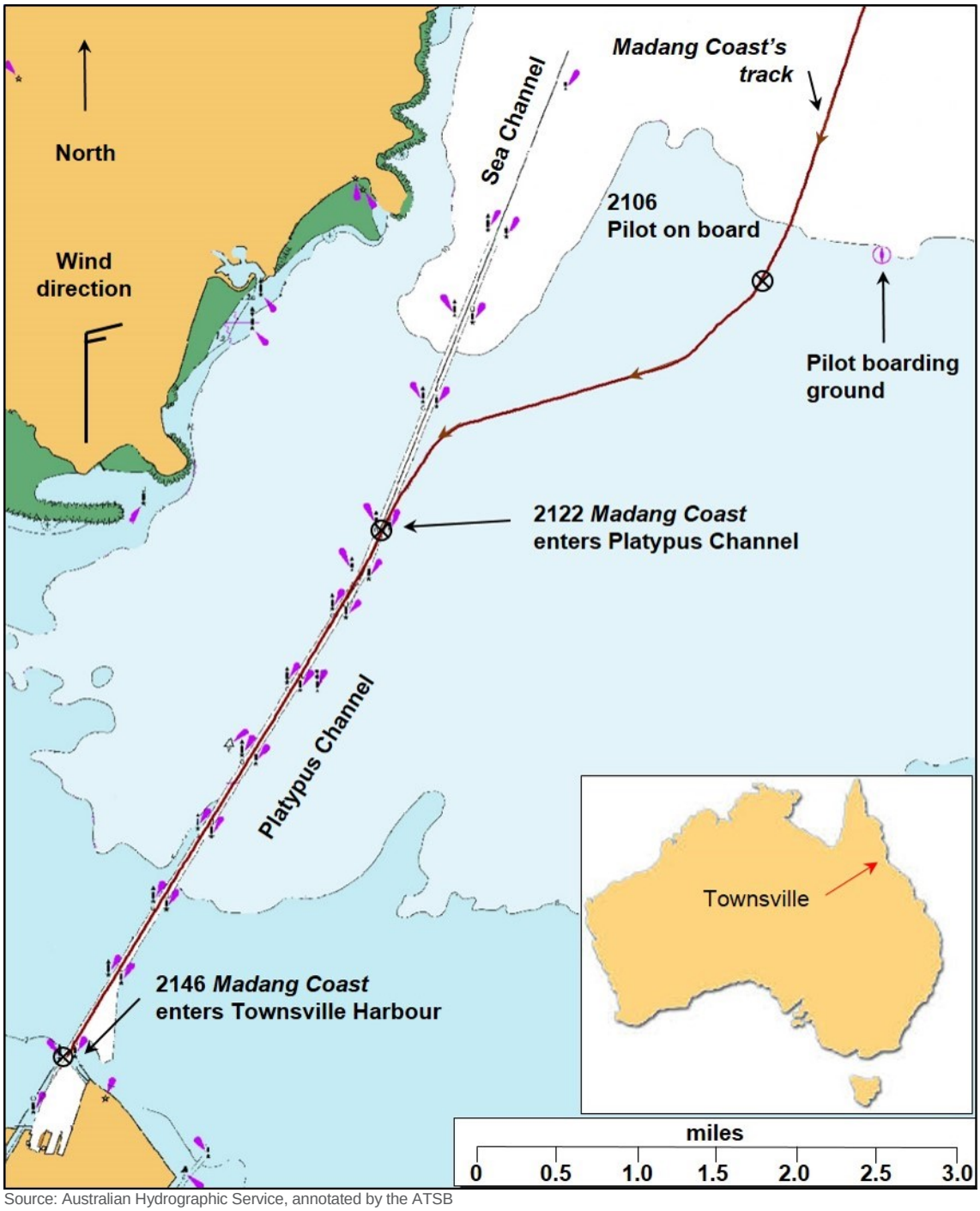
Risk management issues associated with the safe pilotage of ships are commonly known by all parties involved. However, the reality as opposed to the hypothesised scenarios are not always understood nor acted upon. Numerous incidents and their subsequent findings already provide the answers to many of retrospective questions that are asked. Where internal risk management processes may fail to address those questions, forward thinking can. Effective risk management systems and processes can lead to the identification, collation and assessment of found hazards, and, thus, provide the most appropriate mitigation measures.

Contents

The occurrence

At 1636 Eastern Standard Time[1] on 13 November 2015, the 105 m general cargo ship *Madang Coast* arrived at the outer anchorage, Townsville, Queensland, from Port Moresby, Papua New Guinea. At 1930 on 16 November 2015, the ship weighed anchor and started its approach towards the Townsville Harbour pilot boarding ground (Figure 1). The bridge team consisted of the master, the chief mate as the officer of the watch (OOW), and a seaman as the helmsman.

Figure 1: Section of navigational chart Aus 257 showing Madang Coast's track into Townsville Harbour



Source: Australian Hydrographic Service, annotated by the ATSB

[1] Eastern Standard Time (EST): Coordinated Universal Time (UTC) + 10 hours.

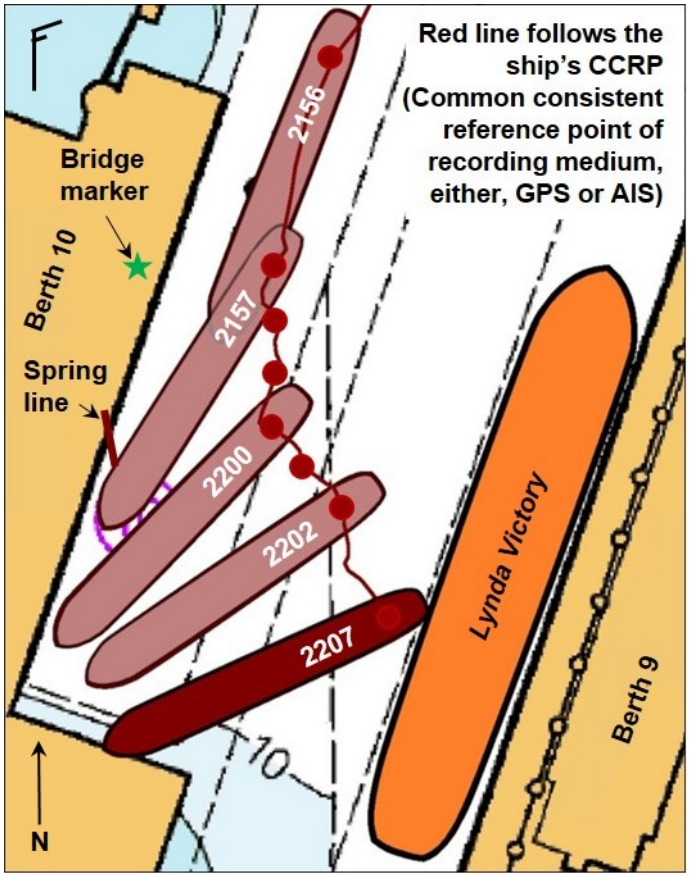
At 2106, a Townsville pilot boarded *Madang Coast* and was escorted to the bridge, where he asked the master for full ahead manoeuvring speed (Appendix A). The master and pilot then commenced the master-pilot information exchange. During the exchange, they discussed information regarding the ship, the inward passage and the berthing plan.

The agreed berthing plan involved a bow-in shallow angle approach, to berth starboard side alongside, without a tug or a lines boat.[2] The ship would approach the wharf with minimum headway and the forward mooring party would run a forward backspring line as the first line ashore. With tension on the spring line and rudder hard-over to port, this should bring the ship in bodily, parallel to the berth. The aft mooring party would then run a stern line ashore to control the stern. The remaining mooring lines would then be run ashore forward and aft.

The master relayed the berthing plan to the second mate via his UHF radio. The second mate was in charge of the forward mooring party, consisting of himself, the bosun and a seaman. He acknowledged the instructions.

At 2146, *Madang Coast* entered the harbour basin at a speed of 5 kt.[3] The pilot continued to reduce the speed as he manoeuvred the ship across the harbour to Berth 10. By 2149, with the speed at 3.6 kt, the pilot asked for stop and shortly after asked for dead slow astern. At 2151, with the ship just over two cables[4] from the berth, the pilot asked for slow astern with the speed now 3.2 kt.

Figure 2: *Madang Coast*'s approach to Berth 10 showing times at each position



Source: Australian Hydrographic Service, annotated by the ATSB

At about 2153, the pilot advised the master he could see the bridge marker on the wharf, the approximate position of the ship's bridge when the ship was in its final position alongside. Shortly after, stevedores waiting on Berth 10 for the ship's arrival advised the pilot via VHF radio that the ship's bow had just entered the berthing pocket. At that time, the wind was from the north at about 11 to 16 kt.

