**Marine Safety Investigation**

**Report No 2007 / 04**

Collision

MT Gan Voyager and

Beacon 46

River Yarra

22 March 2007



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# THE CHIEF INVESTIGATOR

The Chief Investigator, Transport and Marine Safety Investigations is a statutory position established on 1 August 2006 under Part V of the *Transport Act 1983*.

The objective of the position is to improve public transport and marine safety by independently investigating public transport and marine safety matters.

The primary focus of an investigation is to determine what factors caused the incident, rather than apportion blame for the incident, and to identify issues that may require review, monitoring or further consideration. In conducting investigations, the Chief Investigator will apply the principles of ‘just culture’ and use a methodology based on systemic investigation models.

The Chief Investigator is required to report the results of investigations to the Minister for Public Transport and / or the Minister for Roads and Ports. However, before submitting the results of an investigation to the Minister, the Chief Investigator must consult in accordance with section 85A of the *Transport Act 1983*.

The Chief Investigator is not subject to the direction or control of the Minister(s) in performing or exercising his or her functions or powers, but the Minister may direct the Chief Investigator to investigate a public transport safety matter or a marine safety matter.

# **1. EXECUTIVE SUMMARY**

On 22 March 2007 the Bahamian registered tanker Gan Voyager with a pilot on board arrived at the Port of Melbourne from Geelong to berth at Holden Dock in the River Yarra.

The normal berthing procedure for tankers at Holden Dock is to manoeuvre the vessel upstream past Holden Dock, swing around in Holden Dock swinging basin and then approach Holden Dock to berth starboard side to the berth and head facing downstream.

At about 0707[[1]](#footnote-1) when Gan Voyager approached the swinging basin, a thick blanket of fog descended on the river reducing visibility to less than 50 metres. The pilot attempted to stop Gan Voyager in the water and hold her steady until the fog lifted. At about 0710 whilst in the process of manoeuvring the vessel to a stop, Gan Voyager collided with beacon No 46.

The investigation found that the pilot and the master were temporarily disoriented due to the sudden onset of fog just as Gan Voyager was about to commence its swinging manoeuvre.

Since the incident Port of Melbourne Corporation has reviewed its procedures to address vessel operations including reporting requirements at various stages of visibility and intend to install fog sensors to monitor the onset of fog. Port Phillip Sea Pilots has also developed procedures for pilotage operations in restricted visibility. Since the incident, on two occasions pilotage services have ceased in conditions of restricted visibility.

The report recommends that the Port of Melbourne Corporation and Port Phillip Sea Pilots continue to develop procedures for vessel operations in restricted visibility and that the Bureau of Meteorology includes fog warnings in its marine weather broadcasts. The report also recommends that Marine Safety Victoria and Port Phillip Sea Pilots review the adequacy of blind pilotage training and check trips for pilots and pilotage exempt masters.

# **2. CIRCUMSTANCES**

## 2.1 Gan Voyager

The Bahamian tanker Gan Voyager with a licenced pilot on board departed the Port of Geelong at 0200 on 22 March 2007 destined for Holden Dock in the Port of Melbourne.

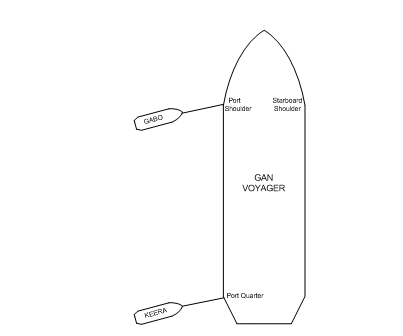
The vessel cleared the limits of the Port of Geelong without incident and arrived at Fawkner beacon in the Port of Melbourne at about 0600. Prior to arriving at Fawkner beacon, the pilot discussed the berthing procedure with Gan Voyager’s bridge team.

Gan Voyager’s bridge team consisted of the master, the fourth officer, the cadet, the helmsman and the pilot. The berthing plan was to manoeuvre Gan Voyager up the River Yarra past Holden Dock, then swing the vessel around in the Holden Dock swinging basin and return to Holden Dock to berth starboard side alongside the berth with the head facing downstream. (Appendix A)

At 0636 Gan Voyager called[[2]](#footnote-2) the Port of Melbourne Ship Management Centre (Harbour Control) to report that it was passing Breakwater Pier at Williamstown. At 0657 Gan Voyager passed under the West Gate Bridge and commenced reducing speed to minimum steerage.

The visibility at this time was moderate to good. There were intermittent patches of mist swirling through the river which on occasion reduced the visibility to between two and three nautical miles[[3]](#footnote-3).

At 0658 the tug Gabo was made fast at Gan Voyager’s port shoulder. At 0700 the tug Keera was made fast at Gan Voyager’s port quarter. At this time Gan Voyager was in the vicinity of beacons 39 and 40 and the master and the pilot observed a dark haze further upstream over Swanson Dock.



Gan Voyager passed the Holden Dock berth at about 0703. At about 0707 Gan Voyager was abreast of Yarraville (beacons 42 and 44) and had commenced lining up in Holden Dock swinging basin to start its turn when a thick blanket of fog descended, reducing visibility to less than 50 metres.

The pilot abandoned the manoeuvre to swing Gan Voyager and attempted to stop the vessel in the water and hold her steady until the fog lifted. At about 0710 whilst in the process of manoeuvring the vessel to a stop, Gan Voyager’s starboard shoulder collided with beacon No 46.