At 2156, the pilot asked for stop and the master set the ship's controllable pitch propeller (CPP) to zero pitch with about 100 m to run ahead (Figure 2 and Figure 3). *Madang Coast* was now parallel to, and about 15 m off the wharf, at a speed of 1.8 kt. Shortly after, when the bridge marker was about midships, the ship's stern started to slowly move away from the wharf.

[2] Lines boat, a boat used to transfer berthing lines from ship to shore.

[3] One knot, or one nautical mile per hour equals 1.852 kilometres per hour.

[4] One cable equals one tenth of a nautical mile or 185.2 m.

At 2157, with 25 m to run ahead, the pilot used astern pitch to further reduce the ship's speed. About 30 seconds later, the forward mooring party threw a heaving line[5] ashore and started running out the forward spring line as the stevedores heaved it ashore.

Figure 3: CCTV images of Madang Coast's attempted berthing at Berth 10

Source: Port of Townsville, annotated by the ATSB

[5] A heaving line is a small diameter rope attached to a mooring line. It has a weighted end that is thrown to the shore allowing the mooring line to then be pulled across.

Shortly after 2158, the line was ashore and was looped over a bollard on Berth 10. The CPP pitch was reduced to zero, with the ship's speed now at 0.8 kt ahead. The master then informed the second mate to hold on to the forward spring line. The second mate relayed this to the bosun and seaman and they made two turns around the first post of the bitts[6] and manually held onto the working end of the line. At about 2159, as weight came on the forward spring line, the ship's bow began to pivot towards the wharf. Shortly after, the spring line slipped on the bitts and it fell slack. The bow continued to pivot towards the wharf and the stern continued to move away from it.

At 2201, with the wind effect acting on *Madang Coast*'s accommodation block at the stern of the ship, the stern drifted away from the berth and towards an oil/chemical tanker (*Lynda Victory*), on the opposite berth. The master instructed the second mate to hold on to the spring line again and the pilot requested tug assistance from the Townsville vessel traffic service (VTS). About 30 seconds later, tension came on the spring line but only for a short time before it fell slack again.

By that time, the pilot and master could see that the spring line was not holding, and they thought the windlass drum end brake had slipped. The master instructed the second mate to take up the slack and hold onto the mooring line. As the spring line was on the bitts, not the drum end, any slack needed to be heaved in manually by the forward mooring party. This was not an easy or quick task, and as the ship continued to move ahead, more line continued to pay out.

Over the next minute, the pilot and master waited for the slack to be taken up and line secured. During this time, the ship's stern moved further from the wharf, due to the action of an astern movement and the wind effect. When the forward mooring party finally heaved the spring line in manually, the tension came on the line momentarily, and then it started paying out again.

The master then instructed the second mate to take up the slack, and for the line to be heaved in again. The forward mooring party then removed the line from the bitts and manually carried it to the windlass drum and started heaving the line in. However, as weight started to come on the line, it slipped again once on the drum end. The ship continued to move away from the wharf.

At 2202, the pilot tried to recover control and used ahead pitch with full port rudder to bring the ship back towards the berth. However, the spring line continued to slip and pay out. As the ship continued to close on the shore end of Berth 10, the pilot ordered the port anchor to be dropped, and held on the brake at one shackle.[7]

At 2203, the port anchor was let go and held on the brake. Immediately thereafter, the crew also let go the starboard anchor. By 2205, *Madang Coast*'s bow had made contact with the shore end of Berth 10 and its port quarter with *Lynda Victory*. The port quarter moved a short distance aft along *Lynda Victory*'s hull, coming to rest at 2207 and remaining in this position awaiting the arrival of the tug (Figure 4).

At 2242, a tug arrived off *Madang Coast*'s starboard quarter and by 2306, the ship was all fast alongside Berth 10 without further incident.

Upon inspection, it was found that *Madang* Coast and *Lynda Victory* both received scrape marks and small indentations to the shell plating. Minor damage was also found along the edge of Berth 10 where *Madang Coast*'s bow had made contact. On 17 November 2015, the ship's classification society surveyed *Madang Coast* and found minor indentations that did not affect its structural integrity. The ship subsequently sailed from Townsville on 18 November 2015.

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6 A rectangular base welded to the deck of the ship, upon which two vertical bitts are welded.

7 One shackle equals 90 ft or 27.43 m.

Figure 4: *Madang Coast* in contact with *Lynda Victory* and the wharf

Source: Port of Townsville

Context

Madang Coast

At the time of the incident, the 105 m *Madang Coast* was registered in Papua New Guinea, classed with DNV GL, and managed by Consort Express Lines, Papua New Guinea. The ship had a crew of 15, consisting of a Sri Lankan master and 14 Papua New Guinean nationals.

The master had 18 years of seagoing experience and held a master's certificate of competency. He had sailed as master for 1 year on a sister ship to *Madang Coast,* with frequent port calls into Townsville. He had joined *Madang Coast* about 3 months before the incident.

The second mate had over 5 years of seagoing experience and held a watchkeeping deck officer's certificate of competency. He had joined *Madang Coast* about 10 months before the incident.

The bosun had 30 years of seagoing experience and had sailed as bosun for 15 years. He had joined *Madang Coast* about 4 months before to the incident.

Propulsion

Madang Coast was fitted with a left-handed turning[8] controllable pitch propeller (CPP) which rotated at a constant speed, in the same direction. Ahead and astern movements were controlled by adjusting the degree of pitch applied to the propeller blades.

During an astern movement, the propeller creates a transverse force on the ship's hull, commonly called cut. Consequently, the stern would move to port causing the bow to sheer to starboard. As the astern pitch increased, this effect would also increase.

Further, when the pitch is set at zero, the equivalent of 'stop' for a fixed pitch propeller, *Madang Coast* would creep slowly ahead. These characteristics had been noted on the pilot card:

> Bow swings to starboard when astern propulsion. Vessel creeps ahead when pitch is set at '0'.

Madang Coast was also fitted with a 280 kW bow thruster and a Becker rudder.[9]

Mooring equipment

Madang Coast's forward mooring deck equipment and fittings consisted of two windlass drum ends,[10] two pedestal rollers[11] and four twin bollard bitts (Figure 5). The mooring plan usually involved using five mooring lines forward (three head lines and two spring lines) and five mooring lines aft (three stern lines and two spring lines). The head lines and stern lines were heaved in by taking turns around the rotating drum end and then manually pulling on the line to create friction for it to grip the drum.

A spring line was usually the first line ashore and held onto (prevented from paying out) by making at least two turns around one post of twin bollard bitts. The remaining spring lines were tensioned using the same method as for the head/stern lines.

When in position alongside, each mooring line was made fast by making six complete turns around one post on a set of bitts. However, due to the limited number of bitts, two lines were made fast on the same set of bitts.

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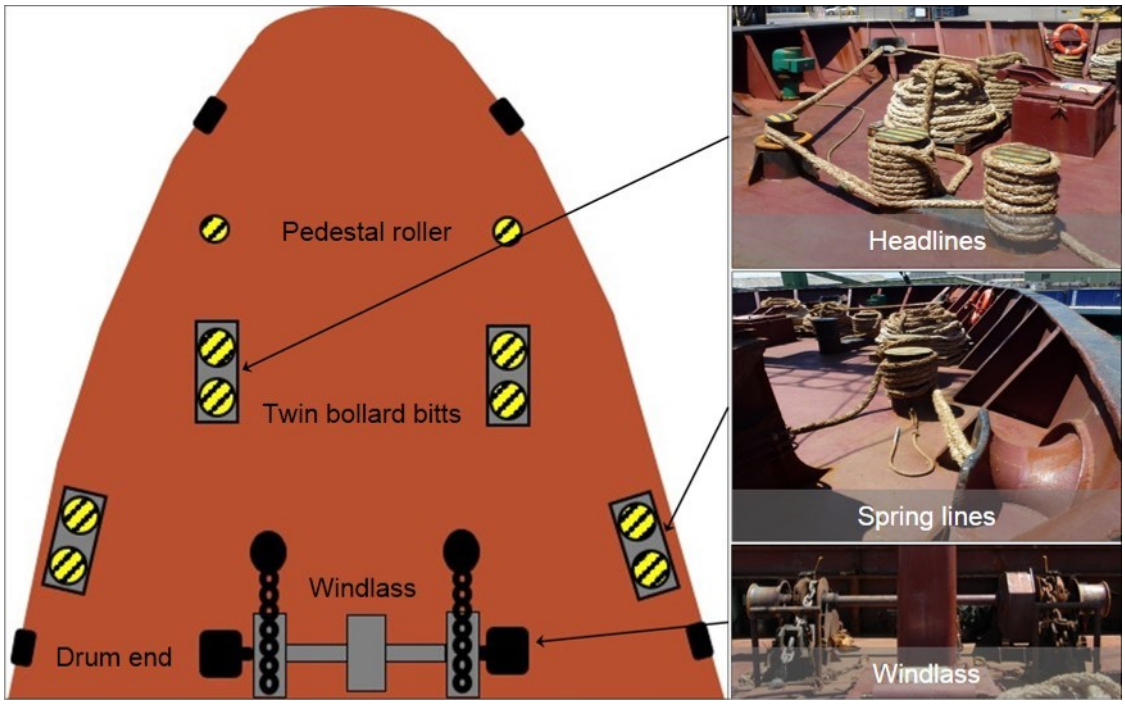
8 When viewed from astern, looking forward, a left-handed turning propeller is seen to rotate anti-clockwise.