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**Image of Gan Voyager on Harbour Control’s AIS[[4]](#footnote-4) Display at about 0710 on 22 March 2007**

## 2.2 Consequences

Beacon 46 was sheared off its pile and sank. Gan Voyager had superficial paint scrape on its starboard shipside.

There were no injuries to personnel and no environmental damage or pollution.

# **3. FACTUAL INFORMATION**

## 3.1 Recorded evidence

At 0701 harbour control recorded the pilot’s VHF radio message to the tug masters “*gentlemen in case you have not noticed there is a bit of fog coming in we may have to do this rather carefully*”.

The AIS data indicates that Gan Voyager’s starboard shoulder collided with beacon 46 at about 0710.

Evidence obtained from harbour control’s AIS data indicates that Gan Voyager was travelling at a speed of about 1.4 knots in its approach to beacon 46 and at the time of contact with the beacon, still had a forward momentum of 1.2 knots. The vessel stopped soon thereafter, came back astern and then completed its swing to starboard.

## 3.2 Gan Voyager

### **3.2.1 The vessel**

MT Gan Voyager is a 29,348 gross registered tonne chemical / oil tanker registered in the port of Nassau in The Bahamas. At the time of the incident the vessel was classed with Det Norske Veritas (DNV). The vessel is owned by Gan-Voyager Co Ltd in The Bahamas and managed by Dunya Denizcilik ve Tic, A.S. in Turkey.

The vessel was built in January 2007. It has an overall length of 183.21 metres and a breadth of 32.2 metres. At the time of the incident the vessel’s static draught was 11.0 metres, even keel.

Propulsion is supplied by a Hyundai – B & W engine of 12,900 brake horse power[[5]](#footnote-5) driving a single, right hand 4-bladed propeller, giving the vessel a service speed of about 15.5 knots.

The vessel’s navigational equipment complied with the requirements of Chapter V of SOLAS 74 (the International Convention for the Safety of Life at Sea 1974). The list of navigational equipment interfaced with the Voyage Data Recorder (VDR) is included with the ship’s particulars in Appendix B.

This was Gan Voyager’s first visit to the Port of Melbourne. At the time of the incident, the crew was ‘on station’ for berthing the vessel. The second officer was stationed forward and the third officer was stationed at the stern.

### **3.2.2 The crew**

The master and crew of Gan Voyager were of Turkish nationality. All officers held appropriate and valid certificates of competency issued by the Prime Ministry Undersecretariat for Maritime Affairs of the Republic of Turkey, in accordance with the provisions of The International Convention on Standards of Training, Certification and Watchkeeping For Seafarers 1978 as amended in 1995 (STCW 95).

The bridge team have worked together on Gan Voyager since January 2007. This was the team’s first visit to the Port of Melbourne. All members of the team complied with the STCW requirements for rest in the days leading up to the incident.

As part of the berthing plan, the master was overall ‘in command’ and in charge of navigation, the fourth officer was in charge of position plotting and the cadet was bridge messenger. The second officer was stationed forward. The chief officer was not required to be on station as he was tasked with preparing the cargo discharge plan.

**Master**

At the time of the incident the master had about 19 years seafaring experience. He obtained his certificate of competency as Master (Foreign Going) in 1993 and obtained command of vessels similar to Gan Voyager in that same year.

At the time of the incident the master held a certificate of competency as Oceangoing Master.

**Second officer**

The second officer commenced his seafaring career in 2002. He has about 12 months service as second officer. At the time of the incident he held a certificate of competency as Oceangoing Chief Officer, which was issued in November 2006.

**Fourth officer**

The fourth officer commenced his seafaring career in 2002 and obtained a certificate of competency as Oceangoing Watchkeeper in March 2005. He was promoted to fourth officer in October 2005.

**The pilot**

The pilot is licenced by Marine Safety Victoria (MSV) to pilot vessels such as Gan Voyager in the Ports of Melbourne and Geelong.

The pilot has about 32 years of seafaring experience. He obtained a certificate of competency as Master (Foreign Going) in 1987 and obtained command of a vessel in September 1989. In April 1999 he obtained his pilot’s licence, issued by the Marine Board of Victoria and since then has been in continuous service with Port Phillip Sea Pilots (PPSP).

In October 2001 this licence was upgraded to “unrestricted” and since that time the pilot has been piloting vessels similar to Gan Voyager. He completed a ship simulator and ship handling course at Warsash University in Southampton, United Kingdom in August 2006.

The pilot was well rested prior to the incident. This was his first assignment following four days of rostered leave.

## 3.3 River Yarra

The River Yarra flows into the northern end of Port Phillip Bay. The Port of Melbourne is situated on the north side of Hobson’s Bay and within the entrance to River Yarra.

Appendix C is a reproduction of the relevant section of Navigational chart AUS 154. The Holden Dock berth designated for Gan Voyager lies about 650 to 700 metres upstream of the West Gate Bridge on the northern side of the river and the Holden Dock swinging basin lies about 550 to 600 metres further upstream, at the entrance to the Maribyrnong River. Holden Dock swinging basin has a declared diameter of 274 metres.

Beacon 46 marks the NE corner of the swinging basin. The Harbour Control tower is situated opposite beacon No 46, on the south side of the river.

## 3.4 Port of Melbourne Corporation

The Port of Melbourne Corporation (PoMC) is the port manager for the Port of Melbourne. PoMC is the owner of all land within port boundaries and is responsible for the port waters of Melbourne, pursuant to the *Port Services Act 1995* (Vic).

In accordance with the *Marine Act 1988*, PoMC must ensure that a harbour master licensed by MSV is at all times engaged for the port waters of Melbourne. The *Act* stipulates the extent of the functions and powers allotted to a harbour master.

All shipping movements within port waters are controlled by the harbour master through the Melbourne Shipping Management Centre (Harbour Control) and the Point Lonsdale Signal Station. The port uses a range of equipment to monitor ship movements including a Vessel Tracking System (VTS)[[6]](#footnote-6) radar incorporating Automated Identification System (AIS) and VHF radio as well as line of sight.

## **3.4.1 Function and power of the harbour master**

The *Marine Act 1988* states that one of the functions of the harbour master is to control and direct vessels entering and leaving port waters including the time and manner of doing so.

The *Act* also provides the harbour master with the powers to make directions with respect to vessels entering or within port waters. To this effect the harbour master has compiled the “Harbour Master’s Directions”, which all masters and pilots must adhere to. At the time of the incident the harbour master had commenced the process to review and update PoMC safe operating procedures for vessel operations.

The harbour master’s powers on a day to day basis are delegated to the duty shipping control officer at Harbour Control by MSV consent.

## 3.5 Marine Safety Victoria

MSV is the State regulatory authority responsible for the licensing of pilots and certification of pilotage exempt masters. Pilots are licenced in accordance with the Marine Board of Victoria *Code of Training and Licensing of Marine Pilots for Victorian Ports*. The Code was adopted in September 1999 and makes a number of references for applicants to obtain the “approval of the Board”. The Marine Board of Victoria (MBV) ceased to exist in February 2002 and the functions of the Board were transferred to the Director of Marine Safety.

Besides other requirements, the Code of Training requires applicants to complete a course in blind pilotage techniques using radar / ARPA[[7]](#footnote-7) simulation equipment prior to being granted a licence. The Code does not specify how recent the course should be.

The Code also specifies requirements to maintain the competency of the licence, which includes undertaking a ‘check trip’ at least once every 12 months. The Code does not specify the criteria to be evaluated on the check trip.

## 3.6 Port Phillip Sea Pilots

PPSP provides pilotage services to the Ports of Melbourne, Geelong and Hastings. Pilot selection and training is carried in accordance with the *Code of Training and Licensing of Marine Pilots for Victorian Ports*.

In addition to the training specified in the Code, PPSP has imposed its own regime of training. Within the first 12 months of their employment, pilots must complete a Bridge Resource Management (BRM) course, if they have not done so within the previous five years.

Pilots also undertake an Advanced Marine Pilots' Training course which includes Advanced BRM training and Blind Pilotage with particular emphasis on constant radius turns in zero visibility using radar only. These are initially conducted in the first year of a pilot's employment, and then at approximately three-yearly intervals.

Once every three years all pilots are required to attend a pilotage training course using either manned model or ship simulator. PPSP sends all pilots to a combined manned model / simulator course at Warsash University in Southampton, United Kingdom. The simulator section of the course is all blind pilotage (navigating solely by instruments) training.

## 3.7 Environmental conditions

The time of the incident was just after sunrise. The sky was overcast and at the time of the incident thick fog reduced visibility to about 50 metres. The wind was northerly at about four knots. The river was in ebb at about half a knot.

Harbour control reported that from about 0330 that morning, the river experienced pockets of mist but until about the time of the incident the visibility did not drop below two nautical miles.

### **3.7.1 The occurrence of fog**

The occurrence of mist or fog is due to the concentration of water vapour particles suspended in the atmosphere. If there is a sufficient amount of water particles suspended in the air, visibility may be reduced. This is called mist. The term ‘fog’ is used when visibility is reduced to less than 1,000 metres.

The formation of mist or fog in Port Phillip is typically around dawn. The Australian Government Bureau of Meteorology (BoM) statistics and PoMC records indicate that mist occurs frequently in Port Phillip, reducing the visibility to about two to five nautical miles. However, the port experiences fog rarely, only on about 10 to 15 days a year. The impact of fog can be isolated to small sections of the port area or be widespread across the bay. The duration of fog is extremely variable but on average is usually for not more than four hours.

### **3.7.2 Weather broadcasts**

The BoM has set up sensors at almost all airports and other crucial locations around Victoria to measure the amount of water vapour in the atmosphere. This information is used to assist in forecasting the probability of mist or fog occurring. Visibility forecasts are provided to aviation users and advice on the forecast range of visibility, the expected time of occurrence of significant reductions in visibility and the general geographical areas that could be affected.

Chapter V of SOLAS 74 specifies that contracting Governments undertake to warn ships of gales, storms and tropical cyclones by the issue of information and to issue at least twice daily, weather information suitable for shipping containing data, analysis, warnings and forecasts of weather, waves and ice.

At the time of the incident the BoM had not been requested to provide information pertaining to mist or fog and the expected visibility, for marine weather forecasts. However, the forecast for aviation advised of “*fog / low cloud patches southern land and adjacent sea, with isolated valley fogs in the north. Fog / low cloud contracting sea by 00Z[[8]](#footnote-8) and clearing by 03Z*”. This forecast covers all of Victoria, King Island and Flinders Island.