9 A spade-type rudder with flap. The Becker-type rudder has a moving flap on the trailing edge. When the rudder moves, a mechanical linkage diverts the flap to a higher angle to maximise the sideways thrust.

10 Drum ends are driven by a horizontal axle that is usually shared by a mooring winch or the anchor windlass.

11 A pedestal roller is generally used to change the direction of lead of a mooring or other line on deck.

Figure 5: Mooring deck equipment



Source: ATSB

Port procedures

Maritime Safety Queensland (MSQ) is responsible for improving maritime safety for shipping and recreational craft through regulation in Queensland, amongst other functions. The Transport Operations (Marine Safety) Regulations 1994 describe the pilotage areas. A Regional Harbour Master (RHM) controls the pilotage areas within their region and has the authority to direct the master of a ship to navigate or operate a ship in a prescribed way.

Each pilotage area has a *Port Procedures and Information for Shipping Manual*. The manual details mandatory regulations, procedures, and services to be observed. The manual also contained guidelines and information to assist masters, owners and agents of ships arriving and departing the area.

In Queensland, an online booking and port movement information website, Queensland Shipping Information Planning System (QSHIPS), is used to book any shipping movements. Shipping agents are required to enter ship arrival details, such as berthing information and tug requirements, directly into the booking system, at least 48 hours in advance.

MSQ's vessel traffic services (VTS) manage the system and are responsible for updating QSHIPS as changes occur. They are responsible for informing relevant personnel such as pilots, tug and lines boat crews and port marine services of any changes.

Port of Townsville operations

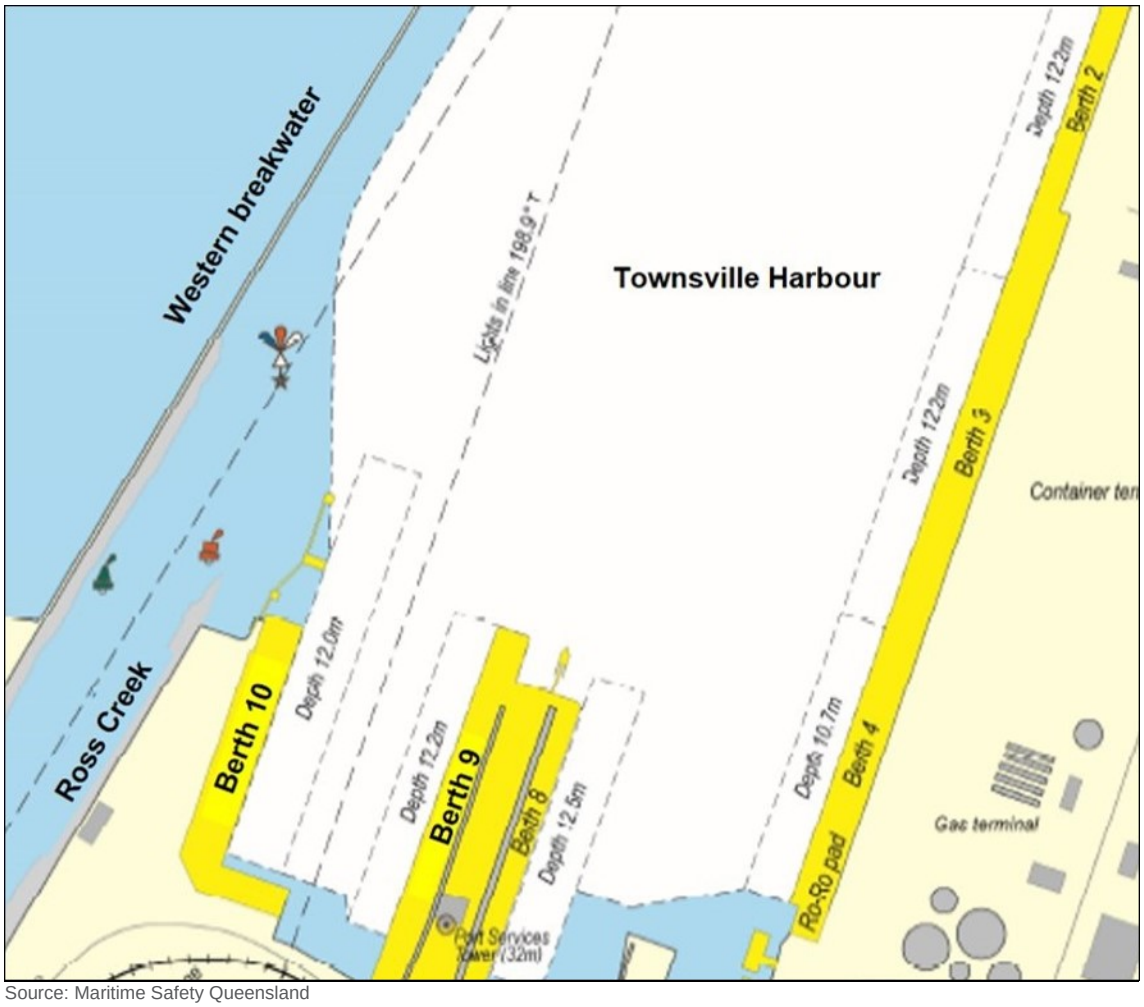
The Port of Townsville is the third largest port in Queensland and averaged 1,440 vessel movements and 12 million tonnes of cargo per annum. That is more than 75 per cent of the state of Queensland's metals cargoes and more than 12 per cent of the state's total international cargo trade.

Townsville Inner Harbour

Berth 10 (Figure 6) was located on the western side of the harbour and formed a finger pier between Ross Creek and Berth 9. Due to its proximity to Ross Creek, ships approaching the berth

pocket may be affected by tidal streams flooding and ebbing into and out of the creek. Berth 10 was designed as a roll-on/roll-off, and general cargo berth for ships up to 300 m.

Figure 6: Townsville Inner Harbour



Source: Maritime Safety Queensland

Tugs

Two tugs were available for towage in Townsville. Shipping agents booked tugs on behalf of ships' masters via the QSHIPS programme for which they were charged a fee for service. Outside of normal working hours, the tugs were not manned, unless a booking had been made.

MSQ's Port Procedures[12] detailed tug usage guidelines[13] for the Port of Townsville. The number of tugs required was determined by the berth, the ship's length and if it was to be swung prior to berthing. For Berth 10, a ship of *Madang Coast*'s length and berthing starboard side alongside required one tug.

However, ships with operable and efficient thrusters and/or enhanced ship-handling capabilities could have the tug requirements reduced. During a ship's first inbound transit, a pilot would assess and make recommendations for subsequent transits to the RHM for consideration. As *Madang Coast* was fitted with a bow thruster and Becker rudder it met the requirements of enhanced manoeuvrability and hence had an allowable tug reduction from one to no tugs.

12 Maritime Safety Queensland Port Procedures and Information for Shipping – Townsville.

13 Port Procedure and Information for Shipping – Townsville – July 2015, Section 9.

Tug reduction request

The Port of Townsville Limited (POTL) Pilotage Services' Standard Operating Procedures (SOPs) provided the following guidance for ordering of tugs:

> It is not a Pilot's responsibility to order tugs.
>
> VTS advise agents of tug requirements in accordance with the Port Procedures Manual and the order is made directly by the agents to the tug company for the port. Variations in addition to the prescribed for a particular job are at the pilot's discretion.
>
> Any reduction to the prescribed no [number] of tugs for a movement has to be approved by the RHM.