### **3.7.3 Bureau of Meteorology report**

Leading up to the incident, a high pressure system in the Tasman Sea resulted in light winds over Melbourne. During the afternoon and evening of 21 March 2007 a sea breeze increased moisture levels over the metropolitan area. Clear skies overnight combined with sufficient moisture resulted in areas of fog over the eastern half of Melbourne.

Observations taken at the BoM office in the city (Melbourne) indicate a haze forming at about 0300 increasing to mist at 0600. Between 0600 and 0900 fog (visibility less than 1,000 metres) was observed.

## 3.8 Other factual information

### **3.8.1 Pilot’s evidence**

The pilot stated that he boarded Gan Voyager at Geelong earlier that morning. The pilot was satisfied with the state of the vessel, its equipment and the cooperation of the master and crew.

During the voyage from Geelong to Melbourne the weather was fine and visibility was good. The pilot stated that he had not received any weather report warning that fog was expected. Until the time the vessel was in the vicinity of the West Gate Bridge, he had no reason to believe that there could have been fog developing in the area.

The pilot explained that when Gan Voyager was in the vicinity of West Gate Bridge, he noticed a dark haze over Swanson Dock. He stated that he had an instinctive feeling, having worked in the Port of Melbourne for about 18 years, that there was fog in the air. Gan Voyager had just made fast the tugs and the pilot recalled advising them on the VHF marine radio “*we have to do this rather carefully……*”. He states that this was a purely intuitive feeling at that time.

The wind was blowing from the northerly direction, so the pilot expected the haze over Swanson dock to drift in the southerly direction and not to interfere with the progress of Gan Voyager, which lay further to the west.

On approaching the turning basin the pilot positioned himself on the port bridge-wing. The pilot’s intended manoeuvre (see Appendix A to follow the sequence) to swing Gan Voyager around in the swinging basin was:

(1) when the vessel was between beacons 39 and 40, to head directly towards beacon 46;

(2) to stop the vessel when the bow was about 50 to 60 metres off beacon 46; and

(3) with the assistance of the tugs, turn the vessel around to starboard.

Whilst swinging around, the pilot would, from his position on the bridge-wing, maintain beacons 46 and 48 in a line. This would give Gan Voyager a clearance of about 40 metres forward and at the stern whilst swinging around. If necessary, he would manoeuvre the vessel by using the engines ahead or astern, to maintain the beacons in a line.

The pilot stated that when Gan Voyager passed Holden Dock the visibility was still satisfactory. However, when the vessel’s bridge was abeam of beacon 44, a thick blanket of fog descended. The pilot said he could see diffused lights off Yarraville wharf but could not estimate their distance from the vessel. He could not sight any physical features around him. He estimated that the visibility was about 50 metres.

The pilot had to immediately translate his last visual bearings to memory whilst orienting himself to ‘blind pilotage’. The pilot stated that his first intention was to stop all headway and to hold Gan Voyager steady with the help of the tugs. He ordered an astern movement on the vessel’s engines and ordered the tugs to ‘pull back’ on Gan Voyager.

When the pilot sensed that Gan Voyager had stopped, he ordered the engines to be stopped. At that moment there was a slight break in the fog. The forward tug reported sighting beacon 46 about 60 metres ahead and closing. The pilot attempted to manoeuvre Gan Voyager’s bow to starboard using the forward tug to push ‘full forward’ to clear the beacon. Fog set in again obscuring the pilot’s vision.

At about this time the second officer reported that beacon 46 was sighted about 40 metres ahead on the starboard side and the distance was closing. The pilot then checked the GPS. The GPS vector indicated that Gan Voyager was moving in a direction approximately north-westerly at a rate of 0.9 knots.

The pilot decided not to go astern on the engines. He was concerned that the vessel could develop astern momentum which, if unable to check, would cause the vessel to run aground off Yarraville wharf. He instead ordered the aft tug to pull back on its line to reduce Gan Voyager’s forward momentum.

A short time later the forward tug informed him that it was in danger of running aground, so the pilot changed his order to the tug to lie alongside Gan Voyager and also try to pull back on its line. When the forward tug master reported that Gan Voyager was still likely to hit the beacon, the pilot then resorted to ‘full astern’ movement of Gan Voyager’s engines.

The pilot stated that due to the lack of visual cues vital when manoeuvring Gan Voyager at low speed and in a restricted area, he was unable to detect and stop the forward motion of the vessel, especially when in receipt of conflicting information from the vessel’s electronic charts, forward and aft officers, bridge team and his own senses.

Gan Voyager finally stopped in the water. When the pilot felt it was safe to do so, Gan Voyager then very slowly completed its turn. By this time the pilot was oriented with the navigational instruments and the fog had lifted just sufficiently for him to see his surroundings. The pilot reported that he then requested the forward tug master and harbour control to confirm if beacon 46 still lay in position. Both parties responded that the beacon was missing.

In his evidence, the pilot also stated that he received good cooperation from the crew of Gan Voyager and that the navigation equipment and the engines performed satisfactorily.

The pilot said that had he known fog was about to descend or if fog had descended just a few minutes earlier, he had a contingency plan to hold Gan Voyager steady ‘port side to’ at Holden Dock, and then complete the berthing manoeuvre once visibility improved.

The pilot also opined that docking / manoeuvring any vessel more so a heavy one in near zero visibility conditions is difficult due to the lack of accurate instruments in relation to the tolerances available. It would be difficult to train masters / pilots to manoeuvre in 50 metre visibility conditions other than to completely cease operations.

### **3.8.2 Master’s evidence**

The master’s evidence corroborated that of the pilot’s in that there was no forewarning that fog was about to descend. The master stated that when passing Holden Dock, the visibility was still clear, but he noticed a dark haze somewhere in the direction of the city.

The master stated that the haze appeared to travel towards the vessel and when in the vicinity of the turning basin, descended on Gan Voyager as thick fog. The visibility reduced to about 50 metres.

This was at about the time Gan Voyager was lining up to swing around in the basin. The master immediately ordered the officers stationed forward and at the stern to maintain a look-out and to call out the ‘clearances’. He then stationed himself at the radar / electronic chart display and commenced monitoring Gan Voyager’s progress.

The master stated that he provided position information to the pilot to assist the pilot’s manoeuvring of the vessel and kept relaying the clearances from the officers stationed forward and astern. At the time that Gan Voyager first commenced its swing to starboard the master noted on the ECDIS that Gan Voyager’s bow appeared to overlap beacon 46. He informed the pilot. The pilot ordered an astern engine movement.

In his evidence the master stated that he was satisfied that the bridge equipment and the engines operated normally. He stated that in his opinion the pilot demonstrated appropriate professionalism throughout the voyage.

The master also opined that had he known that fog was descending, being a fully laden tanker, he would have requested the pilot to lie off the berth at Holden Dock until the fog had lifted.

### **3.8.3 Tug Gabo, master’s evidence**

The master of the tug Gabo stated that he reported on duty the night before. Gabo was involved in a number of vessel movements through the night. The tug master stated that there was nothing unusual with the traffic or the weather throughout the night.

In his evidence, the tug master stated that the visibility at sea level was about three to five nautical miles. He stated that this phenomenon occurs at times in the river and was not cause for concern.

With regard to Gan Voyager’s movements, the tug master stated that Gabo made fast on the port shoulder of Gan Voyager just downstream of the West Gate Bridge. Tug Keera was made fast just upstream of the bridge and the pilot called to both tugs on the VHF marine radio “the fog is heavy so we will have to be careful” or words to that effect.

The tug master’s version of events also confirms that when passing Holden Dock the visibility was clear, but soon thereafter thick fog descended, reducing visibility to “about 50 metres”. The pilot asked the tug master if he could see beacon 46 to which he replied he could not. Shortly thereafter the tug master saw the beacon and reported to the pilot that Gan Voyager was about 60 metres from beacon 46 and closing.

The pilot ordered Gabo to “push full” on Gan Voyager’s port bow. The tug master then lost sight of beacon 46 on Gan Voyager’s starboard side. The tug master sensed that Gan Voyager was very close to the beacon and informed the pilot that Gan Voyager could run over the beacon. He reckoned that Gabo lay to the north-west of the beacon and very close to the shallow water so he then informed the pilot that Gabo risked running aground and therefore had to stop pushing and lie flat alongside Gan Voyager.

He stated that from his experience of performing similar movements in the port, it appeared that Gan Voyager’s speed was “slightly higher than normal”, and that the vessel was “a bit over to the north-west” when it approached the turning basin. Notifying the pilot at that stage was not an option as he did not want to distract the pilot during the manoeuvre.

After Gan Voyager had moved astern and stopped, Gabo was able to position itself perpendicular to the vessel and push the vessel around. When swinging Gan Voyager around, the tug master noted that beacon 46 was not in its designated position.

### **3.8.4 Shipping Control Officer’s evidence**

The Shipping Control Officer (SCO) on duty at harbour control stated that from about 0330 on the morning of the incident, the visibility was variable. There were pockets of mist appearing and disappearing but at no time did the visibility reduce to less than two nautical miles.

As the delegated harbour master, the SCO controls and monitors the movement of traffic and has overall responsibility for safe shipping movements within Port of Melbourne waters. When requested by vessels, the SCO will relay the weather reports and prevailing weather and tidal conditions. The SCO did not believe that there was anything untoward with the weather conditions that morning, until the time fog descended.

The SCO also stated that until the time fog descended, there was no query from vessels regarding the state of visibility in River Yarra or in Port Phillip.

In his evidence, the SCO stated that he observed Gan Voyager approaching. It was still clearly visible as it passed under the control tower. Then, fog descended and the vessel could not be seen. The SCO said that Gan Voyager was again briefly visible just as it was beginning to swing around, then it disappeared in the fog.

The SCO observed on the AIS display that Gan Voyager appeared to have run over beacon 46, but at that stage the SCO deemed it prudent not to interfere with the manoeuvres of the pilot.

The fog lifted again, just as Gan Voyager completed its turn and was headed towards its berth. At that time the pilot called harbour control to ask if beacon 46 was still visible. The SCO verified that the beacon appeared to be missing and relayed that information back to the pilot.

## 3.9 Incidents in restricted visibility

The investigation has found that in the 12 months prior to this incident, there have been four other reported vessel incidents in restricted visibility resulting in one grounding, one collision with a wharf, one collision with a beacon and one vessel experienced navigational disorientation when outbound at the Heads.