Therefore, when a pilot determined the use of a tug was required, they were able to use their discretion to request it. This decision could be taken either after reviewing the daily shipping schedule, on the way to the ship or upon boarding it. However, there would be a delay to the berthing, as if the tugs were not ordered for a specific shipping movement then they were not manned nor on standby. The delay could be up to 2 hours before the tugs were available. These delays, along with the associated commercial pressures of turnaround times and tug costs are among the many factors that can influence the decision-making process.

On 13 November 2015, three days prior to the berthing, the shipping agent submitted a request to the RHM for a tug reduction for *Madang Coast*'s 16 November 2015 berthing. The shipping agent did not consult the ship's master about this request, nor was he required to at that time.

The acting RHM (ARHM) consulted the port guidelines and *Madang Coast* met the requirements for a tug reduction:

> An operable and efficient Bow / Stern thruster: means a fully operational, sufficiently immersed bow thruster, adequately powered relative to ship's size and prevailing weather conditions.

He then discussed the application with the pilot manager and it was agreed that the ship could berth without the use of a tug. The ARHM granted the reduction and the shipping agent was notified. The shipping agent updated QSHIPS and the shipping schedules, which were sent out twice a day, noted that *Madang Coast* was to berth without a tug.

Lines boats

A lines boat is a small vessel that is used to tow mooring lines from the ship to the wharf when the distance is too great for the crew to use a hand-thrown messenger line or the mooring line is to large or heavy to be easily handled manually.

MSQ's Port Procedures stated, amongst others, that a lines boat was required for the following cases:

> all ships with an LOA [length overall] >150m at berth 10
>
> all vessels berthing without tugs (with or without thrusters) – use of a line[s] boat is at the discretion[14] of the pilot berthing the vessel.

Pilotage

On 2 November 2013, the responsibility for the management and delivery of pilotage services in Queensland ports was transferred from MSQ to the various port authorities. Pilotage Services, now a division of the POTL, managed and provided the pilotage services in Townsville. Ownership of the application and approval process for pilot licences and exemptions remained with MSQ. Pilotage was compulsory for all ships over 50 m, unless the RHM had issued an exemption.

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[14] Pilots discretion was referred to in the draft PSMS as 'variations in addition to the above guidelines are at the pilot's discretion. Pilots are to exercise this discretion to ensure safety of the vessel i.e. during strong winds'.

Pilot training content and approach

At the time of the incident, a pilot's training consisted of theoretical and practical observation, study and assessment. MSQ issued training requirements[15] that specified what training had to be completed for each level[16] within each area endorsement (Appendix B). POTL Pilotage Services provided the training and practical assessments. The RHM assessed the theoretical knowledge and issued the pilotage certificate. The pilotage certificate consisted of a licence valid for 5 years, and an area specific endorsement, valid for 2 years.

Each level of pilotage, from trainee (level 4) to unrestricted (level 1), required the pilot to complete a number of observation trips of qualified pilots conducting trips at that level. They were then required to conduct trips under supervision, and then check (assessment) trips.

Additionally, every pilot, at intervals of less than 2 years, had to undertake a check (assessment) of two pilotage trips (an arrival and departure) with a licenced check pilot. Further, after an incident, or if a pilot expressed a concern about berthing, they were sent on observation trips with other pilots.

The pilot

The pilot assigned to *Madang Coast* held a current foreign going master's certificate of competency, an unrestricted pilot's licence, and a check-pilot[17] licence for Townsville. He had 12 years' experience at sea and a further 10 years of pilotage in various Australian and New Zealand ports prior to joining MSQ in 2011.[18] He had piloted *Madang Coast* and a sister ship into and out of Townsville on numerous occasions.

Pilotage Services procedures and guidance

The Ports Australia *Australian Port Marine Safety Management Guidelines* (2015) provided a framework to encourage systemised evaluation of risk, and suggest ways to address and minimise the risk. The Guidelines were not considered a regulatory requirement, rather, they represented a 'good practice' framework for a Port Marine Safety Management System (SMS). These guidelines recommended the following:

> Ports should develop standard berthing plans containing minimum agreed requirements following consultation with affected parties

It was also recognised in the guidance that passage plans were subject to change and it was important not to constrain a master or pilot's need to react to unforeseen circumstances.

Pilotage Services Safety Management System

In 2011, the Townsville pilotage services, then part of MSQ, developed a Pilotage SMS (PSMS) for the Townsville Pilotage Services. At the time of the occurrence, the SMS document (and therefore the berthing guidelines within) had not been approved, as some of the pilots and the pilot manager disagreed with aspects of it. Therefore, there was not an approved working document, and it remained as a draft format.

In August 2013, an audit of the Townsville Pilotage Service's 2011 draft PSMS was completed 2 months before MSQ divested itself of pilotage services. The RHM noted that documented procedures for deviating from the passage plan, contingency plans and emergency situations for the pilotage area were in the process of being developed. Further, with reference to the 2011 draft PSMS, they noted the document presented had not been formally adopted by Townsville Pilotage Services as it was still under review prior to adoption.

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15 Record of qualifications and training for Queensland Port Pilots for the Pilotage area of Townsville.

16 Area endorsement levels are based on ship lengths.

17 A check pilot is licensed under regulation as a pilot and is authorised to assess an applicant's competence to be issued a new or renewed Licence or Pilotage Area Endorsement.

18 At the time of employment, MSQ provided pilotage services in Queensland. His employment was transferred to the Port of Townsville Limited, when MSQ divested itself of its pilotage service division.

In 2014, POTL Pilotage Services' SOPs were implemented, which included elements of the 2011 draft PSMS. The SOPs detailed reference material, duties and responsibilities and passage plans amongst others. In a November 2014 audit, the RHM again recommended the POTL Pilotage Service to develop documented procedures for contingency plans and emergency situations, this time through the pilot meeting minutes. In addition, with regard to emergency situations, the audit also recommended that pilots discuss various scenarios during pilot meetings. This was to develop awareness and identify options to consider in the event of an emergency once past the point of no return.

In November 2015, an audit was completed 11 days prior to the incident. The RHM noted the POTL Pilotage Service now operated under the POTL's existing SMS.[19] It was also noted that procedures were in place for deviating from the passage plan and that the procedures for emergency situations were discussed and documented at pilot meetings in the minutes. However, the RHM recommended that the POTL document standard operating procedures for emergency situations during pilotage.

Berthing manoeuvre guidance for Berth 10

At the time of the incident, there was no published guidance in the SOPs for berthing ships in Townsville. The only guidance for berthing a ship was detailed in the 2011 draft PSMS. The draft PSMS included guidance for when swinging a ship to port or starboard when berthing port side alongside. Additionally, when no swing was required, the ship was to be berthed starboard side alongside.

General guidance from the draft PSMS for berthing at Berth 10 included:

> Smaller vessels, berthing without tugs, often berth starboard side to (head in) to the berth.
>
> Due to the nature of the cargo worked and the size of the vessels that call at this berth tugs are often not required.
>
> In general pilots require a shore end back spring line to be run first as this provides the potential to prevent the vessel from moving too far into the shore end of the pocket.

Specific guidance for berthing when no swing was required included:

> Pilots vary the angle of approach to the berth allowing for:
>
> i. prevailing conditions – wind direction and strength
> ii. tidal streams in and out of the creek
> iii. tug allocation and/or thruster/s and/or planned use of anchor/s
> iv. vessel speed.
>
> Pilots reduce speed gradually and maintain heading using helm, thrusters, tug/s and/or anchors.
>
> Once inside the pocket the vessel is positioned parallel to the berth and manoeuvred alongside using tug/s, thruster/s, the line's launch and/or mooring lines.

Berthing method

Previous berthing methods

Madang Coast had berthed starboard side alongside at Berth 10 on six previous occasions in as many months without incident, and over 20 times in total. Three methods had been used to berth the ship during the previous 6 months (Table 1). The methods included dredging an anchor,[20] using a tug, and using a forward back spring to manoeuvre against.

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[19] Document POTL 1023 R(2) Port of Townsville Pilot Services Standard Operating Procedures. R(2) introduced on 13 May 2015. R(3) was added to the quality document system in March 2016.

[20] Term used to describe the towing of an anchor at a short stay.