# **4. ANALYSIS**

## 4.1 The incident

On the morning of the incident, the occurrence of intermittent patches of mist swirling through the river reduced visibility to between two and three nautical miles. This phenomenon is not unusual and was not considered alarming.

In this incident, fog set in at a critical time when the Gan Voyager was lining up to swing around in a very limited space. Without any visible markers, a speed of 1.4 knots in absolutely still conditions may go undetected, unless there is close monitoring of the electronic navigation equipment.

On approaching the turning basin, the pilot positioned himself on the port bridge wing. Gan Voyager’s GPS and VDR were situated inside the wheelhouse and did not have repeaters in the bridge wings. The pilot therefore relied on his “senses” and information relayed by the master to determine that the vessel had stopped.

At the onset of fog the master positioned himself at the VDR display and relayed positional information to the pilot. However, the pilot and master had less than three minutes from the onset of fog within which to orient themselves to blind pilotage, before collision occurred.

## 4.2 Predicting the onset of fog

Visibility sensors measure the existing visibility at a given location. Other parameters monitored by typical weather stations include wind, relative humidity, pressure, and rainfall amount. Predicting the onset of fog is a skilled science undertaken by trained meteorologists. To predict the likely onset of fog and its density, the meteorologist refers to a range of data for a number of weather parameters both in situ and for surrounding locations in addition to the information provided by the visibility sensors. These data include satellite imagery, cloud cover, wind speed and direction, relative humidity, minimum and maximum temperatures, upper atmospheric conditions and predictions from numerical weather prediction models.

Being informed of the prevailing state of visibility is beneficial to vessel operators and waterway managers in guiding their immediate decisions with regard to vessel movements. However, there is a need within the port to be able to obtain early warning of changing weather phenomena so as to be able to prepare in advance for contingencies.

The BOM provides such services to the aviation industry. In practical terms, shipping activity in any port cannot be conducted on the basis of information received from aviation forecasts. Therefore, as in location specific aviation forecasts, the BOM can extend its service to provide location specific marine forecasts for ports, bays and coastal waterways.

## 4.3 Vessel operations in fog

Due to the infrequent occurrence of fog and its relatively short duration, the parties involved in the port operations systems did not consider fog to be a high priority risk when determining early warning requirements, additional instrument based navigation training or implementation of additional safety requirements. At the time of the incident both PoMC and PPSP did not have written procedures to address vessel operations in restricted visibility or under such circumstances when vessel operations must cease.

Evidence from pilots and masters indicate that some of them have experienced fog at some time when navigating in Port Phillip, whereas other pilots and masters have not experienced this phenomenon even after years of operation in these waters.

This incident, when viewed in conjunction with other incidents that have occurred in the previous 12 months highlights the need for more interaction between harbour control and vessels, to exchange pertinent information and to provide safety information.

Whilst it is acknowledged that the absolute accuracy of VTS information obtained through the AIS system cannot be guaranteed[[9]](#footnote-9), this is an additional source of information available for vessels, should they require it. In this incident, had Gan Voyager requested, harbour control would have provided information regarding its headway and position information, as observed on the VTS. However, in all cases the pilot has ultimate responsibility to decide which item / source of information he or she could most rely on.

Following this incident, PPSP have developed a safety management system which incorporates restricted visibility operations in various stages of restricted visibility. These safe operating procedures do not extend to pilotage exempt masters.

The investigation has not been able to establish whether other vessels operating in the Port of Melbourne with pilotage exempt masters have developed similar safety practices. In effect, this gives rise to two differing sets of safety standards for the port.

### **4.3.1 Blind pilotage**

Navigating and manoeuvring in fog requires a certain amount of expertise of the pilot and the master when relying solely on the vessel’s navigational instruments. This expertise in most cases can only be gained by frequent practice involving instrument navigation.

Masters must complete a short course in blind pilotage using radar / ARPA and ship simulator as part of the mandatory requirement to obtaining a certificate of competency. There is no requirement to attend subsequent refresher courses when revalidating the certificate, unless the master does not have the appropriate sea service.

PPSP internal training policy requires pilots to attend refresher courses every three years. Under the current system, PPSP will enrol a pilot in a blind pilotage course within 12 months of becoming licenced. In effect, a person may be licenced, having no blind pilotage experience within the previous 10 years and then be allowed to pilot vessels for 12 months including in fog, before attending a blind pilotage course.

The rare occurrence of restricted visibility combined with the current frequency of blind pilotage courses undertaken may not give a pilot or pilotage exempt master the opportunity to gain sufficient experience to become skilled in blind pilotage or the immediate transition from visual to blind pilotage.

The investigation has not been able to find evidence that pilots and pilotage exempt masters are being practically examined in blind pilotage / instrument navigation.

### **4.3.2 Limitations due to bridge equipment**

SOLAS 74 specifies the minimum standards required relating to bridge design, design and arrangement of navigational systems and equipment and bridge procedures. These standards address the tasks of the bridge team and the pilot in navigating the ship (that is, its passage through the water) rather than the specific task of manoeuvring the ship to / from its berth.

While all vessels comply with the minimum standards, there is significant difference in the operational limitations and controls of each vessel’s navigation equipment. Pilot’s have limited time to familiarise themselves with the limitations of each particular vessel’s navigation equipment in a very short period of time that they are on board.