Table 1: *Madang Coast*'s berthing history at Berth 10

Tug used	Number of tugs and position	Anchor dredged	Forward spring line	Tidal conditions
No	-	No	Yes	flooding
No	-	Yes (Stbd)	No	flooding
No	-	No	Yes	flooding
Yes	One - aft	No	No	ebbing
No	-	No	Yes	flooding
No	-	No	Yes	flooding

Source: POTL Pilotage Services, berthings between April and September 2015

It was not unusual practice for a tug not to be ordered when the wind was from the north, as the ship had berthed without incident on those occasions. However, on one arrival a tug was used as the tide was ebbing and the wind was from the south-east (acting on the ship's beam, pushing the ship onto the berth).

The berthing method used by a pilot depended on a number of factors, such as wind direction and force, windage, draught, tidal conditions, use of a tug and/or lines boat and characteristics of the ship.

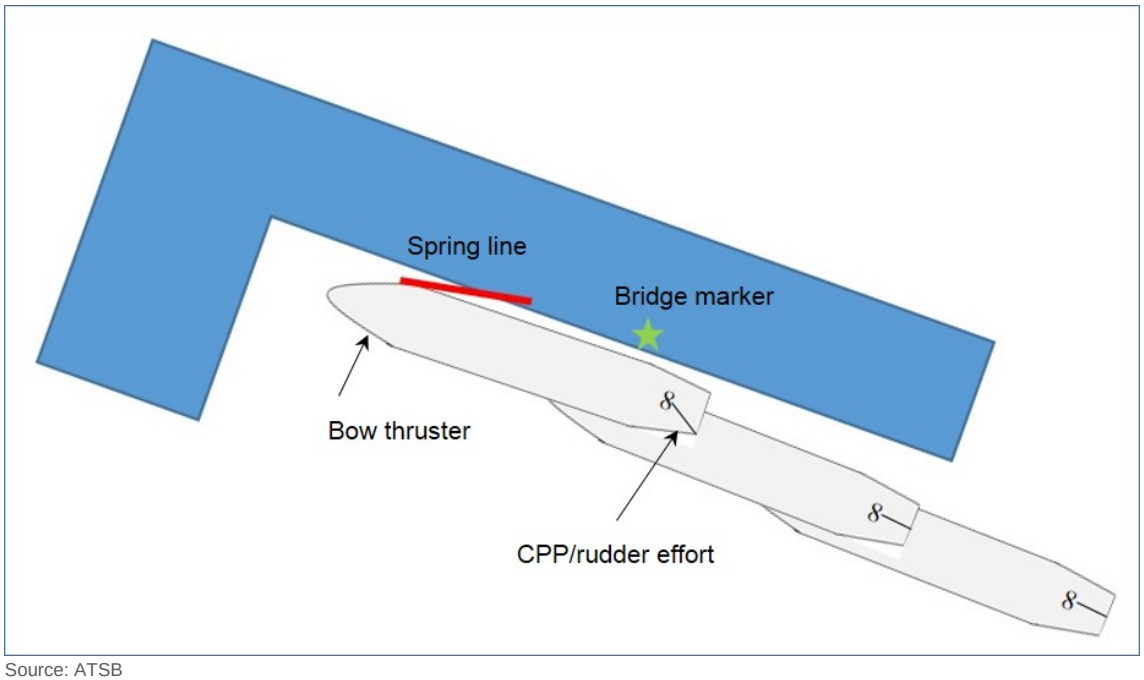
Pilot's berthing plan

The pilot's plan for berthing *Madang Coast* on 13 November 2015 involved approaching the berth at a shallow angle with minimal headway (Figure 7).

As the ship approached the berth, the forward mooring party were to run a forward back spring line and when instructed, hold onto the line.

As weight came onto the line, the forward movement of the ship would bring it slowly alongside. A short ahead movement of the ship's propulsion and with the rudder hard-over to port would swing the ship's stern in and the bow thruster could be used to maintain the bow's position. Once alongside, the ship's final position could be adjusted by using the head and stern mooring lines and/or main engine.

Figure 7: Planned berthing manoeuvre



Source: ATSB

Safety management

A safety management system can be defined as a planned, documented and verifiable method of managing hazards and associated risks. Key operational safety risks can be identified by incorporating processes and practices for:

- managing operational safety matters
- incident reporting
- holding regular meetings
- collation and analysis of safety information.

The benefits of doing so include an increased ability to identify, assess and mitigate safety risks. Relevant references such as the National Marine Safety Committee's *National Marine Safety Guidance Manual* refer to risk management in SMSs:[21]

> The primary objective of a pilot organisation is to manage the risk to life, vessels, the environment within the port or pilotage area, during pilotage. A pilot organisations' SMS should address all significant risks identified using a recognised methodology.

However, only the Townsville Pilotage Service's 2011 draft PSMS included risk management guidance such as:

> Every pilotage involves an assessment and the formulation of a plan in order to minimise and mitigate the risk inherent to the operation. For a majority of pilotage operations this risk is planned for and dealt with by adhering to Regulators legislation, terminal requirements and this PSMS.

Further, the 2011 draft PSMS also contained further guidance for 'Operational Controls as Threat Barriers'.[22] The guidance detailed that the barriers listed in the draft PSMS were not all of the available options and pilots should use any as required.

Safety reporting

The pilots were required to report all marine incidents[23] and near misses to the pilotage manager as soon as practically possible. The Pilotage Information Management System (PIMS) was used to report marine incidents, other incidents not defined as a marine incident and other information.

PIMS was a voluntary reporting system for Australian ports. After a report was logged into PIMS, it was automatically distributed to all Townsville pilots and the pilot manager. The reports could also be sent to the RHM and the Australian Maritime Safety Authority (AMSA). The reported information could potentially benefit another pilot in the same port or other ports or alert the pilotage manager of action required regarding a vessel. Any PIMS reports raised were also added to the minutes of pilot meetings for discussion.

Pilotage meetings

Pilotage meetings were typically held every 2 to 3 months. The pilotage manager arranged the meetings and sent an agenda to all attendees. All pilots and the RHM were expected to attend and POTL managers and other guests were invited as required. Those who could not attend were noted as apologies. The meeting agenda generally covered administrative matters, port authority and berth updates, navigational issues, PIMS reports and, on occasion, contingency plan discussion points, amongst others. Meeting minutes were taken and promulgated to all attendees. In general, the minutes provided a brief overview of the agenda and any subsequent outcomes.

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[21] The revised guidelines were developed by the National Marine Safety Committee (NMSC) in conjunction with Ports Australia, the Australian Marine Pilots Association and Marine Safety Queensland, in 2008.

[22] Amongst others, the PSMS detailed the following as threat barriers: the generic passage plan, the ship's passage plan, the master-pilot exchange, weather forecasts and warnings, pilot training and the PSMS. The latter two indirectly feed into enacting of contingency plans.

[23] An incident resulting in the loss of a person from a ship, the death of a person, a collision, a stranding, material damage or danger of serious damage to a ship amongst others.

The pilot manager and RHM indicated that besides general issues, PIMS reports were discussed and anything of concern could be raised as an agenda item. They also outlined that the pilot meetings were used to discuss policies and to facilitate consultation with people outside of the pilot group.

Weather

At 1550 on 16 November 2108, the Bureau of Meteorology issued a Coastal Waters Forecast for the Townsville coast:

> Winds: North-easterly 10 to 15 knots, reaching up to 20 knots offshore north of Cape Bowling Green in the evening. Winds decreasing to about 10 knots in the late evening.[24]

At 2200, the wind speed at the entry to the Sea Channel was 13.7 kt from 004° and at Townsville's airport[25] was 10 kt from 010°.

Effect of wind

When a ship reduces speed and during berthing, the effect of the wind can create difficulties for a ship with an all aft accommodation (Figure 8). With the wind abeam or abaft the beam and the ship stopped in the water, the superstructure and funnel offer a cross-section to the wind. Further, the area of freeboard[26] from forward of the bridge to the bow also needs to be considered. The centre of effort of the wind (W) acts upon the combination of these two areas and it is further forward than expected.

When considering the underwater profile of the ship, the position of the pivot point (P)[27] is close to midships when stopped. The centre of effort of the wind and the pivot point are close together and the wind creates a minimal turning influence on the ship.

However, when the ship is making headway the pivot point moves forward but the centre of effort of the wind remains where it is. This creates a turning lever between P and W, and depending on the strength of the wind, the ship will develop a swing of the bow into the wind.

This effect increases at lower speeds as the pivot point moves further forward. Therefore, as the speed reduces the effect of the wind progressively increases.