This factor must be taken into account when analysing the pilot’s reaction time when switching from visual to blind pilotage. In most cases, the pilot will initially rely on the vessel’s bridge team to relay situational information from the vessel’s navigation instruments, until he has familiarised himself with the instrument controls.

### **4.3.3 Berthing as a team exercise**

Manoeuvring a vessel to / from a berth is a team exercise. It involves close coordination between the vessel, the tugs and, especially in times of restricted visibility, the port’s VTS if available. The pilot must have access to and receive all information pertinent to safe ship handling.

The Bridge Procedures Guide emphasises bridge resource management wherein the bridge team and the pilot must provide / exchange all pertinent positional, navigational and situational information.

The pilot also has to contend with the particular manoeuvring characteristics of the vessel, which differ from vessel to vessel. The dimensions of the vessel, its weight and the power of the engines affects how the vessel will manoeuvre, turn, gain momentum or stop.

This incident highlights the need when berthing a vessel, for a coordinated approach by all parties to complement the skills and knowledge of the pilot. When requested by the pilot, bridge resource management could be extended during berthing manoeuvres to include information input from tug masters and harbour control.

This interaction becomes even more crucial in restricted visibility when navigational dangers are not readily visible from the bridge of the vessel.

## 4.4 Pilotage check trips

Pilots are licensed in accordance with the Code of Training and Licensing of Marine Pilots for Victorian Ports; and Pilot Exempt Masters are certified in accordance with the Code of Training and Certification of Pilot Exempt Masters for Victorian Ports. Both Codes have specified that every pilot and every pilot exempt master shall, at intervals not exceeding 12 months, undertake one trip with a check pilot who will assess the ongoing competence of the pilot / pilot exempt master, and if such is below the specified / expected standards, the check pilot shall provide a report to MSV.

The reason for the check trip is to ensure that MSV can be satisfied that the pilot / pilot exempt master has maintained his / her ongoing competence to navigate a vessel safely in / out the port. However, neither Code specifies what action will be taken should ongoing competence not be satisfied during the check trip. The investigation was provided with verbal evidence on what may be checked on a check trip but was not provided with any evidence regarding the consistency of observations of the pilot / pilot exempt master or the circumstances prevailing during the trip.

In addition, ongoing competence is checked on that one trip only and in the circumstances / weather conditions prevailing at that time. This could mean that a pilot / pilot exempt master has been checked in clear visibility, calm seas and minimum traffic conditions. In effect, a pilot / pilot exempt master may never be checked in adverse conditions, unless an effort is made to check their competence in those conditions.

Following the incident, PPSP has developed a check list titled ‘Pilot Check List Report’ to provide for consistency of observations during check trips. This check list is an internal document used for pilot check trips only. It lists the criteria for observation and the conditions under which the pilot’s competence is checked. Presently there is no indication that the check pilots will avail themselves of this check list when observing pilot exempt masters.

The investigation has identified a gap in the standards being applied to pilots as opposed to pilot exempt masters, in that PPSP has developed and implemented safe operating practices for pilots in varying conditions of visibility and that pilots are being checked off against specific criteria during the check trip. The investigation has not been able to establish whether pilot exempt masters are subject to the same stringent standards.

# **5. CONCLUSIONS**

## 5.1 Findings

1. The Port of Melbourne Corporation does not have the facilities to predict the onset of fog.

2. The Bureau of Meteorology does not broadcast fog / mist warnings for coastal and port waters.

3. The occurrence of fog in the Port of Melbourne occurs about 10 to 15 days a year and usually lasts for not more than four hours.

4. Pilots in the Port of Melbourne have limited opportunity to improve their instrument navigation skills.

5. Pilots are not practically examined in blind pilotage / instrument navigation however Port Phillip Sea Pilots have identified and initiated additional simulator / manned model training for pilots.

6. Port Phillip Sea Pilots and Port of Melbourne Corporation procedures do not address vessel operations in various stages of restricted visibility.

7. The Marine Board of Victoria Code of Training and Licensing of Marine Pilots for Victorian Ports does not specify the criteria for evaluation of pilotage check trips.

## 5.2 Contributing factors

1. The onset of fog was unexpected, causing the pilot and the master to become disoriented at the critical time when Gan Voyager was about to start its swing.

# **6. SAFETY ACTIONS**

## 6.1 Safety actions taken since the event

1. Port of Melbourne Corporation is drafting policy to address vessel operations in restricted visibility including reporting requirements by vessels in restricted visibility.
2. Port of Melbourne Corporation is currently trialling a fog sensor at Breakwater Pier and subject to satisfactory performance intends to install additional sensors within the port, including Fawkner Beacon and Swanson Dock.
3. Port of Melbourne Corporation and Marine Safety Victoria are in the process of finalising the standards for a Vessel Traffic Services system, which will assist harbour control to be more proactive with navigational information provided to vessels.
4. Port Phillip Sea Pilots has developed a Pilotage Safety Management System which addresses restricted visibility operations and the criteria to be evaluated on pilotage check trips (Pilot Check Trip Report).
5. Port Phillip Sea Pilots has commenced equipping pilots with a personal laptop computer with electronic charts and GPS software installed. The computers can be plugged into the ship’s AIS system as an additional navigational aid so that the pilot can have his own familiar electronic navigation and manoeuvring reference.
6. Following this incident, Port Phillip Sea Pilots has ceased vessel movements when visibility is severely reduced.

## 6.2 Recommended safety actions

**RSA 2007014**

Bureau of Meteorology should broadcast mist / fog warnings in its marine weather reports to ports, bays and coastal areas.

**RSA 2007015**

Marine Safety Victoria and Port Phillip Sea Pilots should review the adequacy and frequency of blind pilotage training and examination.

**RSA 2007016**

Marine Safety Victoria should adapt and implement Port Phillip Sea Pilots’ “Pilot Check Trip Report” for pilotage exempt masters check trips.

**RSA 2007017**

Port of Melbourne Corporation and Port Phillip Sea Pilots should review the circumstances under which it may be necessary to temporarily cease vessel operations in the port. Any decision shall include the operation of vessels with pilotage exempt masters.

**RSA 2007018**

Marine Safety Victoria should review and update the Marine Board of Victoria Code of Training and Licensing of Marine Pilots for Victorian Ports with regard to the applicable time frame for radar / ARPA simulation and other short courses before being granted a licence, frequency of blind pilotage training and examination and the criteria for pilotage check trips.

# **7. APPENDIXES**

## Appendix A - Holden Dock and Beacon 46

Excerpt from navigational chart AUS 154

A map shpwing the Yarra River, including the Holden dock and Beacon 46. The map provides instructions for reaching a berthing position at Holden dock:
1. When abreast becons 39-40, head directly towards beacon 46
2. Stop vessel 50 to 60 metres from beacon 46
3. Swing vessel to starboard keeping the bridge in transit with beacons 46 and 48
4. Continue swinging to starboard maintaining the beacons in transit
5. Final berthing position at Holden dock

## Appendix B - Gan Voyager ship particulars

IMO Number 9314911

Flag Bahama

Port of Registry Nassau

Classification Society DNV

Ship Type IMO II Chemical / Oil

Builder HMD Shipbuilding Co, Ulsan

Year built 2007

Ship Manager Dunya Denizcilik ve Tic. A.S., Turkey

Gross Tonnage 29,348

Net Tonnage 12,036

Light Displacement 9,579 tonnes

Length Overall 183.21 metres

Moulded Breadth 32.20 metres

Moulded Depth 18.80 metres

Distance Bridge to Bow 149.80 metres

Distance Bridge to Stern 33.41 metres

Height of Eye Bridge 34.27 metres above the keel

Voyage Data Recorder JRC, JCY-1700, MB41877

The following navigational equipment is interfaced with the VDR

Marine Radar X band 3cm JRC, JMA-9922-6XA

Marine Radar S band 10cm JRC, JMA-9932-SA

Gyro Compass YOKOGAWA MKR050

Auto Pilot Unit YOKOGAWA PT 500

Course Recorder YOKOGAWA MKR101A

AIS Controller JRC,JHS-182

Echo Sounder JRC, JFE -582

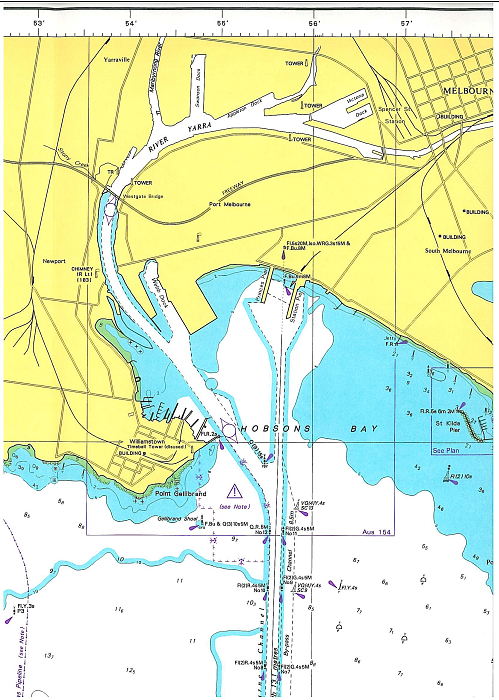
VHF DSC Radio Unit JRC,JHS-32B DSC

Speed Log JRC,JLN-205

GPS Unit JRC,JLR-7700 MK II

## Appendix C - River Yarra

Excerpt from navigational chart AUS 155



1. All times are denoted in Australian Eastern Daylight Saving Time (UTC + 11 hours). [↑](#footnote-ref-1)
2. All communication between the vessel, harbour control and the tugs was by VHF marine radio. [↑](#footnote-ref-2)
3. 1 nautical mile is 1.852 kilometres. [↑](#footnote-ref-3)
4. Automatic Identification System, which is integrated into the Port of Melbourne’s Vessel Tracking System (VTS). [↑](#footnote-ref-4)
5. About 9,623 kW [↑](#footnote-ref-5)
6. As referred to in Port of Melbourne’s ‘Operations Handbook’. [↑](#footnote-ref-6)
7. Automatic Radar Plotting Aids. [↑](#footnote-ref-7)
8. 00Z = 0000 UTC or 1100 local time. [↑](#footnote-ref-8)
9. The accuracy of VTS information depends on the accuracy of the vessel’s dimensions including position of AIS antenna provided to the VTS and the accuracy of AIS data depends on the accuracy of the information being input from the vessel’s navigational instruments. [↑](#footnote-ref-9)