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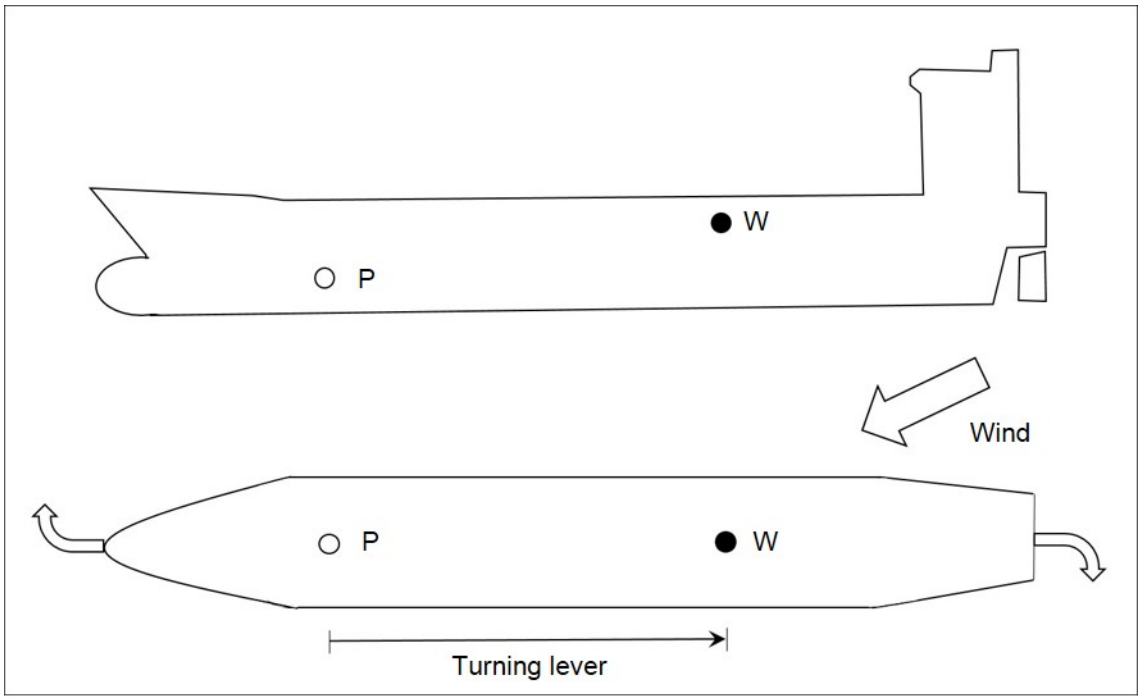
[24] Cape Bowling Green is 65 km east by south of Townsville. The BoM defines evening as 1900 to 2000 and late evening as after 2100.

[25] Townsville's airport is approximately 7 km west of the port.

[26] Vertical distance from the waterline to the upper deck.

[27] The itinerant vertical axis about which a ship rotates during a turn.

Figure 8: Effect of wind with headway



Source: The Nautical Institute, modified by the ATSB

Previous occurrences

In September 2015, several months prior to the incident, a PIMS report had been raised for a ship's contact with Berth 4. The ship had two tugs allocated for berthing due to generator issues. Strong south-easterly winds had been experienced leading up to the pilotage, with the wind from the south-east at about 20 to 25 kt. After boarding the ship, the pilot confirmed the tug attendance with the duty tug master.

However, during transit of Platypus Channel, the master of one tug informed the pilot that the other tug had been cancelled the previous day. The pilot then queried this with the Vessel Traffic Services Officer, who confirmed it, as the ship's generator had been repaired the previous day. Hence, the ship had reverted to its normal tug allocation of one tug for a ship of her length. The pilotage continued without issue, but upon berthing the ship made contact with the wharf. The pilot attributed this to having only one tug for berthing in those wind conditions. He stated that he would have requested two tugs for berthing, but as the ship already had been allocated one tug, he did not make this request.

Safety analysis

As the *Madang Coast* approached the berth, the first mooring line ashore was looped over a bollard on Berth 10. However, shortly after, as weight came onto the mooring line, it slipped on the post of the twin bollard and fell slack. *Madang Coast* started moving off the berth and the stern drifted towards a ship alongside, on the opposite berth. Despite repeated efforts by the ship's forward mooring party crewmembers to hold onto the mooring line, *Madang Coast*'s bow made contact with the shore end of Berth 10, and its port quarter with the ship on the opposite berth.

This analysis will examine *Madang Coast*'s berthing plan, the Port of Townsville Limited (POTL) Pilotage Services guidance for berthing, tug reduction processes and the procedures for pilotage risk management, contingency planning and pilotage best practice.

Guidance for berthing

Madang Coast's berthing

The pilot assigned to *Madang Coast* prepared the Townsville Pilotage Plan for its arrival prior to boarding. The plan detailed the wind and tidal conditions, and that a forward spring line would be the first line ashore.

When the first line was run ashore, the forward mooring party made two turns around one post of twin bollard bitts. The mooring party commonly used this method and it required the working end of the line (free end) to be continuously manned and held on to by an operator to maintain tension. On this occasion, when tension came onto the line, the mooring party could not hold onto it and it started to pay out. During interview, the forward mooring party crewmembers stated this berthing was different to previous berthings, as the ship was coming alongside faster than they would normally expect.

The ship had approached the wharf at about 1.8 kt and astern pitch on the ship's controllable pitch propeller (CPP) was used to reduce the speed to about 0.8 kt, when the spring line was run ashore. Consequently, the left-handed turning CPP led to the stern starting to cut to port and move away from the berth. Further, the effect of the wind progressively increased as the ship's speed slowly reduced, exacerbating the movement away from the wharf.

The master instructed the second mate to pick up the slack in the line. He expected this would be achieved quickly, as he and the pilot had assumed the spring line had been run around a pedestal roller and onto the windlass drum end. However, the master and the pilot had a different comprehension of the situation to that of the forward mooring party.

Despite the repeated efforts of the forward mooring party to recover and hold onto the mooring line, the ship's stern moved further from the wharf. Without the spring line to manoeuvre against, the ship's movement went unchecked. Hence, it is likely that the ship's approach speed in combination with the use of only two turns of the spring line around the twin bollard post contributed to the spring line slipping.

Contingency planning

Contingency planning is a risk management tool, which provides additional controls to avoid and effectively manage adverse events. Anticipation of, and preparation for, a possible event during the non-time pressured planning phase, makes the reaction to that event more effective. The reaction may then be one from a known and practised range of options, rather than an unknown, instantaneous reaction in an unexpected, time-pressured and stressful situation. Further, such planning allows for the identification of single points of failure, which can then be mitigated for they have a chance to occur. Learning only from real emergencies is not practical and therefore, should be enhanced through training, ideally simulation in a controlled environment.

At the time of the incident, the Port Procedures stated:

> The master and pilot should exchange information regarding navigational procedures, local conditions and rules and the ship's characteristics. The proposed manoeuvres should be discussed with the master before commencing the pilotage.

The pilot is the local knowledge expert and is employed to conduct the ship because of this specific knowledge. *Madang Coast*'s pilot had prepared the pilotage plan for its arrival and detailed the wind and tidal conditions, that the spring line would be the first line ashore and that no tugs had been ordered. The pilot and master had discussed and agreed the berthing manoeuvre, using a forward spring line only. This was deemed a routine berthing and had been completed successfully without incident before. However, contingency plans were not detailed or discussed during the master-pilot exchange (MPX).

It was only after the spring line had continued to slip and the ship continued to move off the berth that the pilot considered contingencies. These included requesting a tug, dropping an anchor and running stern lines to control the stern's movement. However, it would take considerable time for a tug to attend. In addition, stern lines could not be run ashore as the distance from the stern to the berth was now too far for lines to be run ashore nor was a line's boat in attendance. Further, when the pilot instructed the master to let go the port anchor, the bow was too close to the wharf for the anchor to be effective in preventing the bow from contacting Berth 10. Consideration of single points of failure during the planning of the berthing, such as the spring line slipping, should have resulted in mitigations such as those listed above being in place earlier in case the planned for potential adverse event eventuated.

The berthing plan relied solely on the use of the forward spring line to manoeuvre the ship alongside. It had not been risk assessed nor had contingencies been considered. As a result, a single failure at such a late stage of the berthing meant that the incident could not be avoided.

Pilotage Services Standard Operating Procedures

Risk Management

At the time of the incident, POTL Pilotage Services standard operating procedures (SOP) risk management process only referred to marine incident reporting and the use of Pilot Information Management System (PIMS). That is, the PIMS reports submitted by pilots were the main source of safety risk management. Although promulgated to all pilots, the reports were only discussed as a group during the pilotage meetings, which were held about every 2 to 3 months. Several pilots had questioned the effectiveness of PIMS as a safety reporting system. There was a perception amongst the pilots that the reports were infrequently logged, and could be used to highlight their own errors, or used as a punitive tool. Even so, the pilots were keen to see PIMS used more frequently, to report a wider range of safety issues and to learn from each other.

Between November 2013 and November 2015, the pilot meeting minutes show that PIMS reports were discussed. However, the minutes only included minimal information related to PIMS reports and did not include detailed outcomes or details of what was actually discussed. In addition, they did not record any discussion points arising from a PIMS report submitted 2 months prior to the incident, which involved a tug reduction and subsequent contact with a berth. Without detailed minutes of discussion points or incorporation of agreed outcomes into the SOPs, any learning opportunities remained with those at the meeting and were lost to those who could not attend.

Further, without structured processes to identify, collate and assess hazards and risks, there was a reduced likelihood of effective management of potential risks associated with pilotage. Therefore, at the time of the incident, the risk management processes were not sufficiently mature nor resilient enough to effectively identify and mitigate risks in pilotage services.

Berthing methods and best practice

At the time of the incident, there was no specific guidance for berthing methods nor manoeuvres, such as standardised berthing plans. There was a perception among several pilots that standardised berthing plans were the same concept as prescriptive methods. The imposition or enforcement of them may restrict the ability of a pilot to respond to an unplanned situation, as a pilot may then attempt to return to the standard plan, rather than adapt to an evolving situation.

All pilots were exposed to the different berthing manoeuvres used by other pilots during observation and supervised trips when undertaking an area endorsement. These trips enabled the pilots to observe their peers' methods of berthing ships. They then either developed their own or followed other pilots' techniques and methods. The area endorsements were seen as the main way to refresh the pilots' knowledge. Hence, the pilots used a variety of individualistic berthing methods to berth ships in the absence of standard berthing plans.

Further, as pilots continued to progress through the competency levels, they could do so by using their own berthing manoeuvre preferences and hence, becoming less familiar and practised with other manoeuvres and less likely to conduct them.

Standardised plans, when incorporating best practice can provide an understanding of the 'how, when and why' of things being done and allow for contingencies. The Ship Handler's Guide outlines that a proactive instead of reactive approach will also enable the better transfer of knowledge to new pilots. As no two pilotages are the same, guidance for berthing methods, for example at Berth 10, could be developed using the collective combined knowledge and experience of the pilots. When used in combination with a risk based framework, the overall flexibility could be enhanced through the development and incorporation of effective contingency plans. Guidance that is revised, amended, briefed and debriefed could also be used for training pilots and provide opportunities for continuous development and knowledge sharing.

Port procedures

Tug usage and reduction guidelines

On 13 November, the shipping agent submitted a request for a tug reduction, as was the usual practice for *Madang Coast*. Following a review of the guidelines and a discussion with the pilot manager, the acting Regional Harbour Master (ARHM) approved the tug reduction request subject to the weather at the time. This information relayed to the shipping agent and Townsville Vessel Traffic Services (VTS). Further, the daily shipping schedule[28] detailed that no tugs were booked for the ship.

The ARHM, pilot manager, and master were all unaware that the agent's request was made without the master's knowledge. During interview, the master stated he had expected a tug to assist berthing due to the wind conditions at the time. This was despite him not requesting nor liaising with the shipping agent to organise this. When he was informed of the tug reduction by the pilot during the MPX, he did not object and allowed the pilotage to continue.

Neither the Port Procedures nor the SOPs included a requirement to consult with a ship's master before the removal of tugs was approved. The pilot became aware of the tug reduction after he reviewed the daily shipping schedule on 16 November. Whilst this tug reduction process followed the Port Procedures, those directly involved in the pilotage were not consulted.

Audit findings

At the time of the contact, Marine Safety Queensland's (MSQ) Port Procedures Manual stated that the MPX should include 'general agreement on plans and procedures including contingency plans

[28] The shipping schedule detailed movements from 1630, 16 November to 2359, 18 November 2015.

for the anticipated passage'.[29] However, the SOPs did not contain any passage or berthing contingency plans for the Townsville pilotage area.

The 2014 and 2015 audits included findings regarding procedures for emergency situations:

> Procedures for emergency situations for the pilotage area. Pilots will discuss various scenarios during the pilot meetings to develop awareness and identify options to consider in event of an emergency once past the point of no return.
>
> Procedures for emergency situations within the pilotage area to be added as an independent section in the Pilotage SOP's.

However, in the period between the 2014 and 2015 audits, only two scenarios were discussed at the pilot meetings, and the outcomes and plans were not minuted as required by the audit finding, nor added to the SOPs.

External auditing is an invaluable tool for identifying areas for improvement. However, for it to be effective both parties need to have a follow-up process that ensures audit findings are appropriately monitored, actioned, and closed out in a timely and appropriate manner.

[29] Port procedures and information for Shipping – Port of Townsville. Pilotage, Section 8.5.

Findings

From the evidence available, the following findings are made with respect to the contact made by *Madang Coast* on 16 November 2015. 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

- As *Madang Coast* came alongside the wharf, the forward spring line slipped and could not be used to manoeuvre against. This was likely a result of the mooring line holding arrangement and the ship's approach speed.
- As the ship approached the wharf, the combination of wind effect and astern movement moved the stern away from the wharf. As the spring line could not be used to manoeuvre against, the stern could not be brought back.
- The pilotage plan did not identify nor consider contingencies for single points of failures, therefore when the mooring line slipped, the contact with the wharf and adjacent ship could not be avoided.
- **The Port of Townsville Limited Pilotage Service risk management processes were not sufficiently mature nor resilient enough to effectively identify and mitigate risks during pilotage.** [Safety issue]

Other factors that increased risk

- **The Port of Townsville Limited Pilotage Services' Pilotage Service Safety Management System did not have documented guidance on berthing manoeuvres nor any associated contingencies.** [Safety issue]
- **The Port Procedures manual for Townsville allowed shipping agents to request a tug reduction without the knowledge of the ship's master.** [Safety issue]
- **The regional harbour master and the pilotage service did not have processes in place to follow up audit findings, to ensure that they were appropriately monitored, actioned and closed out in a timely manner.** [Safety issue]

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.

Depending on the level of risk of the safety issue, the extent of corrective action taken by the relevant organisation, or the desirability of directing a broad safety message to the marine industry, the ATSB may issue safety recommendations or safety advisory notices as part of the final report.

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 provided 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.

Risk management

Safety issue number: MO-2015-007-SI-01

Safety issue owner: Port of Townsville Limited Pilotage Services

Operation affected: Shipboard operations

Who it affects: All ships entering and departing Townsville under pilotage

Safety issue description

The Port of Townsville Limited Pilotage Service risk management processes were not sufficiently mature nor resilient enough to effectively identify and mitigate risks during pilotage.

Status of the safety issue

Issue status: Adequately addressed

Justification: The action taken by the Pilotage Service by reviewing and updating the safety management system addresses the issues.

Proactive safety action

Action taken by: Townsville Pilotage Services

Action number: MO-2017-001-NSA-013

Action date: 8 September 2017

Action type: Proactive safety action

Action status: Closed

Safety action taken: The safety management system has been reviewed and updated and now identifies risks associated with pilotage and provides suggested actions of how to mitigate risks.

Contingency planning

Safety issue number: MO-2015-007-SI-02

Safety issue owner: Port of Townsville Limited Pilotage Services

Operation affected: Shipboard operations

Who it affects: All ships entering and departing Townsville under pilotage

Safety issue description

The Port of Townsville Limited Pilotage Services' Pilotage Service Safety Management System did not have documented guidance on berthing manoeuvres nor any associated contingencies.

Status of the safety issue

Issue status: Adequately addressed

Justification: The actions taken by the Port of Townsville Limited (POTL) and the POTL Pilotage Services have detailed berthing manoeuvres and identified emergency situations providing contingency guidance to the pilots.

Proactive safety action

Action taken by: Port of Townsville Limited (POTL) and the POTL Pilotage Services

Action number: MO-2017-001-NSA-014

Action date: 8 September 2017

Action type: Proactive safety action

Action status: Closed

Safety action taken: The POTL and the POTL Pilotage Services have completed a review of and subsequently updated their safety management system (SMS). The SMS now consists of six parts, including Standard Operating Procedures, Townsville Port Operations and Emergency Management Procedures amongst others. The SMS now includes guidance for berthing manoeuvres and contingency plans in emergency situations for inbound and outbound ships with and without tug assistance.

Tug reduction process

Safety issue number: MO-2015-007-SI-03

Safety issue owner: Maritime Safety Queensland and Port of Townsville Limited Pilotage Services

Operation affected: Shipboard operations

Who it affects: All ships entering and departing Townsville under pilotage

Safety issue description

The Port Procedures manual for Townsville allowed shipping agents to request a tug reduction without the knowledge of the ship's master.

Status of the safety issue

Issue status: Adequately addressed

Justification: The action taken by Maritime Safety Queensland and the Pilotage Service will eliminate the likelihood of an unexpected tug reduction.

Proactive safety action

Action taken by: Townsville Pilotage Services

Action number: MO-2017-001-NSA-015

Action date: 8 September 2017

Action type: Proactive safety action

Action status: Closed

Safety action taken: The tug reduction requesting procedure had been revised. The application now requires a declaration by the ship's master that an assessment of the intended manoeuvre has been undertaken. Further, the application notes that should a pilot recommend an additional tug, it may result in delays to the ship's scheduled manoeuvre. This revision should remove the possibility that the shipping agent has acted without the consent of the master. In addition, the delays to berthing are known and accepted by the ship's master.

Audit response

Safety issue number: MO-2015-007-SI-04

Safety issue owner: Maritime Safety Queensland

Operation affected: Shipboard operations

Who it affects: All ships entering and departing Townsville under pilotage

Safety issue description

The regional harbour master and the pilotage service did not have processes in place to follow up audit findings, to ensure that they were appropriately monitored, actioned and closed out in a timely manner.

Status of the safety issue

Issue status: Adequately addressed

Justification: The action taken by Maritime Safety Queensland to monitor, follow up and close off audit findings within audit timeframes addresses the issues.

Proactive safety action

Action taken by: Townsville Pilotage Services

Action number: MO-2017-001-NSA-016

Action date: 4 January 2019

Action type: Proactive safety action

Action status: Closed

Safety action taken: Maritime Safety Queensland now monitors the progress of audit findings/recommendations and closes off accordingly. The audit report has been amended to ensure follow up and close off on findings in a timely manner. All Regional Harbour Master's will record the progress and closure as per the audit timeframes.

Additional safety action

Following this contact, the ATSB was advised the following addition safety action has been taken:

MSQ has implemented a Continuing Professional Development framework (CPD), developed by the Australian Marine Pilotage Institute (AMPI). The CPD applies to all marine pilots licenced by MSQ for providing pilotage services in Queensland ports. The focus is on improved pilotage training by making it contemporary and relevant to pilots' needs in their ports. As the training is more progressive, new developments and initiatives within the pilotage profession can be identified and incorporated. Current pilots have a transitional period of 3 years to obtain sufficient professional development to be eligible for consideration of renewal of their pilot licence. See Appendix C for details.

General details

Occurrence details

Date and time:	16 November 2015 22:00 (UTC +10)
Occurrence category:	Serious Incident
Primary occurrence type:	Contact
Location:	Berth 10, Townsville Harbour, Queensland, Australia
	Latitude: 19° 15.5’ S Longitude: 146° 49.10’ E
Vessel:	*Madang Coast*
Damage:	Minor scrape marks and hull plate indentations
Injuries:	Nil injuries

Ship details

Name:	*Madang Coast*
IMO number:	9135767
Call sign:	P2V5305
Flag:	Papua New Guinea
Classification society:	DNV GL
Ship type:	General cargo ship
Builder:	Severnav S.A., Societatea Comerciala, Romania
Year built:	1997
Owner(s):	Consort Express Lines
Manager:	Consort Express Lines
Gross tonnage:	4,004 t
Deadweight (summer):	5,125 t
Summer draught:	6.55 m
Length overall:	104.75 m
Moulded breadth:	16.40 m
Moulded depth:	8.30 m
Main engine(s):	8L32/40 MAN B&W
Total power:	3,520 kW
Speed:	15.00 knots
Damage:	Minor

Appendices

Appendix A – Pilot card manoeuvring information

Manoeuvring engine order	RPM/Pitch	Speed in knots Loaded condition	Speed in knots Ballast condition
Full ahead	7.5	12.0	13.0
Half ahead	4.0	8.0	8.7
Slow ahead	2.5	5.0	5.4
Dead slow ahead	1.0	2.5	2.6
Dead slow astern	1.0		
Slow astern	2.5		
Half astern	4.0		
Full astern	7.5		

Appendix B – Townsville Pilotage training requirements

Qualifications and training for Queensland Port Pilots for the Pilotage area of Townsville					
Level	4	3	2	1	Check Pilot
Ship length	up to 120 m	up to 195 m	Up to 205 m	unrestricted	
Pilotage trips		20 Level 4	20 Level 3	20 Level 2	200
Observation[30] trips	14 (4 at night) 7 arr & 7 dep	2	4 on Level 2 ships	2 2 panamax arrivals	
Supervised[31] trips	9 6 arr & 3 dep 2 during darkness	6 4 arr 2 during darkness (1 arr & 1 dep)	6 during darkness (1 arr & 1 dep)	6 2 panamax 2 high windage during darkness (1 arr & 1 dep)	
Check[32] trips	2	2	2	2	2 1 arr 1 dep
Radar and ARPA course	Yes	Yes	Yes	Yes	Yes
Bridge Resource Management		Yes	Yes	Yes	Yes
Simulator course or Ship Handling Course		Yes	Yes	Yes	Yes
Marine Pilots Training Course				Yes	Yes

Source: MSQ (2015 requirements)

30 Trainee pilots observe qualified senior pilots conducting pilotage trips.
31 A mentoring trip by a qualified senior pilot to train a conducting pilot
32 An assessment of a conducting pilot's competence as a pilot

Appendix C – Updated Townsville Pilotage training requirements (in red)

Qualifications and training for Queensland Port Pilots for the Pilotage area of Townsville					
Level	4	3	2	1	Check Pilot
Ship length	up to 120 m	up to 195 m	Up to 205 m	unrestricted	
Pilotage trips		20 Level 4	20 Level 3	20 Level 2	200
Pilotage trips					1000
Observation trips Before incident	14 (4 at night) 7 arr & 7 dep	2	4 on Level 2 ships	2 2 panamax arrivals	
Observation trips	30 (10 at night) min 14 arr & dep 3 with an anchor 4 without a tug	11 6 arr & 5 dep	4 2 arr & 2 dep	10 6 arr & 4 dep	
Supervised trips	9 6 arr & 3 dep (2 during darkness)	6 4 arr (1 arr & 1 dep during darkness)	6 (1 arr & 1 dep during darkness)	6 (1 arr & 1 dep during darkness)	
Supervised trips	12 8 arr & 4 dep (4 without a tug) (2 arr & 2 dep during darkness)	8 5 arr & 5 dep (2 using a tug) (2 arr & 2 dep during darkness)	9 (1 arr & 1 dep during darkness)	6 (1 arr & 1 dep during darkness)	
Check trips	2	2	2	2	2 1 arr 1 dep
Check trips	3 1 arr, 1 dep & 1 berthing without a tug	3	4	3	2 1 arr 1 dep
Radar and ARPA course	Yes	Yes	Yes	Yes	Yes

Bridge Resource Management		Yes	Yes	Yes	Yes
Simulator course or Ship Handling Course		Yes	Yes	Yes	Yes
Marine Pilots Training Course				Yes	Yes
Workplace trainer / assessor					Yes

Source: MSQ (2016 requirements)

Sources and submissions

Sources of information

The sources of information during the investigation include:

- the crew of Madang Coast
- the Port of Townsville pilots
- the Regional Harbour Master for Townsville
- the Australian Border Force
- the Port of Townsville
- Maritime Safety Queensland.

References

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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.

Submissions were received from the pilot, the Australian Maritime Safety Authority, Maritime Safety Queensland and the Port of Townsville. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

The 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.

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 (e.g. engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, current risk controls and organisational influences.

Contributing factor: a 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 factor would probably not have occurred or existed.

Other factors that increased risk: a safety factor identified during an occurrence investigation, which did not meet the definition of contributing factor but was still considered to be important to communicate in an investigation report in the interest of improved transport safety.

Other findings: 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.

Australian Transport Safety Bureau

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Research

ATSB Transport Safety Report
Marine Occurrence Investigation

Contact with wharf by *Madang Coast*
Port of Townsville, Queensland, on 16 November 2015

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